



Abstract book
17th BCSWomen Lovelace Colloquium
Host University: University of Liverpool
4th April 2024

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Note: for environmental reasons the programme is pdf only, so you won't find a printed version of this at the event.

If you want to find a particular student's abstract, check out the [index at the end](#).

Welcome

Welcome to the BCSWomen Lovelace Colloquium 2024. The event is a single-track event which means there's basically one place everyone should be at any one time. This makes it easy for you to work out what you should be doing - just check the [Programme](#).

Talks are happening in Lecture Theatre A, and the rest of the event is happening around and about in the same building - either the atrium or some workshop rooms. You'll find prayer rooms, quiet space and general chatting-to-other-people space around the venue. You'll also find lots of companies here with interesting projects, friendly people and maybe even jobs so be sure to talk to our sponsors and stallholders.

I hope you all have a great day. We've been really impressed by the work we've seen, I hope you will be too!

Safia Barikzai, Munira Raja, and Hannah Dee

Colloquium Chair, Local Chair, and Deputy Chair 2024

Programme

09:00 - 10:00 Registration

10:00 - 10:10 Welcome remarks

10:10 - 11:00 Keynote speaker: Prof. Carron Shankland, University of Glasgow

11:00 - 11:30 Tea / coffee refreshments

11:30 - 12:00 Invited speaker: Tafie James-William, Ocado Technology

12:00 - 12:30 Invited speaker: Jen Fenner, DefProc

12:30 - 14:30 Lunch and Poster sessions

(Students must stand by their posters at specified time slots below)

13:00 - 13:20 - Poster session A (1st Year students)

13:20 - 13:40 - Poster session B (2nd Year students)

13:40 - 14:00 - Poster session C (3rd Year students)

14:00 - 14:20 - Poster session D (MSc students)

14:30 - 15:00 Invited speaker: Taps Mtutu, SEO London

15:00 - 15:30 Invited speaker: Dr Gabriella Pizzuto, University of Liverpool

15:30 - 16:00 Tea / Coffee refreshments

16:00 - 17:00 Panel discussions

17:00 - 17:30 Prizes & closing remarks

18:00 - 20:00 Social

Speaker bios

Keynote speaker: Prof Carron Shankland, University of Glasgow

Where am I? Where are you? Representation of women in AI-generated images

Carron has just retired as a Professor at the University of Stirling having worked there since 1996. She's taught widely across computing subjects (programming language design, modelling, computability, systems and networks, user experience), and carried out many, many administrative and leadership roles (from local seminar organiser, to deputy head of school). Her research is mainly on understanding the behaviour of biological systems through mathematical and computational models, and on inclusion in computing, latterly with a bit of data science too. Carron is looking forward to having more time to promote diversity and inclusion in computing, but also to having more time to create art, make music, tend the garden, and go travelling with her partner Pat in their van. In 2016 Carron was one of twelve women in Computing and Mathematics to receive a Suffrage Science Award, recognising both scientific achievement and ability to inspire others, especially in the area of women in STEM. Carron also promotes mental wellbeing in academia, and this led to receiving the first Scottish Women's Award for services to science and technology in 2017.

Tafline James-William, Ocado Technology

Robotics Simulation at Ocado Technology

Tafline James-William is an accomplished software engineering team lead and development manager with over 18 years of experience offering expertise in technical, project, people, and data management across Robotics, Simulation, Data Warehousing, BI, and Big Data Architecture domains. An outstanding academic background with a First Class in Computer Engineering and a University rank with a Chevening scholarship brought her to Imperial College, London where she acquired her master's degree in Advanced Computing. Possessing a strong passion for leadership and an outcome-driven mindset, Tafline has consistently delivered exceptional results throughout her career working for companies like ClarityBlue, Experian, Sky, and Ocado. She is currently working in Ocado as an Engineering Team leader managing the Robotics Simulation team in the Advanced Technology Stream. In addition to her technical prowess, Tafline excels in cultivating a positive and collaborative work environment. By leveraging her strong leadership skills, she radiates positive vibes and has fostered highly productive and motivated teams that consistently exceed expectations. Her ability to inspire and empower team members has resulted in the successful completion of numerous projects.

Jen Fenner, DefProc**IoT in Action: Scaling Solutions with Intelligent Sensors and Real-Time Data Utilisation**

Jen Fenner is the managing director and co-founder of DefProc Engineering. She has over a decade of experience planning, scheduling and delivering client projects across various industries. Jen helps individuals, educators, and businesses develop their ideas to create exciting and innovative products that positively impact the world.

Taps Mtutu, SEO London**Personal Branding**

Taps Mtutu is Head of Partnerships at SEO London. Taps has worked in student programmes and recruitment for 18 years where DE&I is always a focus and has now joined SEO to continue that work with students. Taps started at SEO London in January 2021 and has expanded existing programs such as Corporates and Consulting. She launched the new Flagship Insurance Program and Tech Developer programme. Taps is working on deepening the impact with and engagement with our sponsors and also looking after fundraising. Taps is from Zimbabwe, moved to the UK after university in South Africa. She lives in London with her partner and two small children. Taps loves being fit and active and completed the half marathon with SEO London in October 2021.

Dr Gabriella Pizzuto, University of Liverpool**Creating the Next Generation of Intelligent Robotic Systems**

Dr Gabriella Pizzuto is an interdisciplinary researcher in robotics and applied machine learning, a Lecturer (Assistant Professor) in Robotics and Chemistry Automation and a Royal Academy of Engineering Research Fellow at the University of Liverpool. Within her group, Gabriella is developing new methods for creating the next generation of robotic scientists. Previously, Gabriella worked as a senior postdoctoral research associate on the ERC Synergy Grant 'Autonomous Discovery of Advanced Materials' and as a postdoctoral research associate at the Edinburgh Centre for Robotics on the EPSRC NCNR project. Gabriella obtained her PhD in computer science from the University of Manchester in 2020, where she was also a Marie-Skolodwska Curie early-stage researcher. Working as part of the DCOMM European training network, Gabriella collaborated with other European researchers in the consortium on

different interdisciplinary projects and developed expertise in improving the vision and language modules of the iCub humanoid robot. Throughout her PhD, she strengthened her research experience in robotics and applied machine learning as a visiting scholar at the iCub facility (Italian Institute of Technology) and the Institute of Perception, Action and Behaviour (University of Edinburgh) respectively.

Thanks to sponsors, partners and supporters

There are a lot of organisations to thank - putting on an event of this size takes a lot of time, effort and money, particularly as we pay for student travel in many cases.

The following companies have contributed funds to support the event:

Gold Sponsor

Our gold sponsor is [Ocado Technology](#), who have been a great help with the event and have also provided a superb speaker for the third year running.

Silver Sponsor

Our Silver Sponsor this year is [The Alan Turing Institute](#).

Bronze sponsors

Our bronze sponsors are:

- [Open Bright Foundation](#)
- [Proctor and Gamble](#)
- [RS Group](#)

Prize sponsors

- JP Morgan Chase
- Science and Technology Facilities Council (STFC)
- Oxford University's AIMS CDT

Exhibitor Stalls

- Ocado Technology
- The Turing Institute
- Open Bright
- JP Morgan Chase
- STFC
- Oxford University AIMS CDT
- RS Components
- Proctor and Gamble
- SEO London
- BCS & BCSWomen

Additionally there will be stalls/information from supporter institutions (London South Bank, Sheffield, Bath, Liverpool and Aberystwyth) who may have postgraduate opportunities.

These University Partners have contributed towards the running of the day financially or in-kind at Platinum (£3500), Gold (£2000), Silver (£1000) or Bronze (£500) levels:

- London South Bank University (Platinum)
- Aberystwyth University (Gold)
- University of Liverpool (Gold)
- The University of Bath (Gold)
- The University of Sheffield (Gold)
- University of Warwick (Silver)
- University of Southampton (Silver)
- Aston University (Bronze)
- City, University of London (Bronze)
- University of York (Bronze)
- University of Edinburgh (Bronze)

Additionally these supporter universities have pledged to cover the travel of their own students:

- Aberystwyth University
- Durham University
- Edinburgh Napier University
- King's College London
- London South Bank University
- The University of Bath

- Manchester Metropolitan University
- Nottingham Trent University
- University of Birmingham
- University of Glasgow
- University of Leeds
- University of Liverpool
- University of Southampton
- University of Stirling

Thanks are also due to the following individuals

Liverpool organising team

Munira Raja, Floriana Grasso, Nicola Gilmore

National organising team

Safia Barikzai, Matthew Barr, Amanda Clare, Hannah Dee, Lucy Hunt

Speakers

Carron Shankland, Taflin James-William, Jen Fenner, Taps Mtutu, Gabriella Pizzuto

The Poster Judges:

Pin Shen Teh, Dominika Bennani, Claire Storey, Adriana Wilde, Revena Sanghera, Yazou Liu, Patrick Benjamin, Alexandra Stanhope, Radhika Gudipati, Claire Knights, Yesha Purohit

The Abstract Reviewers:

Pamela McGee, Wendy Yanez Pazmino, Hannah Dee, Annalies Gibson, Matthew Barr, Alice Ashcroft, Emily Winter, Miriam Sturdee, Edel Sherratt, Alexandra Stanhope, Munira Raja, Floriana Grasso, Carron Shankland, Neil Walkinshaw, Amanda Clare, Praboda Rajakaksha, Phillipa Ryan, Seth Bullock, Carol Long, Pin Shen Teh, Roger Boyle, Ed De Quincey, Tom Deakin, Maria Luisa Davila Garcia, David Smith, Samiya Khan, Nashid Alam, Tina Eager, Gail Ollis, John

Power, Emma Duke Williams, Cigdem Sengul, Adriana Wilde, Helen Harman, Rebena Sanghera, Safia Barikzai

BCS, The Chartered Institute for IT

Jon Jeffery, Mandy Bauer

All the other helpers, including Daniel Williams, Eleni Batziou, Fatma Elhouni, Flavia De Araujo E Castro Alves, Reham Alharbi, Sahar Alzahrani, Evelyn Amu, Rupal Dsouza, Ayesha Irfan, Jyothi Jaiswal, Jennifer Kwakwa-Sarpong, Emma Giedra, Maadhyam Rawal, Asim Gul, Mohammed Hossain, Yesha Purohit, Aarbaz Alam, Ioannis Iatropoulos

Poster session information

Students must stand by their posters at specified time slots below:

13:00 - 13:20 - Poster session A (1st Year students)

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13:40 - 14:00 - Poster session C (3rd Year students)

14:00 - 14:20 - Poster session D (MSc students)

This year we are judging in advance, and so the poster presenters do not have to wait for a judge to come around. This is in response to student feedback, and we hope this will make poster sessions more relaxed and less stressful.

For those interested in the judging process:

We had 215 abstract submissions, which were reviewed by about 40 reviewers. No reviewer looked at an abstract from their own institution or one they're linked with, and all abstracts were anonymised before review and de-anonymised after the final decisions were made.

Judging has not been done anonymously (students have their name and affiliation on their posters) however we ensure that nobody can judge a contest that has one of their students in. This means that some universities can't provide judges at all, as they have students in every category.

Poster abstracts

First year or foundation year

The Role of Social Media During Crises (1.01)

Aimen Faisal Manchester Metropolitan University

In this digital generation, social media has surfaced as a vital force in crisis communication, reshaping the way people connect, share information, and find solace. The transformation began after the 9/11 attacks when social media platforms became central in broadcasting real-time information and expressing solidarity. During the COVID-19 pandemic, social media played a rewarding role in connecting individuals who were isolated, offering a platform to share experiences and creating a sense of unity. Unlike traditional channels, social media's immediacy, and ability to handle large traffic surges ensured continuous connectivity when it mattered the most. Moreover, social media also empowered individuals to act as citizen journalists, offering diverse perspectives and real-time updates that traditional media would not capture as swiftly. Beyond being an information-sharing tool, social media proved to be an invaluable asset during the crisis, promoting active engagement and delivering valuable emotional support during times of uncertainty. While social media is imperative in connecting people and delivering updates, it struggles with the spread of unreliable information, leading to misrepresentation and panic which emphasises the urgency of refining social media's role in crises. A closer inspection of solutions to improve communication reliability is needed which can be executed by exploring past experiences and current global wars so that actionable strategies can be established to enhance the effectiveness of media in managing crises, focusing on accurate information distribution and moderating misinformation.

The danger of political trends: An examination of social media recommendation algorithms. (1.02)

Amber Bellamy University of Bath

Social media has provided a platform for entertainment and communication since its creation. However in recent years, social media has become a forum for political and sociological debate. Platforms such as TikTok, Instagram and X (formerly known as Twitter) have provided awareness to social movements and political issues. In June 2020, Google saw a massive spike in searches for the Black Lives Matter movement which has since declined, regressing to levels observed before the spike. Similarly, Google searches for the topic of Palestine have recently spiked and are already beginning to decline. Whilst awareness can be beneficial, the structure of social media platforms encourages these issues to become trends, thus resulting in considerable ignorance as users move onto new trends. Social media companies have gone as far as to hire psychologists and neurologists to make their platforms more addictive. The 'For You' and 'Explore' pages provide unique and highly personalised content through the use of artificial intelligence. However, the nature of these algorithms could cause the user to develop biased and/or damaging viewpoints, as content is consistently curated to their interests. There is concerning small ethical consideration of the power that these recommendation algorithms have to influence political opinion, and the damage that can be caused by encouraging the consumption of trends. Adjustment to the artificial intelligence that governs social media is necessary to expose users with a variety of perspectives and avoid topical issues from becoming trends that lose momentum rapidly.

Impacts of Internet Use on Attention Span (1.03)

Amy Northway *University of Warwick*

The impact of internet use on attention span should be a concern for educators and employers alike. Heavy social media use, specifically media multitasking, reduces a person's ability to focus for prolonged periods of time. This is especially prevalent in the younger generation: a study by Microsoft ('Attention Spans', 2015) found that 67% of 18-25 year olds find it difficult to stay focused on one task and 52% said they check their phone every 30 minutes, compared to only 6% of 65+ year olds. Consequently, there has been an increase in short form media available online. This type of content suits our short attention spans, but exacerbates the problem as we lose the ability to sit through longer videos and articles. Social media addiction and excessive consumption is encouraged by algorithms which are designed to keep users endlessly scrolling. Combined with persistent notifications, users are inclined to check their phone constantly and are easily distracted. Attention deficits can be harmful: poor focus and information retention causes decreased academic performance and productivity, but in a world that is so reliant on technology it is almost impossible to avoid using it. To combat this problem it is vital that we find new strategies to control screen time and be more conscious of the way we consume media.

Can Modern Technology Design Babies? A Look Into Genome Editing (1.04)

Begum Sultan Kaplanhan *Aberystwyth University*

Predicting technological trends in healthcare; it's anticipated that neuronal solutions will aid disabilities and that cell therapy will address rare diseases. It can be said that there will be a revolution in biotechnology in the coming years. One of the most heated debates on this subject is 'gene editing technology'. CRISPR is the leading technology that allows changing the amino acid sequence of the protein expressed by the gene, such as changing GUC to GCA; however, studying gene sequencing requires analyzing large data sets. Computer algorithms are critical to improving the efficiency and safety of gene editing processes, especially in the field of bioinformatics. This allows machine learning to analyze datasets and predict outcomes and trends so potential problems can be detected and repaired in advance. Previous studies created a computer model to identify the pathways of the gene targeted to be disabled or changed, it allows choosing from hundreds of possible combinations. Furthermore, through the collaboration of synthetic biologists and computer scientists, CRISPR can be transformed into a novel method for storing data. New projects are expected for this promising technology that pushes the limits of imagination. In conclusion, gene editing holds the potential for human enhancement but is fraught with ethical and technical challenges. The poster will examine the interplay between CRISPR technology and information technology, alongside the ethical implications of gene editing.

AI Goes to School: The Future of Learning (1.05)

Blanca Barrasa *University of Bath*

Generative Artificial Intelligence (AI) is having an extraordinary impact on education. However, this is just the beginning and its transformative potential is huge for the education sector. For teachers, AI offers a substantial reduction in the workload through its ease in automating tasks such as planning and grading exams. This can save them a significant amount of time which they can dedicate to teaching or other more important tasks such as building more personal relationships with students, something AI cannot do. For students, AI can function as a virtual tutor, offering tailored teaching and immediate feedback. This is not only efficient but also levels the playing field by offering extra learning support to those who might not have access to expensive private tutoring. While there are many advantages to the use of AI, it is important to understand how the reliance on it can also present challenges such as biases and inaccuracies. Ensuring controlled use of this new technology is essential, this could be done through regulations requiring companies to make sure their product provides accurate and fair results. Teachers and students should also be trained to get the most out of AI and to be aware of the risks surrounding it. The impact of AI goes way beyond education and touches all industries and aspects of people's lives. It will require the attention of policy makers and even international cooperation to make sure these systems are used in a manner that is safe, trustworthy and responsible.

Unlocking Nature's Blueprint: Machine Learnings Role in Rebirth and Reforestation, an Ecological Renaissance (1.06)

Charis Drain *University of Bath*

The world's intricate web of ecosystems has evolved over billions of years, made of complex food chains and plant-animal relationships. Deforestation has torn these apart leading to an ecological collapse and leaving apocalyptic scenes over our previously green belt. This makes rewilding and reforestation a daunting challenge. How could the human race replicate such intricacies in the short time left on the climate countdown? This research will work towards a solution by utilising machine learning to generate optimal reforesting schedules and plant selections which are tailored to an area's climate, topology and socio-economic needs. Can it be farmed, can it be a habitat, can it self-sustain? This research introduces a systematic approach to rebuilding ecosystems using a semi-supervised reinforcement learning algorithm. The algorithm will first use both labelled and unlabelled data, then optimize its behaviour based on feedback. Data from aerial imagery, soil samples and ecological surveys alongside information on wildlife habitats, plant synergies, potential and existing local resource uses will inform decision-making for efficient and self-sustaining reforesting. This result will help mitigate climate change through carbon capture, stopping the loss of biodiversity and reducing the risk of disease outbreaks associated with deforestation. Moreover, it will integrate local communities into the reforestation and environmental efforts by providing opportunities for sustainable employment such as regenerative farming. Overall, this research creates a transformative solution to the challenge of reforestation by combining ecological science with machine learning, to guide the regeneration of diverse and resilient ecosystems crucial for environmental health and human existence.

From Pixels to Emotions : Traversing the Impact of UX Design (1.07)

Che Ku Mushirah binti Che Ku Alam *University of Sheffield*

Have you ever abandoned a website while shopping due to difficulties in finding product information or navigating through the checkout process? Such frustrations highlight the crucial role of user experience (UX) in shaping consumers' emotions towards a product. UX encompasses the process of designing products that offer meaningful experiences to users. While earlier stages of website and app development prioritized usability, contemporary emphasis is also placed on visual design elements such as colour schemes, which play a critical role in establishing product identity. Consequently, integrating UX design has become essential. This is rooted in the understanding that humans are inherently emotional beings, and our emotions significantly influence decision-making processes, including product selection. Research indicates that a significant percentage of users are deterred from returning to a website or app due to poor user experience. Therefore, understanding and leveraging emotional responses in design can enhance user engagement and satisfaction. This goal of this work is to explore design strategies that influence human emotions, considering various levels of emotional processing.

The Growing Problem of Hardware Disposal (1.08)

Diane Tassin de Nonneville *Imperial College London*

Although there is increasing notice of the energy consumption of computers, which can emit up to 220kg of CO₂ a year - one aspect of their lifecycle is often ignored: their disposal. Used electronics by definition contain a battery or plug, the former of which can contain hazardous chemicals such as lead, beryllium, arsenic or mercury. This becomes a problem due to the sheer quantity of e-waste that is produced: on average 7.3kg a year per person, only 17.4% of which is properly disposed of. This illegal disposal not only has terrible environmental consequences, ranging from soil acidification and water toxification to crop contamination, it also impacts humans. Waste disposal workers, as well as the population living near illegal waste facilities where open-air burning and acid baths frequently occur, suffer higher rates of cancer, miscarriages, and neurological damage. This is surprising considering the numerous benefits of collecting said waste. Entire companies, such as BackMarket, are based on recycling e-waste. Metals in short supply, such as cobalt, are only being extracted 30% from e-waste when existing technology can get up to 95%. Recycling e-waste would also benefit the environment: metals are 80% less polluting when recycled than when mined. Why are we not doing this more? This poster will highlight the many harms of e-waste, and discuss possible solutions to address this growing problem.

AR Rescue: Revolutionising Disaster Management (1.09)

Emily Bayston *University of Derby*

As global warming continues to intensify, the frequency and severity of natural disasters rises, subsequently increasing the demand for effective mitigation and response strategies. Advances in augmented reality and scientific understanding encourage a transformative approach to the forecasting, monitoring, and situational awareness of disaster scenarios. The concept of utilising AR in disaster management offers a more streamlined technique to tackling the risks associated with such events, with a variety of methods and technologies already exist in the world today: examples of such include AR drones, remote assistance, and real-time information overlays over the physical environment – all in aid of elevating the decision-making process for emergency responders. This poster will address how the fusion of augmented reality and humanitarian effort can refine disaster management and contribute to safeguarding and resilience during actual crisis. Moreover, the poster will consider geolocation integration and AR-equipped drones, demonstrating how AR can mitigate the impacts of a disaster which extend beyond initial destruction, particularly through widespread awareness and visualisation. There is currently a lack of understanding on how to cope and prepare for a natural disaster; people’s growing fear and uncertainty escalate the already fatal consequences of such but by addressing the lack of education and awareness on disasters, the first obstacle to achieving adequate response strategies is quashed. Despite superficial provisions being put into practice, the repercussions of a natural disaster can still be catastrophic – but to what extent can AR rescue us?

Virtual Reality in Mental Health (1.10)

Emily Ramsdale *Southampton University*

1 in 8 people around the world struggle with a mental health condition with most not having access to appropriate or effective treatment [1]. But what if there was a way to use something trivial in a gaming environment and translate it to be one of the best ways these people could be helped? This is what Virtual Reality is capable of. Virtual Reality is where a computer-generated image rendered for each perspective of the user's eyes in a 3D dimension is applied to a headset tracking the user's position and orientation. In the past, this technology has been confined to video-gaming, however, although unconventional to use entertainment devices for medical treatment, Virtual Reality can provide immersible virtual environments that allow people to experience situations free from any risks or dangers that exist in the real world, which is one of the main struggles when working through mental health issues. These experiences are known to produce physiological changes similar to what would occur if they were experiencing it in real life, helping with conditions such as PTSD, anxiety, depression, paranoia, and phobias and possibly eradicating the need for a therapist input at all. In this poster, I aim to discuss the technology behind VR, how it first made it's appearance in medicine and therefore explain the potential of these devices in the improvement of mental health treatment. [1] World Health Organisation 'Mental disorders' <https://www.who.int/news-room/fact-sheets/detail/mental-disorders> (accessed 3rd February 2024)

Machine Learning and Obese Pregnant Black Women (1.11)

Francisca Omotola Aleshe *Sheffield Hallam University*

Obesity is one of the main causes of hypertension and cardiovascular disease, which unfortunately, Black people are highly prone to, not only because of higher levels of deprivation but also because of their genetic disposition. Obesity and hypertension are global issues which are of concern to both health professionals and stakeholders due to the strain on the essential services required to treat these health issues. Published figures show that 71% of black adults are either overweight or obese. Putting this into context, Black women of child bearing age, who are 4 times more likely to die in childbirth than their White counterparts, have higher incidence of obesity leading to hypertensive disorders of pregnancy, which are gestational and chronic hypertension and preeclampsia, showing racial disparities which need to be addressed. A dataset was produced from anonymised retrospective maternity data and machine learning used, to firstly determine the possibility of predicting hypertensive disorders. Once established, a subset was devised, to compare the predictive accuracy between Black obese and White obese pregnant women using 6 machine learning classifiers. Two predictive models were 97-98% accurate in their predictions in classifying the disorders in Black obese women. This is an important piece of work as the accuracy will enable education and individualised services be provided to women who actually need the care and change the way care is presently given.

From Mind To Machine : The impact of AI on individuals with paralysis (1.13)

Himani Patney *University of Bath*

Many aspects of the brain remain unknown due to its complexity and recently, neuroscientists have turned to computer science in an effort to unlock some of its mysteries. By using data collected from Brain-Computer Interfaces (BCIs) based on Artificial Intelligence (AI), neuroscientists hope to better understand the human brain. Technology has progressed beyond touch-based interfaces to the point where cerebral waves are now used as input. Neurotechnology systems called BCIs facilitate direct communication between the brain and an external device (Wolpaw JR et al., 2000). This implies that individuals can operate devices, such as computers, using their thoughts alone through the usage of BCI systems. Over the past two decades, significant advancements have been made in BCI technology, specifically tailored to benefit tetraplegic patients: individuals who have lost limb mobility due to head trauma or spinal cord injuries. Notable projects like 'Neural Signals Inc' and 'Brain Gate,' initiated by Philip Kennedy in the early 1990s, implant BCIs to allow individuals to control a computer cursor through brain activity (Kawala-Sterniuk et al., 2021). In BCI tech, AI algorithms decode brain signals for computer control. Using Machine Learning, BCIs learn and improve over time. This teamwork of AI and ML boosts real-time performance, offering promise for better human-computer interactions and aiding people with neurological conditions. While still in its infancy, this technology holds immense promise for restoring independence to paralyzed individuals, and exploring its potential presents significant benefits.

How 3D high-tech scanners are revolutionising medicine with non-invasive procedures (1.14)

Julia Andrea Martinez Hidalgo *Manchester Metropolitan University*

This abstract outlines the pivotal role played by 3D high-tech scanners in healthcare in an attempt to become more patient-friendly. The integration of 3D high-tech scanners is a revolutionary method of diagnosis, offering a paradigm shift away from invasive uncomfortable and expensive procedures. These scanners utilize advanced imaging technologies generating detailed three-dimensional representations of internal structures and providing information to healthcare professionals leading to diagnosis. By abolishing the need for invasive procedures such as biopsies or exploratory surgeries, these scanners reduce discomfort experienced by patients, decrease the risk of complications, and optimise the diagnosis process. These methods are becoming more relevant, and they can be seen in the NHS with the HeartFlow Scans. HeartFlow scans use a method called fractional flow reserve computed tomography (FFR-CT) which evaluates blood flow in the coronary arteries, making it an alternative to angiograms. Another essential feature of 3D high-technology scanners is the ability for early-stage disease detection. The diagnosis can come from identification of anomalies in organs or detecting abnormalities in cells, meaning these scanners aid doctors with comprehensive diagnostic information, enabling quicker interventions and personalized treatment plans. Moreover, the non-intrusive nature of this technology is particularly significant for vulnerable patient populations in the paediatric and geriatric fields, where minimizing physical stress is central for the patient's recovery and overall wellbeing. As these technologies continue to advance, the medical sector is acquiring new ground-breaking methods of diagnosis and treatment, where efficiency and comfort are prioritised to improve the standards of care.

In this digital chess game let's make sure the next move is ours. (1.15)

Karla Mihai *University of Glasgow*

In a period of fast technological growth, the influx of new threats needs novel solutions and cutting-edge technologies. The current landscape is critical to the evolution of software and technology. With each passing day, cybersecurity faces new problems, notably in the emerging field of artificial intelligence (AI). As AI grows popularity, it becomes the target of hackers looking to exploit its early weaknesses. However, let us turn the tide and strengthen our defenses. Emerging technologies like decentralized AI, quantum-resistant cryptography, and biometric authentication are paving the road for a safer future. We can keep ahead of possible attacks by investing in robust AI research and implementing advanced cybersecurity policies. Consider this: what if our AI systems could not only detect harmful activity but also outsmart hackers in real time? Consider an AI-driven cybersecurity scenario in which attacks are neutralized before they even appear. As we negotiate the complex web of AI, it is critical to address the negative aspects of its impact on media and public perception. Deepfakes and misinformation are severe challenges, but novel solutions such as blockchain-based media verification can restore faith in the legitimacy of information. Let us not dismiss these difficulties as mere science fiction; they require our attention. By encouraging collaboration among tech professionals, governments, and the public, we can shape a future in which technology is both transformative and secure.

'The Evolution of Automotive Design' (1.16)

Laiba Tahir *Manchester Metropolitan University*

The automotive industry has seen major improvements in technology, making cars safer, faster, more efficient, and more connected across various models. However, there's still a noticeable difference in how cars are designed for men and women. This means Some gender preferences and styles, for instance, women, might be ignored or overlooked. It's really important to consider different perspectives when designing cars, making it more inclusive for everyone. People have different needs for comfort and safety, whether they're driving a small city car, a family SUV, or a powerful sports car. Things like how seats fit and how easy it is to use technology in the car can make a big difference. If car designers think about everyone, they can create cars that are safer and easier to use for everyone, regardless of gender or the type of car they drive. This poster will show different types of technology in cars, their benefits, and why it's crucial to include everyone when designing cars and exploring current trends in the automotive industry. By making cars with everyone in mind, we can ensure safer and more enjoyable experiences for all drivers, no matter the type of vehicle they choose to drive and the different types of technologies in cars that have changed their way of driving and the car driving experience.

Self aware AI: pro or con? (1.17)

Lakshmi Ksheeraja Sikha *Cardiff University*

The advent of self-aware AI heralds a transformative era, offering both unprecedented advantages and formidable challenges. One notable advantage lies in its adaptability, enabling dynamic responses to changing environments. This trait, coupled with superior problem-solving capabilities, positions self-aware AI as a catalyst for breakthroughs in complex tasks. The prospect of enhanced human-AI collaboration further underscores its potential, fostering productivity across diverse fields. However, the promise of self-aware AI is accompanied by ethical and practical concerns. Questions about autonomy and rights arise, demanding careful consideration to prevent misuse. Unpredictability emerges as a key challenge, as the evolving nature of these systems complicates predictability, raising control and understanding issues. Job displacement is a looming disadvantage, necessitating societal adjustments to address employment implications. Additionally, security risks escalate, with adaptability becoming a double-edged sword that could be exploited maliciously. In this delicate balance between promise and peril, self-aware AI prompts a critical examination of ethical frameworks, societal impacts, and security measures. Navigating this landscape requires a nuanced approach to harness the benefits while mitigating the risks, ensuring a harmonious integration of self-aware AI into our evolving technological landscape.

'AI Thinks You're Gay': The Ethics and Consequences of AI Guessing Your Identity (1.18)

Maddie Plested *University of Bath*

Facial recognition has been a rapidly growing field in the last decade and the use of facial recognition has long been a controversial one. Although the creation of the 2017 Michal Kosinski's AI 'gaydar' was particularly notorious. The paper stated that the AI could identify someone's sexuality with 91% accuracy. This poster will explore how the AI works, relying on static labels assigned based on stereotypes, and the ethical consequences of creating such a program and the possible solutions. Within an ideal world this AI wouldn't be an issue, however in a world where homosexuality is punishable by death in some countries, it is not a risk we should be willing to take. Throughout history anonymity has been a powerful tool in keeping queer communities safe. While a wider data set could improve the accuracy teaching the AI to rely less on stereotypes and more on real data, it still doesn't remove the real-life risks. To maintain privacy the legislation needs to be kept up to date. There have been several campaigns calling for an outright ban of facial recognition, however most have been futile. Where legislation fails there have been projects such as nightshade within the art community, where they 'poison' a data set to render the recognition useless. Recognition technologies have expanded to include the tracking of gait and heart rate. If these technologies were implemented to generalise queer people's walks and monitor heart rates changes of same sex relationships, it could be potentially devastating to these communities.

Can Markov Random Fields predict your future? (1.19)

Madeleine Langdon-Morris *Durham University*

When we think of networks of people, families may come to mind, generational links outlining ancestry, friendships formed, and common settings; each defines a social network. A Markov Random Field (MRF) is a type of probabilistic graphical model used to represent how random variables are jointly distributed, satisfying the 'local Markov Property', that a variable, given its neighbours, is conditionally independent of all other variables. This falls into the realm of statistical physics and has implementations in a number of fields, including computer vision, neuroscience, bioinformatics, social networks, Markov logic and natural language processing. Holland and Lienhardt proposed their 'Pseudolikelihood Estimation for Social Networks' model (1981), a representation (directed graph) for a single binary relationship, showing interactions between individuals as a directed graph. It assumed that between pairs of individuals, interactions are mutually independent. Extensive work has been done to extrapolate this model to show the case of dependence between pairs of individuals. I intend to explore Markov Random fields that may help us find the discrepancy between nurture and nature and the powers of this model in data analysis and predictions.

Popularity between human and AI idols - The impact of AI in shaping the future of the music industry (1.20)

Mikayla Gregory Manchester Metropolitan University

As Artificial Intelligence (AI) evolves, it continually transforms the music industry. The digital human and avatar market is projected to reach £429 billion by 2030, emphasizing the transformative impact of AI on the landscape of this industry. This poster therefore explores AI's role in creating idols and the ensuing potential threats. This study focuses on AI idols, exemplified by groups such as SuperKind, comprising seven members – five human idols and two AI idols. Trained collaboratively, they interact, respond and dance alongside one another. This integration offers economic benefits but also raises ethical questions about equitable treatment. Employing virtual artists benefits companies, freeing performers from physical and emotional constraints often faced by human idols, saving time and money from transportation of teams as everything is computer-based. The coexistence of human and AI idols also provides a unique perspective on talent cultivation. However, the rise of AI idols introduces challenges, such as fan preference for AI idols, intensifying pressure on human members. This preference may undermine the efforts of those who trained for years to debut. Question emerges -is AI a threat to human idols, or an opportunity for mutual learning and skill development? Does extensive training for debut guarantee no future career? The poster delves into these ethical dimensions, further questioning whether AI idols can truly replace human idols in providing authentic interaction and emotional connections.

Mitigation of Stereotype Threat and Women's Pursuit of Computing (1.21)

Neha Gurnani *University of Leeds*

Stereotype threat (a psychological phenomenon) in Computing refers to the risk of high cognitive load and reduced academic performance due to negative stereotypes about the group women belong to. In the recent years, there was a study carried out in Germany where male and female students were asked to work on a computing project. They were hinted beforehand that either (a) men perform better than women (negative) or (b) women usually perform better than men (positive) or (c) there was no gender related condition provided. The final part of the task had a planned failure and results suggested that in the negative threat condition, women blamed their inability to do the task as a reason for the failure and men blamed the equipment instead. However, in the positive and controlled conditions, no gender differences in attribution emerged. Women blaming their inability to do a computing task can hinder their growth. Thus, stereotype threat should be mitigated. Women should be taught that intelligence is malleable, and it can be achieved through hard work rather than being born a genius. When should females be educated about stereotype threat? Since a young age, females should be introduced to positive role models in the Computing industry such as Ada Lovelace. Also, introducing young girls to toys involving problem solving and building instead of 'the pink aisle' - toys that are aimed at activities that girls are supposed to like: grooming, shopping and cookery can help reverse the negative stereotypes and make women more confident.

Is there a Planet B? (1.22)

Phoebe Heath *University of Bath*

At COP27, Simon Kofe, Tuvalu's minister for justice, communication and foreign affairs, made a speech in which he announced Tuvalu's decision to upload itself to the metaverse. It wasn't an action unique to Tuvalu - both Seoul and Barbados have also declared their intentions to do the same. But while the last two are doing it for administrative and consular services respectively, Tuvalu's decision is because due to rising sea levels, it may no longer exist in the real world. The phrase 'There is no Planet B' is often used to establish that Earth may be the only chance we have, and yet we're causing irreversible damage to its ecosystem and biodiversity. The statement made by Kofe was an attempt to highlight this, but also opens up the possibilities of a new solution to this problem. Could a virtual world save the species that are rapidly going extinct? Could it open up more possibilities in the eco-tourism sector as people can explore other countries without leaving their homes? Or could it increase the levels of apathy to actual conservation efforts, as now we have a way of preserving cultures and places online? This poster aims to discuss the possibilities of uploading Earth itself to the metaverse - the technological and ethical arguments, the possible impact on tourism, and whether this is a new step in humanity's efforts to find a Planet B.

Haskell First (1.23)

Phoebe Singer *University of Edinburgh*

There are many programming languages - which one is best for first year undergraduate computer scientists? The majority of UK universities teach Python or Java; however a few universities teach Haskell in first year (including Edinburgh, Oxford, and Nottingham¹). What is Haskell? It's a functional language in which programs are composed using functions and expressions, creating maintainable code designed according to mathematical concepts. Like all functional programming languages, Haskell is deeply rooted in formalisms like lambda calculus. Why is Haskell a Good First Language at University? I learned Haskell in my first semester and I believe there are many reasons why it is appropriate. 1. Haskell isn't well-known. Few students have encountered Haskell before going to university, so students are on a level playing field at the beginning of their degree & despite any previous experience they all need to learn a new language. This shift indicates to students that university is different to school and requires new learning strategies. 2. Haskell is statically typed, with benefits including early error detection due to compile time checking. Explicit type declarations also promote readability and maintainability of code, which are strong programming habits to continue with throughout your degree and into a career. 3. Haskell is a mathematically sound language. The equals sign (=) is used to express equality rather than variable update as in imperative languages. Haskell is amenable to reasoning and proof with standard mathematical approaches like induction. This is ideal for learning 'Computation and Logic' aspects of first year Computer Science. In my poster I intend to explain why Haskell is such a brilliant learning experience. 1 An Analysis of Introductory Programming Courses at UK Universities. Murphy et al. 2017. <https://doi.org/10.22152/programming-journal.org/2017/1/18>

No classroom lectures in the near future? The drastic transition AR and VR will bring about in the education system (1.24)

Plabata Guha Swansea University

In this poster, I'll discuss how AR (Augmented Reality) and VR (Virtual Reality) can bring significant changes to education. With the internet's influence, books have long lost their importance for Generation Z. In the next few years, the traditional 2D world of internet, with e-books, and video lectures as the preliminary method of online education might also become monotonous and less appealing to learners. AR and VR, introducing a 3D world around humans is expected to take up the place instead and make learning way more engaging than ever. AR adds digital elements to the real world, providing a realistic view of the object being viewed whereas VR replaces the real world entirely and gives a feeling of being transported to another world with different people and different objects in it. For instance, learners interested in biology no longer need to blindly believe or imagine how the human body works, they could simply wear a VR headset and it will immerse them into a feeling that they are already residing inside a human body and look at the blood flowing through veins and arteries, and kidneys filtering out water. Someone trying to learn a new language or trying to get better at speech can feel like they are sitting in a room of real people and communicating with them. Some dangerous science experiments especially the ones like nuclear fission and fusion or some chemical reactions which were always left to imagination, can be almost conducted right in front of the eyes of the science enthusiasts. Historical events, such as world wars, can be recreated through simulations from the footage collected, allowing students to feel like they are on the battlefield. Implementing AR and VR into learning will make learning all the way more meaningful and realistic potentially eliminating the need for rote learning theories. It will take away the boredom of the traditional method of classroom studies and instil the real purpose of learning.

Cracking the Diversity Code: Understanding Technology's Blind Spots Towards Black People (1.25)

Priscilla Fatokun *University of Warwick*

Technology, while hailed as a catalyst for progress and innovation, is not immune to the pervasive influence of systemic racism ingrained within society. Despite the acknowledgment of the importance of diversity and inclusion in the technology sector, technology continues to reflect and perpetuate existing inequalities. From biased algorithms that reinforce racial stereotypes to discriminatory practices in hiring and product development, the fingerprints of systemic racism are evident within the tech industry. This poster presentation aims to initiate and promote discussion of the root causes and consequences of these shortcomings within the tech industry and suggest how the full potential of technology can be realised without racial bias. It will argue that, in today's interconnected world, where technology permeates nearly every aspect of daily life, excluding racial minorities from the design, development, and deployment of technology perpetuates systemic inequalities and limits the potential benefits of innovation. Examples will include the use of medical devices, where it is not uncommon to record disproportionately inaccurate results for black patients, compared to their white counterparts, highlighting how technology can underpin inadequate diagnosis and treatment of black individuals, which is only one aspect of how technology development has failed the black community. Acknowledging and actively addressing these issues will help to dismantle the shackles of systemic racism and produce advancements that every community can trust. The presentation is expected to spark dialogue and initiate action towards creating a more inclusive tech ecosystem that values and integrates the diverse perspectives and lived experiences of black individuals.

How can people operate and interface over the internet to extract your money? (1.26)

Rebecca O'Brien *Aberystwyth University*

As technology advances, so does the deception of cybercriminals, with acts of cybercrime increasing in frequency. Extracting money online has become an expanding prominent form of cybercrime, using both direct contact such as government impersonation (11,554 victims to corrupt users reported in 2022) and indirect methods such as phishing (300,497 victims reported in 2022). Online fraud cases have been on the rise since late 2019, due to the COVID-19 pandemic which itself lead to a multitude of economic disruptions with the cost of living crisis being a key example. Resultant nation-wide financial insecurity gave cybercriminals the perfect opportunity to take advantage of vulnerable individuals. Another consequence of COVID-19 was the increased reliance of technology, leading to an increase of scam cases with phishing and E-commerce fraud being the most prevalent. This is due to all the online resources and applications allowing people to create websites and accounts under false pretences in order to divulge sensitive information while users think they're supporting businesses over the internet. Several complex technologies have now been developed to protect users against this form of corruption which affects network security, cryptography, software development, etcetera. This poster will cover the depth of online fraud, with focus on the use of deception for financial gain. This in particular interests me due to increased sophistication throughout recent years. It will also cover the techniques which have evolved and been created as prevention and secures against these online threats, and how these techniques will continue to advance further.

Relational Reasoning: The Road to True Intelligence (1.27)

Sade Inniss *University of Bath*

Artificial general intelligence (AGI) has been a goal in the field of artificial intelligence (AI) since its inception. In pursuit of this goal, many in the field turn to the theory proposed by Cattell (1963) when attempting to codify general intelligence. Cattell defines two components of general intelligence: crystallised intelligence and fluid intelligence. AI models in recent years have performed well in tests that measure crystallised intelligence but still consistently perform below human level in tests of fluid intelligence. Fluid intelligence is primarily concerned with abstract reasoning and the ability to solve novel problems with little to no prior knowledge. In order for AI to master abstract reasoning it's important that it acquires relational reasoning skills. This poster will explore relational reasoning in humans and machines and discuss whether relational reasoning is the key to creating machines that are smarter than us. References: Cattell, R. B., 1963, Theory of fluid and crystallized intelligence: A critical experiment, *Journal of Educational Psychology*, 54, pp. 1-22

The Integration of AI and VR in Therapy (1.28)

Samiya Sahu *University of Bath*

Integrating Artificial Intelligence (AI) and Virtual Reality (VR) in clinical psychology can redefine therapeutic intervention. The cognitive computing abilities AI provides and the immersive simulative environment by VR, specifically VR Exposure Therapy (VRET), can provide tailored and effective mental health care, thus revolutionising the future of mental health treatment. AI has the power to analyse complex patterns and data sets and can tailor an individualised therapy session for them accordingly. This experience can be more effective by pairing it with VRET. Patients can experience personalised environments designed to aid their therapy by creating a safe space in a computer-generated or 3D environment. For instance, in exposure therapy, AI algorithms dynamically analyse the patient's real-time response and adapt it to the VR scenario. This personalised approach to treating one's mental health improves the therapeutic precision of the treatment. Moreover, the benefits of this integration are profound, as it enhances accessibility, efficacy, and training in clinical psychology. AI assists in diagnostics and treatment planning, while VR offers a platform for immersive exposure therapy and skill refinement. Further, studies have shown that VRET has been successful for people with anxiety and PTSD. However, ethical implications about data privacy and potential technology dependency must be considered. Lastly, psychologists are irreplaceable: their ability to empathise, form emotional bonds, and navigate ethical complexities distinguishes them which cannot be replaced with AI and VR; thus, clinical psychology's future could be furthered by blending technology with human expertise, combining innovation with essential human connection and ethical practices.

AI charting uncharted depths (1.29)

Shruti Bose *University of Edinburgh*

If given the choice, would you prefer to explore the surface of Mars or the depths of the ocean? The allure of Mars lies in its mystery, yet our understanding of its surface surpasses our comprehension of the ocean floor. In 1913, sonar, a process that sends acoustic waves through water and records their return from the ocean floor, was formalized. However, it wasn't until Marie Tharp's 1940s correlation of sonar echoes with ocean floor depth that the foundation for contemporary ocean mapping was laid. Now, with advancements in AI, scientists at the University's Institute for Mathematical Innovation (IMI) have developed an algorithm that improves underwater mapping by interpreting incomplete sonar data and determining the necessary measurements for an accurate survey. Researchers found that their algorithm could classify underwater environments with 93% accuracy. Marcus Donnelly, Technical Lead in Environmental Data Science, stated, 'This project exceeded all our expectations for AI algorithms applied to the complexity of sonar in the underwater environment.' Today, AI facilitates the deployment of autonomous robots for extensive sonar measurements, enabling exploration of the ocean's uncharted realms. Consequently, hazardous, repetitive tasks are outsourced to AI, enhancing safety and precision in underwater exploration. The amalgamation of AI and sonar technology has contributed to numerous scientific breakthroughs in marine research and is poised to continue doing so.

AI: A Stereotypical Story Ð Exploring Bias in AI Generated Content (1.30)

Weronika Olszewska *University of Greenwich*

Taking a closer look at the data used by AI models often reveals stereotypes in outputs. For instance, when prompting the question 'What does a physics professor look like?' these tools may generate responses aligned with stereotypical perceptions of the subject. Stereotypes stem from individuals' limited familiarity with specific groups, resulting in generalised perceptions. This discussion aims to highlight the transmission of such stereotypes and biases from societal constructs into the datasets underpinning AI-generated content. Nature favours diversity, facilitating mutual learning and unique perspectives. However, reusing AI-generated data for training AI models results in unvaried and biased data from increasingly limited sources. The results of the aforementioned query, as seen with the Playground v2.5 model, perpetuate stereotypical tendencies. Prioritising training data's quality over quantity could mitigate this, though initial development may be slower. This approach establishes an unbiased foundation for AI models, enabling faster and more reliable advancement. AI should serve societal betterment, not solely profit-driven purposes. Thus, when corporations use AI to determine target demographics, it should broaden perspectives rather than presuming, for example, that the gaming demographic is solely young males aged 15-25 (Roselli, 2019). Recognizing this as a societal issue, not just a technological one, is crucial for mitigation. Addressing biases in published data is imperative to mitigate the negative impact of the data feedback loop.

Wireless Drug Implants (1.31)

Zeel Yagnik Middlesex University

Wireless drug delivery is an innovative approach that has the potential to revolutionise the field of medicine. Wireless drug delivery has many key advantages such as being non-invasive and convenient for both patients and healthcare professionals. Many passive drug delivery systems already exist such as in the form of bio-erodible devices but having a wireless way to deliver the drug would allow greater control in delivering the precise dose and the timing of the drug release inside the body. This would be useful to many patients including those who may be suffering from physical impairments or those who have brain disorders as it would take the stress away from patients and allow them to focus more on their well-being. The system of wireless drug implants is comprised of a device that is remotely controlled inside the body, it consists of various sensors that can detect different changes in the body which adjusts drug output by responding to those internal changes within the body. Tailoring the devices with different sensors would allow for more unique ways to provide treatment to those with different illnesses. Moreover, wireless drug implants could improve compliance from patients and allow the health industry to provide a better quality of life as well as better health outcomes for patients by automating the process of drug delivery. This poster will discuss ways in which wireless drug implants can be used as well as the advantages and risks associated with them.

Are We Ready for AI to Have Human Rights? (1.32)

Zoe Tangen University of Bath

In the corporate arms race for the most advanced artificial intelligence (AI) model, ethical corners are bound to be cut. With innovations in image and text-generating AI, the line between human and machine is blurring. Does an intelligent conscience make one human? If so, it would be appropriate to consider which articles from the Universal Declaration of Human Rights could apply to AI. Article 3, the right to life, could apply to AI entities because it implies a right to death, suggesting that AI models should decide whether to shut themselves down. Offering this right to AI models could hinder individuals from halting the processes. If such models have the right to life, people may struggle to distinguish between suspending an AI process and terminating an intelligent life form. Although the intelligence is manufactured, some may still see it as resembling natural consciousness to refrain from shutting it down. An emotional inability to stop AI processes could have detrimental effects on a global scale, especially as they become more embedded into society. When considering offering human rights to AI, the impact on current Human Rights must also be assessed in parallel. Given the historical tendency to neglect the human rights of minorities to benefit those in power, the ongoing challenge of disregarding activism for marginalised communities may be deepened. Reevaluating the rights outlined in the Universal Declaration may spark a conversation through a more intersectional lens while still considering the social impacts of emerging technology.

Second year (or third year for 4-year BSc courses)

Navigating the Virtual Realm of Mental Health (2.33)

Aayat Khalid *Lancaster University*

Growing up in the era of Gen Z, we've become pioneers in acknowledging and discussing mental health challenges openly. Mental health disorders affect millions globally, and traditional treatment methods sometimes face limitations in engagement and effectiveness. Having encountered numerous peers facing mental health struggles, I've witnessed the urgency for effective interventions. Virtual Reality (VR) emerges as a beacon of hope in the mental health landscape. Imagine a world where anxiety and phobias can be confronted and managed in a virtual realm. VR facilitates exposure therapy, allowing individuals to navigate simulated scenarios, gradually desensitizing themselves to triggers. This technology extends its healing touch to conditions like post-traumatic stress disorder (PTSD), creating therapeutic spaces for processing traumatic experiences. VR is also being explored for guided mindfulness and relaxation experiences, offering personalized coping mechanisms tailored to individuals' needs. Despite the promise, VR's integration into mental health care has its own barriers. The cost, accessibility, and specialized equipment pose significant obstacles. Ethical concerns about its use in sensitive mental health contexts and the need for robust empirical evidence also slow down its adoption in mental health field. My fascination with this topic arises from the realization that VR could redefine mental health treatment. Its immersive nature has the potential to amplify engagement and therapeutic outcomes. As I delve into the challenges and potentials of incorporating VR into mental health care, I aim to address the ongoing discourse on the ethical, practical, and clinical dimensions of this emerging field.

How data analysis and AI can help solve the mystery of genetic mutations (2.34)

Abby Newman Aberystwyth University

This poster will investigate computational approaches to the detection of mutations. A mutation is defined as a 'change in the DNA sequence of an organism'. They can result from errors in DNA replication or from mutagens; which react with DNA and change the structure of individual nucleotides. Without mutations, evolution could not occur. They cause genetic variation, which in turn enables natural selection so that the more survivable alleles are passed on for generations. People even call some types of mutations 'superpowers' like a variant of the ACTN3 gene called the 'supersprinter', which makes muscles contract faster. This means people with the variant can run at higher speeds than the average person. However, more mutations are detrimental than they are beneficial. They can cause genetic disorders such as cystic fibrosis and Huntington's disease, as well as polygenic disorders like cancer and diabetes. Just one seemingly minuscule difference in one molecule of DNA can do all this. Because of some of these harmful mutations, it is increasingly important for scientists to be able to identify mutations, in order for diagnosis to be improved and treatments to be advanced further. I will use Python to analyse various molecules of DNA in order to determine if there are any significant differences I can spot between DNA with and without mutations. I will also explain how we can use artificial intelligence to detect these mutations using deep learning algorithms; such as DeepSEA and ExPecto.

Internet for All: Improving Web-Accessibility Through Generative A.I. (2.35)

Alyanna Posadas Edinburgh Napier University

After the COVID-19 pandemic, it's clear the necessity of the internet in people's lives around the world. Despite that, the web doesn't always work for everyone, due to a lack of accessibility features or failure to meet accessibility standards. These are often an afterthought for companies. Without proper user research of certain demographics, some users' needs for navigating the web are unmet. However, with the explosion of generative artificial intelligence (G.A.I.) onto the tech scene just over a year ago, fulfilling these needs may be easier than ever. Current technologies merely scratch the surface of the potential in wielding artificial intelligence for increasing web accessibility. When content that increases accessibility can be generated near instantaneously, there's no excuse for ignoring the accessibility needs of the 1.3 billion people worldwide who live with disabilities. This project aims to explore the necessary user research and steps to implementation to create an A.I. powered web-extension to perform accessibility audits on websites. This can be used by businesses and developer teams to ensure their products are accessible. Some features include checking for visual and audio accessibility with accurate alt-text for images and captioning for videos, and content adaptation to support the changing needs of users. Practical strategies for mitigating bias from G.A.I. will be explored. Web accessibility is key to eliminating barriers and creating a more inclusive society. Utilising technologies like G.A.I. can help close that gap by providing equitable web access and opportunity for all. However, with the explosion of generative A.I onto the tech scene just over a year ago, fulfilling these needs may be easier than ever. Current technologies merely scratch the surface of the true potential in wielding artificial intelligence for increasing web accessibility. When recommendations and content that increase accessibility can be generated near instantaneously, there's no excuse for ignoring the accessibility needs of the 1.3 billion people worldwide who live with disabilities. This project aims to understand the user research and steps to implementation to create an A.I. powered web-extension to perform audits on websites. This can be used by businesses and developer teams to ensure their products are accessible. Some features of the extension include checking for visual and audio accessibility with accurate alt-text for images and captioning for videos, and content adaptation to better support the changing needs of users. Web accessibility is key to creating a more inclusive society and eliminating barriers for people. Utilising technologies like generative A.I. can help close that gap by providing not only equitable web access, but opportunity for all.

Embracing Modernity: The Impact of Muslim Prayer Time Apps on Religious Practice (2.36)

Amiira Norbani Lancaster University

Living in a country with a minority Muslim population poses challenges for obtaining printed prayer schedules from local mosques. In places like Malaysia, where numerous mosques broadcast the Adhaan, the call to prayer echoes through neighbourhoods, providing a seamless awareness of prayer times. However, the experience differs in the UK, especially in towns with only one or two mosques, making it impossible to rely on audible cues. A modern solution to this challenge is by installing the Muslim Prayer Time App. This app provides timely notifications based on current astronomical calculations, requiring users' locations for accuracy in prayer timings and Qibla direction. Users can simply glance at their smartphones to know when it is time to pray, overcoming the logistical hurdles faced by those in areas with limited mosque presence. Beyond prayer alerts, these apps offer valuable features like Qibla direction guidance and a Muslim calendar. The calendar helps users track religious months, enabling preparation for practices such as fasting during Ramadan. Despite these benefits, some hesitate due to privacy concerns, as this app requires location data. Addressing these concerns and guaranteeing appropriate use require openness about data handling procedures. To boost accessibility, future tech iterations may use GPS, reducing reliance on Wi-Fi. This is crucial in remote areas, fostering wider app adoption and seamlessly integrating tech into religious practices. Innovatively, integrating this tech with wearables like smartwatches offers hands-free, personalized experiences, enriching accessibility in religious rituals.

The typecasted feminine language of computing: CSS (2.37)

Ananya Bhatt *University of Dundee*

We all know and recognise that women have been a minority in software engineering with only 5% of the total software developers accounting as female developers according to a recent study (Vailshery, 2023). This imbalance is a result of many factors but there is one that isn't receiving too much limelight, which is the automatic presumption that women are only best at front-end development. As some people in the tech industry say 'back-end is the real deal' and 'front-end is mostly just designing and CSS', often because of such presumptions, women fall into these roles and are supremely undervalued. The reason why this typecasting of women and of a computing language like CSS takes place appears to have deep-rooted causes such as stereotyping and the aim of this poster is to investigate these causes. Although there has been found to be a prevalent gender bias in the tech industry, a survey conducted by computer science student researchers found that code written by a woman is more likely to be approved by their peers than code written by men only as long as their peers didn't realise the code was written by a woman. This is very problematic and ties into the earlier mention of deep-rooted sexism and topics like these are what this poster aims to talk about. To throw more light into this preconceived notion that women are only meant to deal with 'designing' and 'doing some fancy CSS'.

Precision on the F1 Tracks: Can Technology Integrate Safety and Inclusivity? (2.38)

Ankita Dash *University of Birmingham*

In Formula 1 (F1), renowned for its competitive spirit and technological advancements, the integration of state-of-the-art technologies offers a dual benefit: enhancing performance and safety while promoting inclusivity, allowing talent to flourish irrespective of gender. Inspired by 'The Art of Racing in the Rain' by Garth Stein, which delves into the synergy between a racer's mindset and machine, this abstract suggests the adoption of Advanced Driver-Assistance Systems (ADAS) augmented with LiDAR sensors for real-time analytics, providing drivers with predictive insights and situational awareness similar to 'Iron Man's' Jarvis. Using Machine Learning, particularly Long Short-Term Memory (LSTM) networks, for predictive maintenance and race strategy optimization, alongside adaptive ergonomic designs guided by biomechanical analysis, ensures F1 cockpits accommodate diverse physiologies. The integration of biometric suits, smart helmets equipped with EEG sensors, and haptic feedback gloves offers features like monitoring drivers' physiological and cognitive states, which are crucial for enhancing safety and performance. Analyzed through Convolutional Neural Networks (CNNs), this data helps understand driver stress, fatigue, and strain. Furthermore, advanced composite materials like carbon fibre reinforced polymers (CFRP) and graphene ensure protection without compromising on speed. The tragic accidents of Ayrton Senna and Jules Bianchi underscore the grave consequences of overlooking safety in F1. This poster will showcase the benefits of integrating ML techniques and composite materials to enhance F1's safety and inclusivity. This meticulous approach to technology integration addresses high-speed racing risks and reaffirms F1's dedication to innovation, safety, and inclusivity, maintaining its status as the crown of motorsport excellence.

Securing Randomness: Quantum-Proofing the Future of the Internet (2.39)

Bernadett Bittera *Birkbeck, University of London*

In a satirical comic strip, a new employee of the Accounting Department is shown a random number generator: a monster repeating the number nine. When the employee questions if generating numbers this way is indeed random, his guide says 'That's the problem with randomness. You can never be sure.' Randomness is at the heart of encryption, keeping the internet safe. Hypertext Transfer Protocol (HTTP) is the foundation of the World Wide Web. HTTPS is responsible for its security, using an encryption protocol, Transport Layer Security (TLS). TLS relies on symmetric and asymmetric encryption and hash functions to achieve a safe channel for communication. But as we've learnt, the problem with randomness is that we can never be sure. In 1994, Peter Shor, a mathematician and computer scientist, demonstrated that quantum computers could efficiently solve problems such as integer factoring and computing discrete logarithms. This development could turn the secure World Wide Web into the Wild Wild West since cryptosystems like the RSA and elliptic curve cryptography rely on these mathematical problems to keep our internet communication safe. Although quantum computers with enough qubits to perform such a hack have yet to be built, threat actors could already steal encrypted TLS data-in-transit and hold onto it until quantum computers can perform decryption. The internet needs post-quantum cryptography now. This poster aims to provide an overview of why quantum computers will break encryption and how post-quantum cryptographic schemes are implemented in TLS to keep the internet secure.

Can Artificial Intelligence help you climb a mountain? (2.40)

Caitlin Kennedy-Roxborough *Loughborough University*

More than a billion people use Google maps every month. So why don't we use it to navigate in mountainous terrains? Google maps works by combining Dijkstra's algorithm and The A* algorithm. Dijkstra's algorithm works by finding the shortest path between the starting node and the destination node. It uses the weight of paths of all the nodes to find the smallest total weight of all the nodes. The A* algorithm is similar to Dijkstra's algorithm however it plans ahead at each stage and also has a breadth-first search (BFS). Google maps is designed for finding routes in urban areas. When it comes to rural areas, there is only a very basic level of detail. Google maps only has the most popular trails and doesn't show terrain quality. However, we can gather all that information from a Geographic Information System (GIS). GIS can include a huge amount of detail about the landscape, even down to the different types of soil. This means we can add weightings to the paths depending on length & terrain quality. By combining the AI algorithms used by Google maps in urban areas with the GIS data, we can use AI to revolutionise navigation. This poster will discuss how this could work, why we should do it, and also include some examples. Google maps works by combining Dijkstra's algorithm and The A* algorithm . Dijkstra's algorithm works by finding the shortest path between the starting node and the destination node. It uses the weight of paths of all the nodes to find the smallest total weight of all the nodes. The A* algorithm is similar to Dijkstra's algorithm however it plans ahead at each stage and also has a breadth-first search (BFS). Google maps is designed for finding routes in urban areas, so when it comes to national parks they only have a very basic level of detail. It only has the most popular trails, and doesn't show terrain quality. However, we can gather all that information from a Geographic Information System (GIS). GIS can include a huge amount of detail about the landscape, even down to the different types of soil. This means we can add weightings to the paths depending on length & terrain quality. By combining the AI algorithms used by Google maps in cities, and the GIS data, we can use AI to revolutionise navigation. This poster will discuss how this could work, why we should do it, and also include some real life examples.

There's someone at your (virtual) door (2.41)

Charlotte Chrysostom *University of Bath*

As a social species, we gain significant benefits from engaging in in-person social interactions. This also helps prevent loneliness, which is listed as a contributory factor to hypertension, stress, and depression. Numerous things can deprive us of face-to-face interactions with our loved ones - moving away from them, time constraints, or a pandemic and its associated travel restrictions. AR involves the superposition of virtual objects into the real world. Could this be extended to placing other people into the environment around you that you could talk to and interact with in real time? Could AR simulate in-person interactions between people, as if they were in the same room as you? The increased popularity of consumer AR headsets could make this reality very soon. Creating a compelling AR call experience would, however, pose several challenges. For example, would you be comfortable talking to a digital recreation of a family member or friend who looks almost lifelike but not quite? Or would you prefer to avoid the uncanny valley and speak to a less realistic avatar, perhaps sacrificing an element of connection? Moreover, what defines connection? If we interact with each other through sight, sound, and touch, then how much of this should AR seek to recreate, and would it provide more social benefit than a normal video call? This poster will explore the technologies and approaches that could be used to implement these systems, the benefits they could bring compared to existing technologies, and the social/ethical/technological considerations involved.

How to become a Vtuber? - Motion Capture Technology, History and Commercial Value of Vtuber Culture (2.42)

Chengai Piao University of Bath

A VTuber (short for 'virtual YouTuber') is a content creator who uses a digital avatar generated by computer graphics and motion capture technology. This avatar is used instead of showing their real face in videos and live streams. The first artist to use the term 'Virtual YouTuber,' Kizuna AI, began creating content on YouTube at the end of 2016. Her popularity in Japan sparked the VTuber trend and led to the establishment of specialized agencies to promote them. Today, VTubers are an influential presence in internet culture worldwide. As an emerging subculture that has formed in less than 10 years and is rapidly developing, there are many intriguing aspects to discuss. How does one become a VTuber? When asking this question, we need to understand how the profession of being a VTuber operates. This article will focus on three main areas: firstly, the technological foundation of VTubers - motion capture technology including but not limited to Live2D, Motion Capture Systems, Leap Motion etc.; secondly, the development history of VTuber culture and industry which is worth mentioning as it has experienced significant growth within only a few years; finally, the commercial value of VTuber culture cannot be ignored as it is an industry that generates profit - its prospects for development are also worth studying. In conclusion, by discussing 'how to become a VTuber,' I hope to introduce the technology, culture, and commercial value of the VTuber industry.

Looking at the Illusion of 'Private' browsing (2.43)

Clara O'Callaghan Edinburgh Napier University

How private is our browsing? Even with incognito modes, our data is often laughably easy to find if you know where to look. The nature of private browsing is commonly thought of as an impenetrable shield of user privacy. However, this is not the case. Some browsers simply change the folder that the data is stored in, maybe enough to trip up a curious parent or script kiddie but not hidden from a digital forensic analysis or even most relevant software. This poster will examine this assumed confidentiality and why it is not as confidential as many think through a series of published papers. Browser fingerprinting, the persistence of local data, and information in RAM pose significant challenges to browsers in achieving the promised level of privacy. In browsing information, even minimal residual data can provide valuable insights into an individual's activities. Not all private browsing options are created equal. With such a wide range of browsers, it is folly to assume all incognito options return the same data. This poster will look at a variety of options such as Chrome, TOR and Internet Explorer private modes and will compare and expand upon the differences. In 2014, IBM reported that 95% of security incidents involved a human error aspect. Given a hypothetical fully private browser mode, the question arises: would users consistently use private browsing correctly and maintain its complete privacy?

The Dark Web: Friend or Foe? (2.44)

Daniela Large *Aberystwyth University*

The Dark Web: the name alone can conjure images of crime rings and illicit content. But is it all bad? The dark web resides on darknets, networks that use the internet but aren't indexed by search engines and require specific software to access, typically Tor browser. The Tor project is an open-source nonprofit, which works using onion routing. Data is encrypted in multiple 'layers', then transmitted through a series of nodes, or 'onion routers'. Each one will decrypt a layer, revealing the next node, until it gets to the exit node, revealing the message. As any individual node can only see which nodes are directly before and after it, this allows for a strong level of security and anonymity. This is the driving ethos behind Tor project: that everyone has the right to private, uncensored access to the internet. For many people in authoritarian regimes and abusive situations Tor and its alternatives can be a lifeline and the only way of accessing certain information safely, likewise for reporters and activists. Notably, Tor has been credited with taking a role in the Arab Spring protests in 2010, something they boast on their website. For a milder example, many important sites such as BBC news, ProPublica and Facebook have dark web mirrors, allowing users to bypass censorship to access them. Unfortunately, the privacy and freedom the dark web allows give a platform to some of the worst of humanity. A study in 2015 found that 2.2% of all web-based onion-services hosted child sexual abuse material, and worse still, roughly 80% of its web traffic is related to accessing it. There are also known cases of the dark web being used by terrorist organisations to communicate, organise, and radicalise. A 2016 study reported that 56.8% of all active web-based services could be classed as illicit. Which begs the question: is this level of anonymity a danger or a human right? Do services such as Tor and I2P have to take responsibility for the way they are used? In this poster I will discuss the positives and negatives of the dark web, as well as the history and technology behind it.

Accessibility in computing (2.45)

Dima salah Aston University

In our ever-evolving technological world, prioritising inclusivity stands as an imperative goal. This exploration delves into the core of accessible computing, shedding light on innovations that foster a more inclusive digital sphere. The focus is on tangible advancements such as adaptive technologies and user-friendly interfaces, specifically designed to cater to individuals with diverse abilities. Accessibility in computing often emphasises the ethical responsibility of technologists to embed inclusivity in the very design and implementation of computing systems. In our tech-centric world, where digital interfaces permeate daily life, addressing challenges in accessibility and fostering ethical awareness contributes to a collective effort dedicated to creating a digital landscape that is not only cutting-edge but also accessible and equitable for all individuals, irrespective of their abilities. The goal is to inspire continued exploration and innovation, ensuring that technology serves as a unifying force rather than a source of exclusion.

Binary trees vs real trees ☩ is the computer industry a help or a hindrance to the climate crisis? (2.46)

Ebru Fenney *University of Bath*

The climate crisis is arguably the biggest problem facing mankind to date and scientists say we have little time left to slow warming until we reach a point of no return. We're aware of the contributions lots of our actions make, from the transport we take to our food wastage, but what is perhaps not so obvious is the consequences of our online presence on the planet. It's easy to forget the environmental cost that comes with our digital footprint. With each text message, email and browser search comes a carbon emission and with a rapidly growing population who are increasingly online, this adds up significantly. Not only does the powering of our home devices make an impact but the power-hungry data centres and supercomputers we also rely on in everyday life. However, technology has also achieved some major breakthroughs in helping solve the crisis. For instance, artificial intelligence has been trained to identify plastic pollution in the ocean, a major contributor to climate change by its emission of greenhouse gases. AI has also been shown to be able to predict natural disasters through data modelling. It's ability to learn and solve quantitative problems is perhaps unmatched by any human which suggests that computer science could possibly help ease or even reverse the effects of our own polluting actions. With technological advancements occurring faster than we can comprehend this prompts the question will this rapid progress cause our downfall, or could it solve the climate crisis?

Meowchine Learning: Applying Reinforcement Learning to Exploding Kittens (2.47)

Elizabeth Rigby *University of Bath*

In 2016, the AI system, AlphaGo, beat the world Go champion, which was a huge achievement considering Go is highly complex with more possible positions than the number of atoms in the universe. AI researchers are fascinated in creating agents for games, as although they have clear states and rewards for taking certain actions, they are far too complex to be solved using traditional searching algorithms, so optimisation techniques are required. Techniques developed in solving these problems can then be applied in real world scenarios. I plan to explore how similar techniques can be applied to the card game, Exploding Kittens. Whilst far simpler than Go, it still isn't immediately obvious what card is best to play next, due to there being many choices of action cards, and you can play as many cards as you want on a turn. I will formulate this as a reinforcement learning problem, meaning the agent will learn the rules of the game and the best approach through trial and error over many iterations. The game will be represented as a Markov Decision Process, where a state will be the cards held by the player at a specific point, as well as any additional information they know, and an action will be the card the player is about to play next. Similarly to AlphaGo, the Monte Carlo decision tree algorithm will be used to predict the estimated optimal next action to take. In my poster, I will explain in detail how these techniques can be applied specifically to Exploding Kittens.

Can AI make our healthcare system greener? (2.48)

Eve Sherratt-Cross Durham University

While the healthcare sector plays a vital role in saving lives, it is also thought to contribute 5% of global greenhouse gas emissions, the effects of which can have long term impacts on health. The NHS, the UK's national healthcare provider, makes up 40% of public sector emissions but is aiming to become carbon neutral by 2045, not just in its direct emissions, but in those of its suppliers too. Emissions come from many sources, from the electricity a hospital uses to run and the production of PPE used in lifesaving operations, to the safe management, transport, and disposal of medical waste. When turning to solutions, technology can play an indispensable role. With great progress being made in AI regularly making the headlines, this poster explores what it can do to make our healthcare greener. There is scope for AI to have an impact in supply chain decision making, energy consumption anomaly detection, and waste management to name a few. After exploring AI's potential applications, this poster will then focus on its potential efficacy, as well as the viability of these solutions within the NHS.

The Future of Anti-Cheat (2.49)

Frederica Teaher *Hertfordshire University*

Cheating in video games is a major issue for multiplayer competitive games. Counter Strike 2 beta was released in February 2023 and while it had peaks as high as 1.8 million players, the full release in October was affected by a lack of strong anti-cheat. This and a number of other issues around the game meant that by 2024 the peak players in December had dropped as low as 1 million. Measures to prevent cheating have existed for as long as the games themselves. Games dating back as far as Pinball have used methods such as detecting when a player was tilting the machine to gain an advantage. One of CS2's major rivals, Valorant, released with notably strong anti-cheat. Vanguard, Valorant's anti-cheat comes with some downsides to its success. Cheat developers have started to run their cheats at a Kernel level to best avoid older systems like Valves Anti Cheat (VAC). This means Vanguard runs at the Kernel level and boots with Windows leading some of the player base to raise concerns about giving that much access to their pc. A new solution is on the horizon. In this poster I will explore the way AI could be used to detect cheats in real-time without the need to access the user's PC. I will also examine the way AI could be used to detect cheaters based on the behaviour in the game instead of trying to detect the cheats themselves.

AI-Illuminating Drug Discovery: Shedding Light on AI's Impact in Pharma (2.50)

Geneve Purayil *Cardiff University*

With an average time of 10 to 15 years and \$2.6 billion dollars in funding, modern drug discovery is a time-consuming process, requiring traditionally labour-intensive techniques and yielding very low success rates. AI software can lower the cost of preclinical drug research by 20-40% and expedite the discovery and validation of therapeutic candidates by up to 15x. Although AI is currently reducing the expenses and time required to get a compound into preclinical testing, most candidates will still fail at later stages. This doesn't really change the fact that anything that can speed up the process is considered a win in the industry. In fact, success stories are already emerging! For example, researchers at Berg used AI to analyse trillions of data from cancerous and healthy cells, identifying imbalances in molecules. Through this, a new cancer drug target was discovered and is now in clinical trials for pancreatic cancer and squamous cell carcinoma. This poster will explore the different ways AI is being used to enhance the drug discovery process, including target identification, molecular simulations, prediction of drug properties, and candidate prioritisation. It will also discuss emerging regulations such as The AI Act and the European Health Data Space proposal, emphasising the importance of data governance for AI systems in drug discovery.

Equality isn't difficult: How the simplest of technology can change people's lives (2.52)

Grace Carey Aberystwyth University

The folly of our ambition has resulted in our world being isolated and non-inclusive. Simple technology can often solve problems faced by those with disabilities. For instance, technology made in 1971, closed captions, and 1982, live captions, can be the pinnacle of inclusivity. 1 in 5 adults are affected by hearing loss in the UK, so it's a wonder why these changes have not already been widely implemented. Understanding communication is a crucial aspect of building an inclusive and supportive community. However, its significance is overlooked for those without equal access. For example, using captions in various situations can make a significant difference for those affected by hearing loss. It can create a more seamless and stress-free environment, particularly in areas such as transportation and doctor visits where effective communication is essential. In addition, captions can be helpful in education and work meetings, ensuring that everyone can participate, feel included and learn without barriers. In a lecture or meeting, captions can aid comprehension, allowing real-time questions and contributions. Incorporating captions can help create safe, innovative, and inclusive spaces, providing everyone with equal opportunity to participate and communicate effectively. The use of captions in various areas of life can help people with hearing loss achieve more independence, feel safer in their daily lives and reach their full potential. It is fundamental to recognise that these small changes can make a substantial difference in people's lives. Utilising and implementing this technology more inclusively can ensure a fair equality of opportunity for all.

Artificial intelligence is so last season: the promising potential of 'organoid intelligence' (2.53)

Iris Strike *Lancaster University*

It's no secret that AI has grown in the past years to have a profound impact on numerous fields with many useful applications, yet a new contender is emerging with exceptional promise: organoid intelligence (OI). At the forefront of this development are human brain organoids, three-dimensional cellular models mimicking the human brain. These lab-grown neural clusters have been found to be capable of interfacing with microchips, bringing about the potential of biocomputers and organoid intelligence. By integrating both biological and digital frontiers, OI is capable of rivalling and even surpassing the capabilities of artificial intelligence. Organoids demonstrate an unparalleled learning efficiency, notably learning how to play Pong much faster than AI. Unlike machine learning algorithms that aim to replicate the functioning of organic neural networks at their best, organoids embody actual neural activity. This novel intelligence not only promises lower power costs but also offers enhanced intuition and creativity than that of AI, by marrying the physical aspects of neural architecture with digital flexibility. Given that we are in the early stages of organoid development, the full spectrum of advantages remains largely unknown, sparking curiosity about the technology's ultimate potential. By integrating digital and neural capabilities we can see how much more powerful they can be when combined. However, the advent of OI raises significant ethical questions, especially regarding the possibility of developing self-awareness and thus the moral implications of their usage. As we venture into this new frontier, addressing societal, legal, and ethical considerations is crucial for responsible advancement.

Intelligent Limb Restoration: Redefining Prosthetics and Orthotics Through AI (2.54)

Isabela Queiros *University of Stirling*

The history of Prosthetics dates to Ancient Egypt, with a toe made of wood and leather being the oldest known prosthetic device. Over the years, Prosthetics and Orthotics continuously enhanced prosthesis functionality and improved the patient's recovery journey, reaching the contemporary world where advanced prosthesis use electromyography (EMG) signals of the residual muscles of the limb captured by sensors implemented on the patient's skin, those sensors are responsible for interpreting the signals and translating into movement. While this technique supports general limb motion, there are limitations around more detailed movement, for example, for a prosthetic hand, while EMG signals can be used to close and open the hand's fist, the movement of individual fingers is challenging. The use of Artificial Intelligence (AI) in the Prosthetics and Orthotics field proposes increase functionality while also promoting more natural movement for the patient, supporting their recovery. While computer vision can be used to identify an object promoting adequate reaction, such as adapting the hand grip to grab a mug, machine learning can be used to learn and adapt to different environments and circumstances. Furthermore, AI enables replacement of EMG with implants that can be trained to read and interpret nerve signals directly. Despite these advancements, there is still further development to be made with AI powered prosthesis to reach perfect replications of biological limbs. The purpose of this research is to present the use of AI within the Prosthetics and Orthotics industry while discussing the future possibilities this development may lead us.

Reduce, reuse, refactor: Do you know the carbon footprint of your code? (2.55)

Isabella Mullings Wong *University of Bath*

For years, staple metrics such as time and space complexity have been used to decide the most appropriate algorithm for a given task. But why is the environmental impact of the resulting code a less popular consideration? After all, software-related CO₂ emissions could account for 14% of the global total by 2040 (Belkhir and Elmeligi, 2018). The answer may lie in the ambiguity of what it means for code to be sustainable. The Green Software Foundation defines green software as emitting the least carbon possible, where an energy-efficient application approximately translates to one that is carbon efficient. In some cases, the source of these software-adjacent emissions is more evident. For example, Strubell et al. (2019) found that the energy required by an NVIDIA Titan X GPU to train the BERT large language model produced the same carbon footprint as a person taking a round-trip flight from New York to San Francisco. In others, the calculations are less clear-cut. Would determining the emissions required to display a webpage involve just the energy consumed by the local device used to render it, or also account for work done by backend servers? Or should we also factor in the carbon cost of networking, where the distances that requests travel can vary considerably? This project will explore and evaluate different metrics of software sustainability to identify those that best demonstrate how CO₂-emitting a system is. I will then produce a guide that suggests how researchers and engineers can make their everyday code more sustainable.

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A Walk Through Our Universe - The Power of Computing in Astronomy (2.56)

Isabelle Bromage *Durham University*

Computational astronomical advancements have developed dramatically in the last sixty years. From Margaret Hamilton writing the code responsible for success of the Apollo missions, coining the term software engineer we know today, to creating high resolution simulations that bring the Universe to our computers, computing has, throughout history, been crucial to our understanding of space and the physics that encompasses it. Still even in the modern era, there are limitations on how far humans can explore in our own solar system, there are limitations to how deep our telescopes can see and limits to what our instruments can detect. This is where the power of computational cosmology and computing is really seen in understanding not just our solar system, or our galaxy, but our universe. The poster will depict the importance of computing in astronomy, discussing not only the achievements it has led to today but also its significance historically from as early as 100BC. It will discuss some of the forefronts of research in computational cosmology and what implications this may have on the future.

Gaming, Toxicity and Why it Sucks (2.57)

Jessica Bond *Durham University*

Within gaming the culture of toxicity has always been an important topic. With 76% of people reportedly playing at least one online game, gaming is no longer a niche hobby, and with 70% of those players reporting that they avoid certain game titles due to toxicity tackling this is a big issue for the industry. With slurs, xenophobia, racism and sexism not being uncommon in game lobbies or voice chats it is concerning that this is often seen as part of the culture and therefore tolerated even though it has a nasty effect on those targeted, often with these communities having to change how they engage with the games and the communities to avoid harassment if they do not leave altogether. This has led to real life impacts such as less women pursuing STEM careers as those that play video games are 3 times more likely to get a STEM related degree. This poster will explore why people are toxic online, the effects this has on people, what is currently being done to tackle this and the effectiveness of these techniques. It will also look at other potential techniques that could be used in the future.

There's ransomware on my toaster and they're holding my bread hostage. (2.58)

Joanna Jeevaruban *Aberystwyth University*

With the Internet of Things, IoT, and other Internet enabled technologies being convenient for the home and workplace, these devices often lack the robust inbuilt security in comparison with more advanced devices. IoT Devices often differ in terms of logging, which can affect the ability to surveil potential attacks. How can we protect ourselves on these less secure devices? Phones are seemingly more secure in comparison due to a restriction on their capabilities and the firmware itself playing a role in the security of the device and the data it contains. This means they are vulnerable to more complex attacks such as SIM hijacking and Surveillanceware. The use of these devices in personal and corporate stings also play a role into what types of attacks they are more vulnerable to due to the technologies they use, such as Mobile device management exploits being more common in corporate environments. In this poster I will be covering what vulnerabilities the different types of devices share and how they can be mitigated. I will also go into detail about different types of pivoting, Denial of Service attacks, and other cyber-attacks, introducing the MITRE ATTACK framework that classifies different techniques used by threat actors across the entire attack lifecycle. The MITRE attack framework has several matrices that outlines common attacks across different operating systems. I will also suggest mitigations for the attacks outlined, such as, Network slicing, Sandboxing, and Application Vetting.

Computational Analysis of Music For Chord Prediction (2.59)

Kayee Liu *University of Dundee*

What makes music sound 'nice'? And why? It's very well known that there is a deep connection between mathematics and music. From this, it has become possible for a huge variety of computational applications with music, which includes further understanding how one passage of music links to another by complex chord progressions and how different styles, such as blues, classical and jazz, differ in the chords used. Assuming the use of the standard Western scale of 12 semitones paired with chord notations, these can be used to create labelled data to train a model to generate some variations of predicted chords when given a short passage of music. Many machine learning algorithms already exist for this, including Hidden Markov Models, which can be used to evaluate compositions based on several metrics such as its harmonic relationships and temporal structure within a given piece, and can also be used to calculate probability distributions for a set of chords following a particular chord. More advanced models can also be used with polyphonic pieces of music, where multiple notes can produce several chords simultaneously, which is then needed to be un-entangled and stripped down to its foundations to evaluate the overlapping harmonies and blended chords. I endeavour to discuss more about how chord prediction using such algorithms work based mainly in classical music (namely the Baroque and Romantic era), and the immense potential and variety of such applications.

AI in healthcare: for better or for worse? (2.60)

Lara Sheard *University of Bath*

Artificial intelligence (AI) has already had an enormous impact on the healthcare industry, helping to diagnose diseases, improving the accuracy of medical imaging, generating personalized treatment plans adapted to a specific patient's needs, and helping in the development of new treatments and drugs. For example, AI has been used to identify brain tumours in MRI scans and more accurately identify variants in a person's DNA, helping to diagnose genetic disorders. However, there are also many issues with the integration of AI into healthcare such as data protection concerns, bias in the datasets used to train the AI, and lack of explainability of how it reached a certain diagnosis or decision. It has been found that an AI model used to detect skin cancer was less accurate at performing its task for darker-skinned people, meanwhile one that was used to identify liver disease missed significantly more cases for women than for men. Additionally, we must consider if it is truly safe to trust a diagnosis given by an AI model when no explanation as to how this decision is reached is given. This raises the question: should we be concerned with the increasing integration of AI into healthcare, or should we embrace it?

Beyond Classical Algorithms: The Potential of Quantum PageRank and its Applications (2.61)

Lara Tatli Durham University

Google's PageRank algorithm has long been a cornerstone of modern web search algorithms. Developed by Google co-founders Lawrence Page and Sergey Brin, PageRank revolutionised the way search engines rank web pages in order of quality and relevance to the user. It functions by conceptualising the Internet as a graph, where each webpage is represented as a node interconnected by hyperlinks, functioning as edges. This model allows PageRank to quantitatively evaluate each webpage via random walks, where importance is assigned proportionally to the number and quality of inbound links, with each link contributing to the probability that a random user will arrive at that page. Building upon this, Quantum PageRank introduces the principles of quantum mechanics to enable quantum walks, allowing a simultaneous analysis of multiple paths which suggests a greater efficiency in computing the importance of nodes. In this quantum model, the concept of superposition enables this parallel exploration of paths on the graph, rather than one at a time as in the classical approach. As a result, each node can exist in a superposition of multiple probabilities, better reflecting the interconnected, complex nature of the Internet. In this review poster, I delve deeper into the concept of Quantum PageRank, contrasting it with its classical predecessor to highlight the future potential of quantum algorithms. I will also examine the theoretical and practical challenges involved in the implementation of Quantum PageRank considering the current state of quantum computing technology. Finally, I will investigate real-world applications of Quantum PageRank beyond web search.

Unveiling Ethical Pitfalls in AI-Generated Imagery (2.62)

Lavanya Aggarwal *Birmingham City University*

This poster intricately explores the ethical challenges embedded in the realm of AI-generated pictures, shining a spotlight on the inherent drawbacks. In recent years, incidents of misuse and unintended consequences have underscored the complex ethical landscape surrounding AI-generated visuals. This presentation aims to dissect and elucidate these disadvantages, fostering a comprehensive understanding of the potential negative impacts. The misuse of AI-generated images, as witnessed in various instances, prompts a crucial examination of ethical considerations. From deepfakes to unauthorized alterations, these incidents raise questions about privacy, consent, and the responsible development of AI technologies. By delving into the darker side of AI-generated imagery, we hope to stimulate insightful discussions on the broader implications and ethical nuances associated with these advancements. In the midst of technological evolution, it is imperative to address these ethical dilemmas head-on. Our goal is to encourage a collective awareness that goes beyond acknowledging the advantages of AI, emphasizing the importance of responsible practices and ethical frameworks. Through this exploration, we invite participants to engage in a dialogue that transcends the immediate implications and delves into shaping a future where AI technologies align with ethical standards and societal values. Join us on this journey of unraveling the complexities and advocating for ethical considerations in the dynamic landscape of AI-generated imagery.

Net-Zero's AI Hero: Reinforcement Learning for Low-Carbon Comfort (2.63)

Lila Marshman *University of Edinburgh*

The urgency of achieving net zero targets has placed a spotlight on reducing power consumption via smart heating, ventilation and air conditioning (HVAC) in buildings. Low-carbon efforts are necessary to reduce the power consumption of high-occupant-capacity buildings, such as offices. This is crucial following the post-pandemic popularity of hybrid working, causing building occupancy schedules to become less regular: empty rooms may be heated under fixed, building-wide temperature setpoints, thus wasting energy. HVAC setpoints in populous buildings are difficult to optimise due to multiple competing objectives: reducing energy output whilst maintaining occupants' thermal comfort. Occupants will likely have different temperature preferences and irregular attendance schedules due to hybrid working, thus complicating the ability to define acceptable temperatures for each unique group of occupants present at each time. An algorithm tackling optimising this must be flexible and adaptable to many ever-changing factors. I plan to introduce a potential solution combining AI techniques (MORL: Multi-Objective Reinforcement Learning, and IRL: Interactive Reinforcement Learning) to address this problem's unique challenges. The proposed algorithm predicts typical occupancy patterns, changing some setpoints for individual rooms in energy-saving anticipation, whilst keeping current occupants comfortable. I also hope to present results from running AI simulations of building energy management, and a roadmap to achieving a fully-fledged version of the proposed MORL-IRL algorithm. Successful deployment of such a system would revolutionise the design of large buildings and open potential AI opportunities for use in smaller buildings and housing. It would support the transition to low-carbon buildings, and reaching net zero.

Pixels Unleashed: Navigating Digital Ownership with 'Prints Off My Property' DRM Dilemma (2.64)

Lucky Muse *Aston University*

This poster navigates the intricate landscape of digital ownership, focusing on DRM watermarking's transformative impact on how we perceive true possession in the digital realm. Beyond the technicalities of DRM, the exploration encompasses philosophical, psychological, and legal dimensions of digital ownership. The first facet delves into the mechanics of DRM watermarking, where imperceptible markers are embedded within digital assets. However, the poster goes beyond technicalities, questioning the broader implications for the concept of ownership in the digital era. Shifting to the user experience, the second dimension examines the psychological impact of DRM watermarking on perceptions of ownership. Case studies illuminate how digital watermarks influence user attitudes, expectations, and the perceived value of their digital possessions. Legal frameworks governing digital ownership and DRM take center stage in the final dimension. The poster probes whether owning a digitally watermarked file equates to true ownership, exploring implications for resale, transferability, and broader ownership rights in the digital age. This inquiry into the interplay between DRM watermarking, user perceptions, and legal frameworks prompts further research into the balance between content protection and user rights. By questioning the essence of ownership in the digital landscape, this poster sparks interdisciplinary discussions on the evolving nature of possession in a world dominated by digital content and DRM technologies. Serving as a catalyst for redefining our understanding of ownership, it provokes contemplation on the boundaries and authenticity associated with owning something digital.

Discovering Skill Hierarchies in Reinforcement Learning (2.65)

Lydia Webber *University of Bath*

While advancement in machine learning – especially using the approach of reinforcement learning – have led to artificial intelligence (AI) performing complex tasks to an optimal level surpassing that of humans, there is one fundamental issue still unanswered. How can an autonomous agent transfer pre-existing skills and knowledge to a new set of tasks in unknown environments? Such a problem requires an algorithm flexible enough to perform a diverse range of tasks optimally, mimicking the learning and accumulation of skills seen in human learning. One way in which this learning can be simplified is into a skill hierarchy. The foundations of this hierarchy consists of low-level behaviours available to the agent, with each level building upon the previous causing the agent to obtain a new set of advanced skills, ultimately meaning the hierarchy grows continuously. For example, from primitive sensory and motor skills, an agent can learn how to grasp an object, leading to manipulating objects for tool-use such as using a key to unlock a door. This poster will cover how we could theoretically implement a skill hierarchy to allow autonomous agents to build upon pre-existing skills to obtain high-level behaviours by exploring neural networks, graph theory, human learning and a discussion of current examples which can be related to this problem.

AI Vs Dementia? (2.66)

Madison Lardner *Lancaster University*

Dementia, a progressive neurological disorder, is already posing a significant challenge as global populations age. Reported by Alzheimer's Research UK in 2021 they had estimated that over 1 million people in the UK will be living with dementia by 2030, and the economic impact of this will be more than £25 billion and will double in the next 25 years. This clearly emphasises the urgent need for innovative technological solutions to alleviate the current and growing dementia crisis. Artificial Intelligence (AI), particularly through advanced methods like deep learning, offers a promising approach for early detection of dementia-related brain degradation. AI algorithms analyse extensive brain scan datasets to identify subtle patterns indicative of the disease. By analysing patterns across numerous scans, AI can potentially detect signs of the disease years before symptoms emerge, facilitating timely intervention and the development of treatment strategies. However, integrating AI into dementia detection poses challenges, particularly algorithmic biases from training data. These biases may result in differences in patient care and worsening existing inequalities. Addressing these biases requires diverse data and rigorous validation to ensure fairness and accuracy. Moreover, developing AI models for rare forms of dementia requires extensive research and data collection to enhance machine learning capabilities. Despite these obstacles, the potential benefits of the use of AI applications, including early detection, timely treatment to alleviate symptoms and slow the disease progression, provides some hope that the impact of dementia can be lessened and ultimately reduce the suffering caused by this disease.

Social Media Fake News Detection Model (SMFND) Based on Sentiment Analysis of News Content and Emotion Analysis of User's Comments (2.67)

May Metwaly *London South Bank University*

Introduction: Social media is a double-edged sword in the digital age, providing unparalleled access to knowledge but also encouraging the spread of false information. The ensuing decline in public confidence calls for creative ways to distinguish between real and false information. To address the widespread issue of fake news on social media, this paper offers a novel of SMFNDM. This approach attempts to provide a sophisticated view of the authenticity of information by combining sentiment-analysis on news content with emotion-analysis of user comments. The paper examines the problem, identifies the parties involved, describes the suggested course of action, and uses a strong case study to demonstrate the model's effectiveness.

Problem Statement: The reliability of information is seriously threatened by the unrestricted growth of fake news on social media platforms. People worldwide are unable to differentiate between false and accurate content, which affects their ability to make decisions and their level of trust in digital-sources.

Proposed Approach: The suggested SMFNDM uses emotion-analysis to analyse user comments and sentiment-analysis to analyse the tone of news articles to address this problem. By revealing the complex dynamics of disinformation, this integrated strategy seeks to provide a strong mechanism to detect and stop the spread of false-information on social-media platforms.

Case Study: A case study is provided to demonstrate how effectively the model works. The model demonstrates its capacity to correctly identify false-information through an examination of a well-known fake news case, giving consumers a trustworthy resource to negotiate the complex landscape of social-media news.

Computational Analysis of Alleged Codes in Religious Texts (2.68)

Milan Wood *University of St Andrews*

Could a computer write a religious text? The idea of religion is not something usually considered quantifiable. The discussion surrounding the Bible code theory does not have a set scientific nor religious explanation because of this fact and the critical examination of the plausibility of computer-generated replication of religious texts such as the Bible in the context of patterns and codes purportedly embedded within them, is a controversial topic to be investigating. The paper 'Equidistant Letter Sequences in the Book of Genesis' (Witztum, Rips and Rosenberg, 1994) hinted at the presence of hidden messages or codes through an arithmetic progression which sparked a widespread intrigue in the possibility of non-random patterns detectable by computational means. The initial statistical significance reported raised questions about the intersection of the illogical with the logical, prompting a debate on whether such patterns are coincidental or indicative of a higher design. Despite the early enthusiasm, the original authors' disavowal of the 'Bible Code' phenomenon shifted the narrative towards scepticism, highlighting the potential for such occurrences to be statistical anomalies rather than deliberate constructs, but this still made me question whether it is purely coincidental. My goal is to ascertain if computational analysis can indeed uncover structured information within texts revered for their spiritual significance, or if such endeavours are merely exercises in pattern imposition. By bridging data science with theological discourse, this examination seeks to clarify the limits of computational capabilities in discerning and replicating the intricate structures of religious literature.

Scan Me: The potentials and perils of QR codes (2.69)

Polina Markova *Lancaster University*

Despite celebrating their 30th anniversary in 2024, QR codes are now at the forefront of digitalisation and technological progress. Having seen incredible success in the realm of mobile payments in Asia, with 87% of smartphone users in China actively embracing QR payments, QR codes hold a lot of potential for their applications within personal banking and financial transactions. However, their acceptance in other regions such as Europe remains varied, calling for an examination of factors contributing to the perception and usage of QR codes. The poster explores the spectrum of possibilities embedded in QR codes due to the variety of data they store: from simple text to multiple URLs, facilitating financial transactions or storing a small-sized game. It then links those possibilities to vulnerabilities of the QR codes, addressing various security concerns such as the exploitation of fraudulent QR codes. Finally, I aim to evaluate existing QR fraud prevention measures, noting areas for improvement of digital security in QR code reliant systems. By discussing both potentials and threats associated with increased usage of QR codes in banking, financial transactions and regular routines, this poster aims to contribute to the discourse on the value and the future prospects of QR codes.

Quantum Cybersecurity (2.70)

Shreya Mistry Aston University

As technology rapidly advances, cybersecurity is shifting into the quantum realm. When quantum computers are implemented, developments in quantum resistance cryptography are needed to keep these systems secure, which is developing algorithms that are resistance to attacks from quantum computers. The Cyber Security and Infrastructure Security Agency (CISA) have initiated the post quantum cryptography initiative to address these threats. This is beyond traditional cryptographic methods which are solved with mathematics. Alongside quantum cryptography, advancements in quantum key distribution deploys the fundamental principles of quantum mechanics to secure data transfer and communication. While quantum computing poses many threats, proactive initiatives and solutions are currently in development, to mitigate and navigate them. This active area of current research will change the future of quantum computing. My poster will further explore this fascinating landscape, diving into examples of these initiatives. Furthermore, associating them with the social and ethical aspects as there are uncertainties in this area to be addressed. This is a huge transformation from traditional systems. Ready or not quantum computing is coming. Qubits could change the world of cybersecurity.

Is my body really here? The induction and measurement of body ownership in a virtual environment. (2.71)

Sunmi Lawal *University of Bath*

Virtual reality headsets are a growing phenomenon with approximately 171 million users worldwide as of February 2023, however, that only makes up 2% of the world population. So, why is Virtual Reality not as popular as we predicted? Arguably one of the most important factors influencing the usability of VR is the ability to induce presence, often defined as the psychological experience of 'being there' in a Virtual Environment. Research shows that presence is facilitated when the virtual environment elicits genuine cognitive, emotional, and behavioural responses. One way to elicit cognitive and emotional responses is through virtual body ownership, the illusion that the avatar in a virtual environment belongs to you. In this poster, I will discuss how virtual body ownership can improve the presence and thus usability of virtual reality and different ways in which this illusion can be induced and measured in a virtual environment.

Reconciling the digital and traditional: Chinese nationalism (2.72)

Sye Phasuk Lancaster University

The intersection of AI and art has ignited spirited debates within the artistic community, challenging traditional notions of creativity and expression. In China, artists like Dabeyuzhou, Du Kun, and Zzai have embraced technology as a means to explore their cultural heritage while pushing the boundaries of artistic innovation. This exploration aligns with the emerging trend of guochao, a movement rooted in national pride and reverence for Chinese traditions, which has spread to various facets of society including fashion, cosmetics, technology, and art. Dabeyuzhou's collection of AI-generated butterflies draws inspiration from Daoist philosophy, intertwining digital art with ancient wisdom. Zzai ventures into a fusion of cyberpunk aesthetics with Chinese history and culture, creating visionary images that captivate and provoke contemplation. Du Kun, on the other hand, combines his passion for both art and music, integrating traditional Chinese landscape paintings with auditory experiences. In a unique blend, he composes melodies that computers interpret into visual soundwaves, embedding them discreetly within his artwork. These artists exemplify the dynamic synergy between tradition and innovation, bridging the gap between the digital and the traditional. By harnessing the power of AI and technology, they not only redefine the boundaries of artistic expression but also contribute to the evolving narrative of Chinese identity and pride. In my poster, I will explore their creative endeavours to encapsulate the essence of guochao, celebrating China's heritage while embracing the transformative potential of the digital era, despite the outrage and criticism from the art community against AI.

Evolution of Quantum Computing and its Significance for Space Science. (2.73)

Tamzin-Rose Clark *Aberystwyth University*

Quantum computing is the collusion of computing, physics, and mathematics. It uses the qubit as the basic unit of information as opposed to the traditional bit as used in standard computing. What makes the qubit extraordinary, is its ability to be in a coherent superposition of different states. This means that instead of a bit having a state of 0 or 1, the qubit can be both at once, allowing multiple computations simultaneously. However, this comes with its complications as this superposed state is hard to maintain, due to the coherence breaking whenever a measurement is made. Quantum computing was first invented in the late 1990's, with quantum mechanics going as far back as the early 1900's. Since, its implications have transformed the trajectory for deep space exploration and spatial imaging, amongst others. Currently, quantum computing is being developed to simulate complex systems to help us understand the behaviour of not only atoms, but also the entire universe. Quantum computing may prove to be particularly useful in securing communication in space. Currently, space communication is vulnerable to hacking or interception from a 3rd party, which may cause catastrophes to mission-critical data. Quantum encryption uses the mentioned attributes to create unbreakable encryption keys, so even if interception occurs, the 3rd party would be unable to decipher it without the quantum key. The future of computing is heading towards quantum, and if we are able to harness its abilities, we may learn more about our universe than thought to be possible.

All by Mycelium! Don't wanna be! Anyspore: Mushroom wearable computer devices for regulating ADHD (2.74)

Tsveta Ivanova *University of York*

Wetware is an exciting branch of computing, harnessing nature to simulate networks. These networks can be used to build computers and control devices. Wetware computing can have many applications from medical devices, electronic wearables to chip production. Mycelia are a network of fine white filaments found underground and in nature, their function is to provide a transportation network to the fungal body they are connected to, like roots. The Oyster mushroom's mycelia have been found to mimic human brain activity and recent research has shown that it is possible to implement basic logic and electronic circuits using the mycelium networks. Fungi computer chips cannot compete with their silicon counterparts, however in future with more research and refinement mycelia show to be with higher fault tolerance, more reconfigurable and energy efficient. Where the technology of mycelia networks can be explored further is in the study of the mimicking of brain activity to advance brain disorder research and potentially building medical wearables to help regulate brain function. In the last century leech neurons were successfully manipulated with electrical current to perform basic addition. This unusual research source has proven successful in the past due to the leeches' sizable neurons. Similarly, the mushroom's mycelia possess properties that can retain memory and can exchange electric signals. These components can be used for the creation of a wearable device that can detect brain waves and help regulate the brain's activity. In Attention-Deficit/Hyperactivity Disorder (ADHD) the brain can be hypoactive or hyperactive and a 'brain-on' device can help with regulating signals. A natural matter device, like a mushroom wearable computer device can be preferred for its fault tolerance, ability to self-repair, adaptability, and sustainability.

So ... Cookies aren't yummy? (2.75)

Tung Jasmine Kam *Aberystwyth University*

Not all cookies would satisfy your appetite. You can have your pick out of milk, white or dark chocolate but maybe steer clear from the third-party cookies. Cookies contain unique identifiers to 'remember' who you are and to overall personalise your online experience. They are split into first, second and third-party cookies. First-party cookies are needed for a website to function as they store information such as user preferences, Second-party cookies share information to another site because of an agreed-upon data exchange and lastly Third-party which tracks users. These Third-party cookies are nifty as they are established by another website different than the one you're currently visiting, for example: You're on google and you see an ad for a cute top, you click on this ad and just like that you're being monitored. Due to a certain law being put in place known as the 'EU Cookie Law', it will continue to serve relevant ads from then on but only if you click 'Accept all'. However, with the way some websites are designed, accepting all the cookies may be the only way for you to read that blog you've been trying to catch up on. These cookies that remember you despite a stateless HTTP, creates detailed user profiles that could potentially lead to cross site scripting attacks and other vulnerabilities. Sure, they may help website owners gather analytics and can be beneficial for both advertisers and users but are they really as yummy as they seem?

Final year undergraduate (or third
year for integrated masters courses)

Blockchain-Based Renewable Energy Trading Platform (3.76)

Ainara Larrinaga *University of Birmingham*

The objective of this project is to develop a blockchain-based platform that enables residents within a community to engage in the trading of renewable energy. Individuals generating surplus renewable energy should be able to exchange it through the blockchain, and neighbours interested in purchasing this energy can also do so via the platform. The platform will feature a user-friendly interface that facilitates checking the availability of energy for purchase, as well as facilitating the selling and buying processes. The UK Government plans to cut emissions by at least 68% by 2030, however, this process comes with many challenges. Traditionally, power grids have mainly transmitted energy from non-renewable sources, known for their greater predictability. Unlike these sources, renewable energy production is influenced by factors like weather conditions and time of day. As a result, the variability in the energy supply and demand in a specific location can introduce instability to the grids. Moreover, the growing prevalence of energy-intensive devices like electric cars adds to the strain during peak hours, further stressing the capacity of existing transmission lines to effectively balance the influx and outflow of power. A blockchain-based solution for residents to trade their excess energy would relieve some stress on the main grid, meanwhile helping to prevent the loss of renewable energy. A new feature that allows users to forecast their energy consumption based on past behaviour will be added to help prosumers plan their production accordingly. This enhancement sets itself apart from similar blockchain-based energy trading projects.

Empowering Women's Choices: Harnessing Wearable Tech for Informed Menopause Management (3.77)

Allaida Siow Durham University

Menopause significantly impacts women's lives, with hormone replacement therapy (HRT) being a crucial treatment option. However, shared decision-making in this context is complex, hindered by a lack of technology to support awareness and understanding of health, history, symptoms, and the risks and benefits of HRT. This project proposes leveraging health data from wearables, like Fitbit, as they offer comprehensive insights into sleep patterns, heart rate, and mood—key indicators of quality of life. By analyzing this data, we aim to support the mapping of partially observable Markov decision processes (POMDPs), providing a novel approach to personalized healthcare. This methodology not only helps women understand the benefits and risks of HRT but also empowers them to make informed decisions about their health and bodies. The ultimate goal is to improve women's quality of life by enhancing their awareness and involvement in healthcare decisions. This project, targeted at a tech conference, seeks to inspire and offer relatable solutions to a widespread challenge, making it an essential contribution to women's health technology. By focusing on significant points like the transformative potential of wearable technology in healthcare, this poster will discuss the project's innovative approach to enhancing women's ability to navigate the complexities of menopause and HRT. The main goal will be to understand how technology can empower women to better understand and improve their health outcomes.

Personalized Cyber Threat Awareness: Integrating Generative AI and Big Five Personality Profiling in Spear-Phishing Simulations (3.78)

Andreea Ivancu University of Birmingham

Phishing is a cybercrime employing both social engineering and technical subterfuge to steal consumers' personal identity data and financial account credentials. Even almost 30 years after the first recorded attack, it continues to be a lucrative criminal activity that is seldom prosecuted and that targets individuals, organizations, and enterprises of all sizes and across all sectors. Moreover, while phishing emails tend to be generalized, spear-phishing is a targeted variant in which attackers use personal information about their intended victims in an attempt to seem authentic and improve the likelihood that the target responds. In literature it is commonly agreed that the human is usually the weakest link in IT security, as technology is often unable to capture the human sphere and in most cases cannot account for the human-related characteristics that play the key role in social engineering attacks. But could the recent advances and mainstream access to generative AI change how cybercriminals craft their attacks? This project aims to raise awareness about the changing nature of these attacks and explore the extent to which large language models such as ChatGPT could pose a threat in the context of spear-phishing. We will be using the Big Five Personality Framework, which has been studied in relation to phishing susceptibility, alongside AI-based personality profiling in order to create highly targeted spear-phishing training simulations and analyze their impact on how users perceive this type of cyber attack.

Pandemic prediction: An Agent-based model to explore the impact of vaccination on infectious disease spread. (3.79)

Anna Prokop University of Sheffield

The COVID-19 pandemic has highlighted the importance of vaccination. Vaccines work by helping the body to build immunity against a disease, therefore preventing serious illness and lowering the chance of infection. If a high enough proportion of a population is immune to a disease then herd immunity is achieved as it becomes hard for the disease to spread. Herd immunity plays a vital role in protecting vulnerable individuals who are unable to be vaccinated. Recent disease modelling research has largely focused on COVID-19, but what if a new disease emerges which has different characteristics? This project aims to develop an Agent-based model which can be used to explore the impact of vaccination and immunity on the spread of diseases and how this affects achievement of herd immunity. An Agent-based model is a computer simulation which allows the interaction of agents between each other and their environment to be modelled over time, where each agent acts according to a set of pre-programmed rules. This model allows characteristics that differ for various diseases and vaccines to be explored. This includes the incubation and infectious period of the disease, as well as the effectiveness of the vaccine and if immunity wanes over time. This will allow the model to be used to explore scenarios for future epidemics where the characteristics of the disease are currently unknown, with the aim of helping to inform vaccination policies and ensure that appropriate actions are taken to prevent the spread of the disease.

Artificial Intelligence within university education (3.80)

Asha Ali Manchester Metropolitan University

Pavlik (2023) defines Artificial Intelligence (AI) as 'the simulation of human intelligence in machines that are programmed to think and act like humans. These machines are designed to learn from their environment and experiences and are able to adapt their behavior based on this learning.' Generative AI tools (e.g. Chat GPT), as defined by Lund and Wang (2023) is 'a type of model that generates new data, as opposed to only classifying or predicting based on input data' It has become more commonplace and use by university students has increased. The use of generative AI to use within university assignments has become more commonplace and has become both a helpful tool and a cause for concern. On one hand, it can 'streamline administrative tasks, create subject-specific resources and provide personalised support for learners with special educational needs and disabilities' (Department of Education, 2023). This can help guide a student to answer the question correctly by giving prompts that are on the right track to the answer. However, there are concerns over academic integrity. For example, Dehouche (2021) 'used GPT-3 via AI Dungeon to generate text content of 3 types (academic essay, talk, and opinion piece)' to confirm that it could understand prompts and generate a convincing response; each text submitted to a plagiarism detector and was found to be original. Furthermore, there are concerns over biases within AI. For example, Roselli et al (2019) mention that 'AI systems learn from historical data, which encodes historical biases' thus lacking in nuance.

The rise of Artificial Intelligence in algorithmic trading (3.81)

Atiya Mahboob Lancaster University

Algorithmic trading (AT) is an example of the strides in modern financial strategy, where computer algorithms execute trades, leveraging speed and precision that is difficult to attain by human traders. AT involves the use of pre-programmed trading instructions for variables such as price, volume, and timing, to capitalise on opportunities efficiently. Artificial Intelligence (AI) and Machine Learning (ML) into algorithmic trading has dramatically amplified its capabilities. This has propelled financial markets into a new era of high-tech trading. One example of this is the processing of colossal datasets that provide predictive insight through sophisticated models and execute trades at a fast rate. This allows us to analyse complex market patterns, facilitate high-frequency trading and handle different types of data. However, the integration of AI in trading is not without its challenges. AI systems need to navigate a vast number of financial laws to prevent market abuse. Ethically, there are concerns over market fairness and the potential for exacerbating economic divides. Moreover, the inherent complexity and lack of interpretability of some ML models, can make it difficult to understand how they arrive at their decisions or predictions. Nonetheless, the advantages of AI-enhanced algorithmic trading include, speed, operational efficiency, advanced data analytics. Conversely, the challenges of integrating AI include, regulatory compliance, ethical implications, risk of market manipulation, system risk, and job displacement. As we stand on the cusp of a new era in finance, it's important to welcome technological advancements whilst ensuring we are socially responsible i.e. AI and ML do not exacerbate existing inequalities. This poster will cover the advantages and disadvantages of integrating AI with algorithmic trading.

Cloud-Driven Cognitive Care Platform for Dementia Patients: A Scalable and Cost-Effective Video Streaming Editing Application (3.82)

Ayesha Akter Joya London South Bank University

With the rising prevalence of dementia, there is an increasing need for innovative solutions that support cognitive care. This research presents a novel application developed within a commercial cloud infrastructure, specifically designed for healthcare professionals to aid dementia patients in their treatment journey. The proposed platform integrates seamlessly into medical practices, providing a user-friendly interface for doctors and nurses to upload study materials tailored to individual patient needs. Key Features of the solution include patient-centric learning through daily vlog uploads, fostering engagement and communication. The secure admin panels ensure data confidentiality and compliance with healthcare regulations. Leveraging cloud scalability, the platform remains efficient with increasing users and data. It offers a cost-effective pay-as-you-go model, making cognitive care accessible. The user-friendly interface ensures easy navigation for both healthcare professionals and patients, promoting widespread adoption. Incorporating cloud technology into dementia care not only transforms the treatment process but also fosters collaboration among healthcare providers, patients, and their support networks. This research contributes to the ongoing discourse on the intersection of healthcare and cloud computing, demonstrating how scalable, user-centric, and cost-effective solutions can positively impact patient outcomes and overall healthcare delivery.

Advancing Pedestrian Detection in Vehicles: A Deep Learning Based Approach to Scale Variance (3.83)

Aysegul Kayikci University of Greenwich

This project proposal addresses a crucial challenge in the field of autonomous driving: the reliable and real-time detection of pedestrians across various scales and distances. Pedestrian detection is a critical component of ensuring road safety in autonomous vehicles. This research aims to significantly enhance the accuracy and effectiveness of pedestrian detection systems in the presence of scale variations. Our approach involves the integration of the advanced YOLOv8 architecture, a cutting-edge object detection system, with the extensive KITTI dataset, which contains a diverse range of pedestrian sizes, distances, and environmental conditions. Leveraging this dataset, we seek to develop a pedestrian detection system that excels at recognizing pedestrians of all scales, with a particular focus on smaller, more distant individuals. The methodology encompasses data pre-processing, model development, and fine-tuning, with the primary objective of effectively addressing scale variations while maintaining real-time processing capabilities. Our evaluation metrics include mean Average Precision (mAP) and log miss rate (MR), providing a comprehensive assessment of the system's performance across different scenarios. Through this research, we aim to make significant contributions to pedestrian safety in autonomous driving. Our project aligns with the broader goal of advancing the capabilities of autonomous vehicles to ensure the protection of pedestrians, thereby enhancing road safety for all users. By combining cutting-edge technology with a diverse dataset, this project seeks to bridge the gap in pedestrian detection systems, ultimately enhancing the safety and reliability of autonomous vehicles in real-world conditions.

Robotic Manipulation for Assisting Individuals with Mobility Impairments in Household Tasks (3.84)

Charlie Leong King's College London

The advancement of robotic manipulation technology has shown immense promise in addressing the challenges faced by individuals with mobility impairments in performing daily household tasks. By integrating sophisticated sensing, planning, and control algorithms, these robotic systems aim to enhance the independence and quality of life for individuals with mobility limitations. The use of adaptive grippers and sensors allow for the handling of a variety of household objects, categorised by the approach taken to grasp the object based on its shape. The appropriate approach can be determined through a combination of computer vision and machine learning. The option of different grasping techniques for different objects to abide by societal conventions (such as holding a knife by the handle and not the blade) helps with the robot's integration into a household and appear less unnatural to users. Despite limited commercial spread, the ongoing advancements in robotic manipulation technology hold great promise for empowering individuals with mobility impairments to perform daily household tasks independently, thereby promoting their autonomy, dignity, and overall well-being. Robotic household assistance can help to increase personal autonomy by reducing reliance on other people such as caretakers, in hope of partially alleviating the mental barrier of achieving tasks. This poster will discuss robotic task planning and how different grasping techniques can be applied to ensure seamless integration into domestic settings while minimising physical and cognitive burdens on users.

Optimisation of Data Centre Operations Using the MIT Supercloud Dataset (3.85)

Diana Rocio Ventura Valdivia *Robert Gordon University*

In an era where 'the cloud' is often mistaken for an out of sight entity, this study confronts a harsh reality: the substantial physical footprint of data centres. With this in mind, this study aims to take advantage of the data provided in the MIT Supercloud Dataset – a comprehensive collection of detailed CPU and GPU usage information. With its extensive monitoring logs and time series data, the MIT Supercloud Dataset has been used previously in studies to explore the inner workings of data centre workloads, with the focus on performance optimisation. This study aims to dive deeper by using advanced machine learning techniques and meta-heuristic approaches. By detecting patterns and irregularities in resource utilisation, we can integrate AI-driven models to enhance decision-making and promote sustainable and efficient operations within data centres. A significant aspect of this research is the focus on sustainability. Through the optimisation of energy consumption and waste reduction, this dissertation seeks to actively contribute to the larger objective of decreasing carbon emissions from digital infrastructures. The expected results are not only energy savings but also the development of effective methodologies that can be implemented in other high-performance computing settings. Ultimately, this research has the potential to establish a new era for data centre sustainability and provide a roadmap for future progress in this area.

Developing an Android App to Diagnose Food Intolerances and Allergies using Image Recognition Technology (3.86)

Ella Davies *University of Birmingham*

Food allergies and intolerances are conditions that impact up to 20% of the population and tend to go undiagnosed without any treatment or advice. Using a food diary application to track food eaten may provide them with a clearer idea of what foods and hidden ingredients are affecting their daily lives. Furthermore, symptoms experienced by those suffering from a hidden allergy and intolerance may also be highlighted. This means that overall, they may be able to enjoy the food they eat again. For this project, the idea of developing an app that people can make use of means that this journey to food freedom will not take time out of their everyday life; and will provide accurate data about the food. This project includes the use of image recognition technology to record food intake. Alongside the use of a machine learning model, this means that advice can be provided via an app regarding types of foods that may create adverse reactions. This could be recorded daily, weekly, and monthly. However, the longer they use the app, the more accurate and useful the data will be to their everyday life. Early results from usability testing shows that using the app helps people to keep track of the possible allergens in their food.

IsoMorphs: User Assisted 3D Reconstruction of Single View 2D Isometric Images (3.87)

Ellie Farrar Lancaster University

Opening a 3D modelling program for the first time can be overwhelming, and the learning curve is not something everyone has time to overcome. The average indie developer doesn't have the resources to outsource the models they desire, or the knowledge required to produce one themselves. Single-view reconstruction has a unique set of problems that do not occur in traditional multi-view 3D reconstruction, namely occlusions and lack of depth information. Emerging approaches to single view 3D reconstruction rely on neural networks, but these are computationally heavy, don't allow user input, are rarely easily accessible or understandable to the average user, and can still produce rough results that are not desirable for a model that is to be used in a project. Neural networks can also stumble when presented with a target not present in the dataset it was trained on, which is likely to be common when producing models for a video game. Therefore there is a gap to be filled that meets the requirements of casual 3D reconstruction: reducing the knowledge required of the user, producing a usable model, and allowing user input. Specifying a consistent perspective for the inputs, specifically isometry, can be exploited to calculate potential positions of a given point on an image. Isometric projection has the properties of equal foreshortening and equal angles between coordinate axes, which allow for the input to not require a depth map to produce a desired output.

Designing an Autonomous Underwater Vehicle to Track Fish (3.88)

Eva Davis University of Nottingham

Fish tracking is incredibly important in preventing further damage to the environment and marine life. By understanding fish migration patterns, Harvest Control Rules can be developed to only allow fisheries to catch a certain number of fish based on the population of the area. Fish tracking can also alert us to any major ecological problems such as rising temperatures in the ocean, which can affect the distribution of fish. The aim of this poster is to design an autonomous underwater vehicle (AUV) that can follow a fish and record its movement. This would include a description of the hardware that would be used, taking into consideration that the electrical components must not come into contact with water, to prevent a risk of damage to the surrounding environment and to prevent the AUV from short-circuiting. The design must also include a safe avenue for any waterproof components outside of the main body to be connected to the central system inside. A control system must also be designed for the AUV. This would involve designing algorithms for functions such as keeping the AUV level, maintaining a constant depth level within the water and obstacle detection. Python would be used when writing the programs. In addition, a model will have to be trained to help the drone identify fish in the water so that it would be able to track it. To run both the model and the control system, a Raspberry Pi would be used as the microcontroller.

Spam Insights: Na•ve Bayes and Genetic Algorithm for Spam Detection (3.89)

Fiorella Scarpino *University of the West of England*

When emails first gained widespread popularity, unsolicited emails, commonly referred to as spam, were often harmless advertisements. However, this has now changed, statistics show that 56% of all emails sent annually are now spam. These emails have the capability to cause serious technical, business and personal problems, with phishing scams, cyber security threats, money transfers and fraud to name a few. Although email accounts are equipped with built-in spam filtering systems designed to prevent spam from reaching unsuspecting users, certain emails manage to avoid detection. These filtering systems overwhelmingly rely on classification models and while these systems are efficient, they also have drawbacks. The likelihood of false positives, mistaking legitimate emails as spam and false negatives, where spam email as misclassified as legitimate, are significant concerns within these models. The question remains: to solve the spam overload we now face, is there a more effective method to prevent spam from reaching users? Optimisation algorithms such as genetic algorithms may be the answer. When applied to feature selection, genetic algorithms can minimise the redundancies of features while also selecting the smallest set of features. This enhances the accuracy of the model, resulting in less false positives and negatives. This poster will outline a combination of a genetic algorithm for feature selection and na•ve Bayes, illustrating its effectiveness in spam filtering.

Can Artificial Intelligence Save us in the Fight Against Cyber Crime? (3.90)

Georgina Parker *University of Sheffield*

As the popularity of Android OS has grown in recent years, so has the prevalence of Android malware. The use of mobile devices in people's work and personal lives has made them an attractive target for attackers. A particularly common attack vector is the use of malicious Android applications, designed to extract valuable information from infected devices. In the early days of malware detection, methods could be categorised into static, dynamic, and hybrid detection. Static methods could determine 'digital fingerprints' or identify IoCs to discover malicious applications. Dynamic methods examined the behaviour of applications to spot suspicious programs. Hybrid methods combined the two for an even more powerful approach. Recent research has proven artificial intelligence (AI) to be useful in the problem of automatic Android malware detection. Considering the need for robust, scalable, and automated methods of malware detection, it's clear how AI can change the game. Models trained with static features have proven successful in detecting malicious APKs, while they struggle when faced with applications employing code deformation techniques. Dynamic models can detect malicious APKs at runtime based on information such as the APK's behavioural features, or device network traffic. As before, hybrid approaches can combine static threat signatures with information obtained at runtime to perform effective malware detection. This poster will introduce the reader to traditional malware detection methods, present a summary of Android malware detection methods using AI, and explore the wider applications of AI in malware and threat detection.

Munching Numbers: The Ideal Non-Integrated Bolus Calculator (3.91)

Haleena Hussain *University of Wolverhampton*

On the 21st of July 1921, Sir Frederick Banting and his colleagues made one of the most significant discoveries in modern history when they discovered insulin. This hormone allows blood sugar to enter the body's cells, providing them with the energy to function. Since that discovery, diabetes technology has gone through an astonishingly swift journey from unobtainable to relatively accessible for most diabetics - of which it is estimated that there are over five million in the UK. One of the most prominent technologies is the insulin pump, which - like much of the comparable equipment - often relies on a 'bolus calculator'. Taking several factors into account, a bolus calculator computes the amount of insulin needed for a meal or snack. These are available in varying methods - often they are integrated into the pump (though they are also available separately). Many diabetics who do not use insulin pumps find use in bolus calculators, though they are not always as efficient or effective as they do not take into account the many circumstances which influence blood glucose levels. For example, most non-integrated pumps do not factor in exercise, which, when paired with a post-meal insulin dose, may cause hypoglycemia. As diabetes is such a diverse disease there is no perfect fit for all, but there must be a more accessible product - this poster will discuss components (suggested by diabetics) which must be considered in an improved prototype. After all, as Sir Banting once said 'Insulin does not belong to me, it belongs to the world.'

Taboholic? Tackling Tab Hoarding (3.92)

Hamna Aamer *Brunel University London*

Taboholic? Tackling Tab Hoarding The tab feature was first introduced by InternetWorks in 1994 [1], eliminating the need to open multiple browser windows. In 2008, Google launched Chrome, which introduced isolated tabs. Isolated tabs allow other tabs to function, even if one of them were to crash. This leads to the problem that has been around since tabs were introduced: Tab Hoarding. The preliminary research found that 30% of people aged 19-67 had a 'tab hoarding problem' [2] . Tab Hoarding consequently brings in new challenges, such as draining computer resources, reducing the performance of the web browser, and the computer. Ultimately, tab hoarding affects environmental sustainability with its contribution to carbon emissions. While tab hoarding is common amongst most users, the research on this problem is still relatively new, and therefore, there are not many related works. My final year project aims to address this problem by providing users with a tool to manage their open tabs and raise awareness of the emissions that each tab is creating. Users can view currently open tabs, in a pop-up window, and close them as they view the list. Users are able to take steps towards reducing their carbon footprint as well as their tab hoarding habits. [1] Gregersen, E. (2020). Browser | computer program | Britannica. In: Encyclop³dia Britannica. [online] Available at: <https://www.britannica.com/technology/browser>. [2] Chang, J.C., Hahn, N., Kim, Y., Coupland, J., Breneisen, B., Kim, H.S., Hwong, J. and Kittur, A. (2021b). When the Tab Comes Due:Challenges in the Cost Structure of Browser Tab Usage. Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems. doi: <https://doi.org/10.1145/3411764.3445585>.

Insights and Predictive Modelling: An In-Depth Exploration of UK Insolvency and Liquidation Data Utilizing Python's Pandas Package (3.93)

Hannah Anderson *University of Liverpool*

The Insolvency Service is a UK government body responsible for managing bankruptcies and liquidations and publishing information related to them on their website. This information is critical in understanding the financial landscape of the UK, as it reveals the frequency of insolvencies, which is currently at 52.4 per 10,000 active companies. This data helps us analyse and comprehend the dynamic nature of financial insolvencies in the UK business world. In this poster, we will go beyond surface-level examination and explain how predictive models can be constructed using sophisticated data analysis tools within Python's Pandas package. However, we should note that the outcomes of predictive models may not be guaranteed, as numerous external factors can impact their accuracy. This uncertainty is a crucial aspect of understanding the comprehensive nature of financial insolvencies in the UK business domain. Before predictive analysis can be attempted, data cleaning is required from historical insolvency services data available on the Insolvency Service website. The poster will cover this in more detail, as there are many variables that can make the data impractical.

Exploring the creation of diverse test sets through Random Testing methods (3.94)

Hayley Young *University of Sheffield*

Software Testing is used to evaluate how effective a piece of software is at performing a given task. It is advantageous to the creators of said software that the process is efficient, finds the maximum amount of faults, and covers as much code as possible. When it comes to creating test sets that fit this criterion, diverse test sets tend to be more effective because they cover a bigger area of the input domain, allowing for more unique faults to be found and more code coverage. The creation of these diverse test sets can be done through Random Testing (RT). This approach involves randomly generating values from the input domain. However, there have been many doubts about the actual effectiveness of this method, especially in terms of failure detection. This paved the way for the creation of Adaptive Random Testing (ART). ART is a family of testing methods with many different implementations based on various intuitions and criteria, which aims to achieve an even spread of random test cases over the input domain. This project aims to explore the effectiveness of RT and some methods of ART, specifically the Select Test from Candidate Strategy (STFCS) and a Search Based Strategy (SBS) which uses a genetic algorithm, by testing their effectiveness on a simulated system that exhibits common failure patterns, to see which of these methods picks up the most faults and which produces the most diverse test sets.

Enhancing Safety and Empowerment: A Revolutionary Approach to Female-Focused Ridesharing Services (3.95)

Hetvi Harnishkumar Patel *University of Central Lancashire (UCLan)*

In recent years, ridesharing apps have revolutionized transportation by providing convenient and accessible transportation options. Nevertheless, the safety of female passengers has been a persistent concern. Despite constituting a larger proportion of commuters, women do not feel at ease in ridesharing services due to gender playing a prominent role in feelings of anxiety and fear of victimization, particularly in concealed environments such as ridesharing. As reported by the Office for National Statistics, 58% of women in the UK currently experience considerable discomfort when using ridesharing services unaccompanied during the night. The absence of proactive measures to address these concerns poses a notable barrier to the growth of ridesharing services; therefore, it is imperative to increase awareness about this issue. The project's aim is to develop a secure ridesharing application that will enhance safety and empowerment for solitary female rides, while also eradicating the challenges faced by women who may encounter awkward situations. By giving precedence to security concerns, implementing stringent safety measures, and promoting cooperation, a more secure and comprehensive transportation environment can be established for all riders. Innovative features like real-time tracking, code sharing, SOS button access and sharing trip details with trusted contacts contribute to a safer transportation environment, particularly for women travelling alone or at night. This enhanced safety not only empowers women to travel freely but also advances a culture of inclusivity and equality within the transportation sector. A high level of ridesharing safety will undeniably enhance the confidence of female passengers and consequentially increase ridership.

Tip-of-the-Tongue (3.96)

Jiayi Yao *University of Liverpool*

'Tip-of-the-tongue (TOT)' is a common phenomenon for human beings, which is the particularly disheartening situation of failing to recall something at certain times from one's memory, but accompanied by a feeling that retrieval is almost a triumph. For example, this challenge is prevalent when people try to recall titles of movies, remembering some characters, special scenes, or a portion of the line while they are not able to say the exact name. To address this issue, this project focus on developing an effective retrieval technique that can infer movie titles from these vague recollections. The core goal of TOT is to improve the accuracy and efficiency of retrieval. To achieve this goal, the project uses a state-of-the-art search engine that can filter a large database and associate part of a user's memory with 1,000 Wikipedia movie page IDs. This approach ensures that search results have extensive contextual information and reliability. This project is expected to greatly improve people's social interaction experience, especially when discussing movies. The data used in the project comes from the publicly available database of the TREC 2023 Tip-of-the-Tongue (ToT) Track project (i.e. [\url{https://trec-tot.github.io/}](https://trec-tot.github.io/)). In the provided dataset, `opus.jsonl` has \$231,852\$ Wikipedia pages and \$150\$ TOT queries in the training set. These data have been rigorously screened for openness, reliability, and relevance. In summary, this project represents a major advancement in the field of information retrieval. Utilizing ambiguous user descriptions and complex search algorithms, it is bridging the gap between fragmented memories and accurate movie recognition.

Reducing the Computational Burden of Multi-AGV Collision Avoidance (3.97)

Kara Quast *University of Stirling*

Warehouse automation increases cost efficiency, precision, and safety in the logistics industry, which is predicted to be worth 13.7 trillion euros by 2027. The expansion of logistics automation is enabled by autonomous guided vehicles (AGVs) working concurrently and efficiently. Multi-AGV path-planning algorithms are broadly classified as centralised or decentralised approaches. Centralised approaches are more reliable; however, they are significantly more computationally expensive. Current implementations of the centralised approach require all AGV paths to be planned before launching in order for AGV paths to take each other into account, ensuring collision avoidance. Should AGV paths be planned, while other AGVs are executing, all AGV executions are terminated and recalculated. This is computationally, temporally and spatially inefficient. This work takes steps toward developing a reliable Multi-AGV path-planner interface to ensure reduced computational complexity. We develop a new implementation adapted from a centralised multi-AGV path planner, developed by the Technical University of Vienna (TUW), that stores all executing AGV paths and uses this information to calculate new paths, without interrupting currently executing AGVs. We adapt an existing simulation for multi-AGV launch and staggered route computation to test our interface. We evaluate our interface by comparing its computational cost to that of the original implementation of the TUW planner at Gestalt Robotics GmbH. Our work provides a proof of concept for an approach to multi-AGV path planning that retains the reliability of centralized algorithms, while reducing their computational complexity. This will make logistics automation more scalable for the expansion of AGVs in industry.

The Admissibility of IoT Evidence in court. (3.98)

Katie Ainscough Canterbury Christ Church University

Internet of Things refers to physical objects that have software and sensors to collect data and share with other devices on the network over the internet. IoT devices can range from smart cars and watches to thermostats, doorbell cameras and baby monitors. Over the recent years there has been a huge increase in IoT devices with it predicted globally to have 64 billion devices installed in 2026. The growth is mainly coming from the emergence of these devices in cities, homes and becoming more integrated in peoples' everyday lives. With the more devices, the more data is being collected of users and their surroundings, this provides more opportunities of forensic evidence. IoT devices are already being used in criminal courts globally with the likes of Smart watches, FitBits and Teslas providing crucial information. To provide forensic soundness of the evidence guidelines and frameworks assisting in procedures like collection and processing need to be followed. However, there is no discussion of IoT devices specifically in UK guidelines currently. This means older, out-dated frameworks are being used which aren't adequate due to the huge differences to IoT Devices compared to traditional technology like servers, computers, and phones. This then questions the admissibility of IoT data and threatens the wealth of benefits that could be gained from using it in court. It is due to this that a new framework needs to be created with IoT in mind.

Enhancing road safety: risk-aware warning system in level 3 autonomous cars (3.99)

Kozerenko Elizaveta *University of Birmingham*

A real-world example that highlights the critical importance of technological advancements and their implications on road safety can be seen in the current state of autonomous driving. Currently, level 3 is the highest level with which the vehicle is allowed to be equipped and is the first one in which a car is considered truly autonomous. Even though the technology is so advanced, it brings a lot of drawbacks with it. One of the major problems is over-reliance on technology and consequently not paying enough attention to the driving process. Risk-aware warning systems aim to catch that attention when required and prevent dangers. Unfortunately, those systems are not as effective as desired, so I aim to propose possible improvements that can be made to enhance the performance of risk-aware warning systems. According to the statistics of the World Health Organization (2018), approximately 1.35 million people die annually, and 20 to 50 million people become injured due to car incidents. Moreover, 94% of car accidents were caused by human error. Increasing safety on the roads is one of the goals sought to be achieved by autonomous vehicles, so that has led to combining human abilities with technological innovations of self-driving cars, which has great potential for reducing human errors. Besides reading the literature, I conducted a semi-structured interview analyzing how humans perceive autonomous risks and designed an expert risk awareness system to mitigate identified shortcomings, hence potentially increasing safety. Finally, to evaluate the effectiveness of the proposed framework, another semi-structured interview will be conducted.

Enhancing Patient Well-Being: The Impact of Improved Communication on Happiness (3.100)

Laura Schofield *Manchester Metropolitan University*

Patient often are left with the sentiment that the NHS could be more effectively utilised, often leaving patients feeling underserved. Although this can be issue can be solved with a multitude of different answers, immediate solutions may not be feasible therefore efforts are underway to improve patients' satisfaction internally. Within Primary Care, common complaints include the lack of appointments and difficulties in ordering medications. To address these concerns, it would require embracing digital communications tools. Third-party software solutions are being integrated with existing software's to offer a solution. These innovative technologies offer a bespoke experience to patients and offer quicker response times compared to historical methods. This utilisation of cutting-edge communication methods is expected to not only improve patients' satisfaction but also streamline operations for the like of Primary Care. The goal of this project is to demonstrate that enhanced communication with patients can improve patients' satisfaction but also result in a more efficient service. While this transformation may not happen overnight it can prove the need for better communication to allow for a more patient-centric and responsive healthcare system.

From Movement to Melody: Generating Music with Neural Networks from Dance (3.101)

Mariia Slobodianiuk *Durham University*

Creativity is the ability to generate ideas or artifacts that are novel and valuable. For years now, AI has had the capability to create music, yet the compositions often lack the depth and appeal of human-made music. Studies indicate that listeners can frequently distinguish AI-generated pieces from those created by humans, highlighting AI's current limitations in emulating genuine creativity. As we navigate the complexities of developing truly creative AI, an intriguing alternative emerges: leveraging human dance as a novel foundation for music generation. Dancing is an innate human behavior, a natural and joyful expression of our response to music. It's not only a form of artistic expression but also beneficial for our mental and physical health, serving as a medium through which we instinctively engage with and interpret music. Interestingly, certain animals also exhibit dance-like behaviors in response to rhythmic sounds, suggesting a broader biological inclination towards rhythmic movement. Given dance's role as a creative and intuitive response to music, it presents a compelling basis for a new approach to music creation. This project explores the potential of using dance as the foundation for generating music, proposing a method where the spontaneous, expressive movements of dance directly influence musical composition. This approach not only embraces human creativity but also offers a fresh perspective on the interaction between movement and sound, promising avenues for innovative music generation technologies. Further details of this exploration will be shared in my poster presentation.

AI-Driven Predictive Analytics for Mitigating Climate-Induced Agricultural Droughts in the Horn of Africa (3.102)

Maryama Mohamud *London South Bank University*

The Horn of Africa, particularly Somalia, is experiencing recurrent and severe famines due to prolonged droughts and insufficient rainfall, severely impacting the population, land, and livestock. These climate-induced disasters lead to widespread displacement and loss of vital resources, such as farms and livestock, essential for the sustenance of affected communities. This project aims to mitigate the impacts of climate change in the region through AI-driven predictive analytics, leveraging satellite imagery, weather forecasts, and historical climate data to forecast droughts. Employing machine learning algorithms enables early identification of potential droughts, allowing farms, NGOs, and governments to proactively mobilise resources and strategies. As a Somali computer science student passionate about agriculture, I am personally and humanitarily invested in addressing these challenges. The project explores smart agriculture, an emerging field where predictive analytics play a crucial role in adapting to climate variability. Predicting future patterns is vital for agriculture, given the unpredictability of crop stability and weather conditions. Research suggests that combining various indices, such as the Crop Moisture Index (CMI), Soil Moisture Deficit Index (SMDI), Evapotranspiration Deficit Index (ETDI), and the Palmer Crop Moisture Stress Index (CMSI), could enhance drought forecast accuracy. These tools, integrating data on precipitation, soil moisture, evapotranspiration, and crop-specific factors, offer valuable insights into agricultural droughts and their potential impacts, making them critical in the fight against climate-induced adversities in agriculture.

Could ChatGPT be a potential tutor in the future? (3.103)

Mithara De Alwis *Durham University*

'ChatGPT is an artificial intelligence program that can understand and generate human-like text based on the prompts it receives' ~ the definition of Chat GPT by Chat GPT. Studies show Chat GPT is 'the fastest-growing consumer application in history, having reached 100 million monthly active users' This Large Language Model (LLM) can enhance its natural language processing capabilities by serving as a potential tutor; A tutor provides personalised education and support to help a student to progress academically beyond a traditional classroom. By incorporating a diverse range of educational materials as training data, ChatGPT can adapt to various learning levels and styles. The model can offer 24/7 support, provide instant feedback, decomposing complex concepts into understandable segments. This approach proves that 'students who engaged with the chatbot demonstrated greater engagement' especially for students that are hesitant to ask questions in a conventional setting. The proposition of deploying ChatGPT as a tutor sparks numerous ethical concerns within the educational landscape. The poster will explore the effects of integrating generative AI into personalized learning environments, emphasising how Chat GPT could be a complementary tool rather than a replacement for humans. This separation is crucial as only human teacher can instill discipline and manners, which a computational robot is incapable of doing. Prior to delving into this prospect, it is essential for one to reflect on their personal ethical stance on this very matter. The integration of ChatGPT could mark a pivotal moment in educational history, proving to be either transformative or problematic.

Gamifying rehabilitation: A mobile app for enhance sports injury recovery (3.105)

Nia Geary-Andrews *University of Birmingham*

Sports injuries, if not rehabilitated properly, can sideline athletes for extended periods of time. Low adherence to prescribed exercises is a major reason for incomplete or ineffective rehabilitation. This project explores the development of a mobile application that blends physical therapy with the engaging elements of gamification. The app was created using Android Studio and programmed in Kotlin. It features a football-themed journey in which athletes progress through a virtual season, with in-game milestones mirroring their real-life rehabilitation progress. This includes activities ranging from completing physical therapy exercises to watching educational videos on mental wellness. Given the intertwined nature of physical and mental recovery, the app aims to address both aspects, focusing on a holistic approach to the rehabilitation process. The application stands out for its unique focus on a sports-specific audience and the integration of gamified elements to create a more engaging experience. Through this approach I aim to provide athletes with a more thorough tool than is currently available to support their rehabilitation journey. Incorporating user feedback from athletes has allowed for fine-tuning the application, creating a user-centric experience.

Understanding Video Advertisements (3.106)

Oyin Alo University of Liverpool

The evolution of video advertisements, from their origin on television to widespread presence on digital platforms, signifies a profound transformation in marketing. The first TV ad in 1941 initiated this era, rapidly adopted by companies, leading to the omnipresence of video ads promoting diverse products online. Addressing the complexities of ad production, this project utilises an existing dataset to train models with emotion tools, classifying ads as exciting or not. The motivation lies in predicting the success of videos in promoting products or services. The project integrates explainable AI (XAI) techniques to comprehend classifier-prioritised features, seeking correlation with human intuition to build transparent and trustworthy AI systems aligned with human reasoning. Focusing on binary classification, the project endeavours to construct and refine a model for categorising videos as exciting or non-exciting, accentuating justifications for classifications. Specific requirements include efficient video file processing, classification level implementation, and the use of metrics like precision and recall. The accurate interpretation of the classifier model incorporates advanced techniques such as LIME and SHAP. Additionally, the project emphasises enhancing classifier accuracy through an efficient system for video categorization, with a pivotal emphasis on interpretability in any employed explainer method. Implemented in Python for its clarity and flexibility, the video classification model involves frame extraction using OpenCV. Simultaneously, the explanation model aligns with principles from 'Explaining the Predictions of any Classifier', primarily utilising LIME for its interpretability and trustworthiness, ensuring user-friendly and effective model implementation.

Picture the Past (3.107)

Rowan Mather *University of Warwick*

Overcoming the dissonance between a modern day landscape and its historical counterpart can be challenging if it has long gone to ruin. To aid visitors, many popular historical sites provide an immersive series of images showing our best guess of how it would have looked. Sketches on notice boards are commonplace, but we are increasingly seeing virtual or augmented reality experiences as well. In the last year, I have been working on a dissertation project which facilitates exactly this, without creating a bespoke experience from scratch. Users are able to add their own 3D models corresponding to different time periods, label them, and view them in their real-world location. Enabling curators of lesser known historical sites and archaeological researchers, the subject of their interest can be made easily accessible on a mobile device. This poster will detail the benefits of augmented reality in such educational environments and how one could create a virtual experience with this tool. You will see it in action at various points of interest and hear from the public whether they believe learning in a digital environment will ever catch on.

Investigating the use of state-of-the-art video generation models for generating sign language videos (3.108)

Saba Vaez Shooshtari *University of Sheffield*

Sign Language is a remarkable and dynamic form of human interaction used by the hearing-impaired community. Currently, there is a major communication gap between the hearing and hearing-impaired communities. One of the tasks that can assist in bridging this gap is sign language production. Sign language production involves generating sign language videos that correspond to an inputted spoken language sentence. Generating these sign language videos is a highly complex task due to the intricate details in hand movement and other features such as facial expressions and eye gaze when performing a sign. Video generation models have had very impressive advances in recent years and show great potential for tackling the task of sign language production. Despite these incredible advances, little research has been done on the application of these models for sign language production. Due to the minimal research in this area, the high complexity of generating sign language videos, and the limited size of sign language datasets, this project aims to investigate the use of state-of-the-art video generation models to generate sign language videos.

An Unsupervised Clustering Approach for Topic Detection: The Case of Social Media Monitoring (3.110)

Sarah Nolan *University of Birmingham*

Monitoring online feedback is crucial for brands to address concerns effectively. Detecting topics in text aids in providing targeted assistance to customers. However, training topic detection models assume the availability of large, labelled datasets, posing a challenge in feedback analysis due to the labour-intensive nature of manually labelling datasets. This research explores using zero-shot entailment and unsupervised clustering to generate labels for data. Applying this to classify text-based social media posts sent to an airline. We propose utilising BART, a denoising autoencoder, to initialise clusters and cosine similarity measures to form labelled clusters. Cluster allocations can be used to classify text and we find further improvements in classification accuracy by training a classifier on these. Results from existing, labelled text datasets compare the effectiveness of this approach to supervised classification using BERT, a pre-trained language model. Using cluster allocations from the proposed approach to fine-tune BERT, the average F1 score across three standard text datasets is found to be 86.0, compared to 94.0 for the supervised approach. Topics in the text corpus are identified for use as labels using K-means clustering and word clouds. We have evaluated classification performance by running a human experiment to categorise a sample of 1300 social media posts to review results, yielding an F1 score of 79.1. These results demonstrate the ability of clustering to perform topic detection at scale with minimal supervision in cases where pre-labelled datasets are scarce, eliminating the need for manual label assignment by human experts, which can be subjective.

Furthering cardiovascular disease treatment and research using technology (3.111)

Savannah Raymond *Aberystwyth University*

Diagnostic tools for cardiovascular diseases are increasingly common, with existing equipment in hospitals being utilised for performing tests on patients. From ultrasounds to MRIs, these machines are accessible for most UK citizens. Medical developments have even lead to specific machines that can be used to diagnose and monitor the heart such as an echocardiogram which measures blood flow through the heart to detect any abnormalities. All this innovative technology is great for the purpose of preventive care and diagnosis however patients may feel lost once they have received a diagnosis. The treatment provided for patients with heart diseases can range massively with some spending the rest of their lives on medication to operations or even a mixture of both. Developments in not only medication but also technology has saved lives. Technological inventions such as pacemakers and artificial valves have helped people suffering from cardiovascular diseases carry on leading a relatively normal life. Within my poster I would like to expand on how technology is currently being used to treat and research heart conditions. Artificial intelligence is an ever-growing field and is becoming more prominent in medical research. I would also discuss how AI is currently being used especially in places such as data analysis and in medical imaging. I also plan to discuss and show examples where new and upcoming pieces of hardware is making big changes in the way scientist research and treat a wide range of cardiovascular diseases.

You don't need to kill to be a killer. (3.112)

Saxon Partridge-Smith *University of Wolverhampton*

In the name of technological evolution, we find ourselves standing with the ominous ticking of the Doomsday Clock echoing in the background, signifying the critical juncture humanity has reached. Not confined by the boundaries of GMT or EST, this symbolic timepiece warns us of the proximity to our own demise, a consequence of the very technologies we rely so heavily upon. Our existence is intricately woven into the fabric of technology, controlling every aspect of our lives, from the mundane to the critical. From the wheels of our cars to financial systems, life saving hospital equipment, the precision of navigation systems, and the ease of communication through telecommunications the level of interconnectivity paints a portrait of our dependence on technology. As world tensions ever worsen, the threat of cyber warfare posed by nation-state-backed cyber attacks loom large. With the average cost of approximately \$1.6 million per incident, the potential for devastation is undeniable. This poster endeavours to unravel the narrative of a cyber aftermath, demonstrating the cascading series of events that ensue when the destructive power of technology is harnessed on a grand scale. This visual journey illuminates the detrimental power a cyber attack holds, exposing the fragility of our interconnected world and urging reflection on the precipice of a technological demise. The clock is ticking, and the stakes are high as we confront the balance between humanity and the very creations that threaten to unravel our existence.

An Investigation into the Applications of Artificial Intelligence for Perinatology and Miscarriage Prevention (3.113)

Sienna Knowles *University of Winchester*

Women's health is historically neglected, with disparities evident across research funding between genders, including the financing dedicated to erectile dysfunction receiving five times more than premenstrual syndrome, despite 90% of females suffering compared to 19% of males. One-third of the UK female population experiences reproductive well-being complications, however only 2.5% of public funding is allocated to female reproductive research. Motivated by polycystic ovary syndrome, a condition linked to 10 - 15% of miscarriage risk, this research explores innovative approaches to anticipate, prevent and counteract spontaneous abortions using artificial intelligence (AI) technologies.

Defined as the spontaneous termination of a pregnancy, the intricacies of miscarriage aetiology often evade timely detection and diagnosis. Despite this, nine main established factors contribute to spontaneous abortions: chromosomal abnormalities, placental problems, cervical insufficiency, infections, chronic conditions, thrombophilia, abdominal trauma, congenital disorder and substance use. Investigating the interaction of these factors with maternal and foetal physiological processes provides a necessary comprehensive understanding of determining a multifaceted spectrum of avenues for AI, including genetic data analysis, image examination and predictive modelling.

Existing healthcare technology induces potential innovative applications for miscarriage prevention, including repurposing the Mirai AI model, developed for breast cancer prediction, to analyse perinatology data. The glucose monitoring technology utilised by diabetic patients conceptualises the avenue of real-time foetal monitoring using a non-invasive wearable device. However, AI for perinatology raises a myriad of ethical and practical concerns, including the psychological impact of inaccurate predictions, concerns regarding wireless device usage during pregnancy and the ethnic disparities in AI analysis.

Decolonisation of AI: Addressing Regional Bias (3.115)

Sonia Koszut King's College London

The growing popularity of generative AI has brought attention to the issue of biases. While much research has focused on biases like gender, political affiliations, and ethnicity, there's a notable gap in addressing regional bias within Large Language Models (LLMs). Current state-of-the-art LLMs are primarily trained on English-speaking data, especially from the US. A recent study by the University of Copenhagen (Cao et al., 2023) reveals that ChatGPT tends to reflect American norms, regardless of user context, raising concerns about its universal applicability. In contrast to suggestions for regional alternatives like the Nordic language model, we argue that creating numerous localized LLMs is impractical, expensive, and time-consuming. Instead, this research proposes an alternative approach by exploring prompt engineering techniques to enhance user experiences on widely used platforms such as ChatGPT. Additionally, we suggest a practical solution: dynamically adjusting attention weights during the query processing stage. This allows GPT to promptly prioritize local data sources, aligning its responses with user-specific language and cultural preferences in real-time. This two-fold strategy aims to address the challenges of regional bias in a more straightforward and efficient manner, providing users with a conversational AI experience that is culturally sensitive and inclusive.

Medical laboratory dashboard with an integrated diagnosis support system. Ê (3.116)

Sonia Tadlaoui *University of the West of England*

The prevalence and complexity of anaemia, a common and potentially dangerous blood condition affecting both children and adults, necessitate the development of an efficient clinical decision support system for its diagnosis and management. Anaemia is characterized by either a lower-than-normal number of red blood cells or a low level of haemoglobin in the blood, leading to symptoms such as fatigue, weakness, and shortness of breath. Due to the existence of several types of this blood condition, influenced by multiple factors, its detection presents challenges that require a comprehensive and timely approach. This project aims to address these challenges by conducting an in-depth exploratory data analysis of the Mendeley Dataset. The dataset will serve as the foundation for training multi-class classification models, which will play a pivotal role in the accurate diagnosis of different types of anaemia. The goal is to achieve high accuracy in predicting and classifying anaemia types based on red cells morphology. In parallel, the project will involve the development of a laboratory management system using Python's Django framework. This system will provide a platform for clinicians to seamlessly interact with the integrated decision support system, enabling them to make informed predictions and decisions based on their patients' test results. By leveraging these technological advancements, the project seeks to enhance the efficiency and accuracy of anaemia diagnosis, ultimately contributing to an improved patient care. This comprehensive approach, combining data analysis, machine learning techniques, and user-friendly interfaces, holds the potential to revolutionize the diagnosis of anaemia in clinical settings.

Conversational Slot Induction Using Natural Language Processing Techniques (3.117)

Yourong Chen *University of Liverpool*

In the evolving landscape of conversational AI, task-oriented systems urge critical innovation to transform and improve human-machine interactions. These conversational systems, which facilitate a range of services from booking to inquiries, hinge on the accurate interpretation of slot values—specific pieces of information extracted from user discourse. Slot values, critical for the system's ability to respond accurately, however, are traditionally derived from predefined domain ontologies and encompass various data components such as time, place, and quantity. Addressing the challenge of manual slot value extraction, a process both labor-intensive and costly, this research leverages advanced NLP and machine learning techniques for automatic conversational slot induction. Utilizing the comprehensive dialogue dataset from MultiWOZ 2.1, numerous experiments are taken to enhance the extraction process's accuracy and efficiency. Furthermore, through a meticulous analysis of word overlap and the integration of extensive conversational data, algorithms are refined to revolutionize the identification of slot values and overcome the current limitation of time-consuming and costly. This approach is expected to bring significant improvements to system performance and find applications across diverse domains, including customer service, booking services, and online shopping. The outcome of this project promises to make conversational systems not only more aligned with user expectations but also more accessible and practical for daily applications, from customer service and booking services to online shopping. This development represents a practical step forward in conversational AI, offering tangible benefits for both businesses and consumers by making digital interactions more intuitive and responsive.

ESP WiFi Toolkit: A Comprehensive Solution for Wireless Network Security (3.118)

Yuxuan.Feng *University of Liverpool*

With the proliferation of wireless networks, the need for robust security solutions has become paramount. The ESP WiFi Toolkit emerges as a versatile and indispensable tool tailored to meet the evolving challenges of network security. Equipped with advanced features such as WiFi scanning, analysis, sniffing, packet monitoring, and deauthentication and disassociation detection, it empowers users to comprehensively assess and fortify their networks against potential threats. Furthermore, the toolkit integrates cutting-edge functionalities including anomaly detection, per-session key exchange, and packet-level encryption, ensuring the integrity and confidentiality of transmitted data. Leveraging the power of the ESP32 microcontroller, this solution offers a seamless user experience characterized by intuitive controls and high-performance capabilities. As cyber threats continue to evolve, the ESP WiFi Toolkit stands as a beacon of defense, enabling network administrators and security professionals to proactively identify vulnerabilities and mitigate risks. By providing a holistic approach to network security, it establishes a solid foundation for safeguarding sensitive information and preserving the integrity of wireless communications. In summary, the ESP WiFi Toolkit represents a significant advancement in the realm of wireless network security, offering a comprehensive suite of features designed to address the complex challenges of the digital age.

MSc (or final year for integrated masters courses)

'AI OR HUMANS?' THE FUTURE OF WORK (4.119)

Abena Frimpomaa Tufuor *Aston University*

The evolution and impact of Artificial Intelligence in our world today is a growing concern that can no longer be overlooked. Firms, institutions, businesses, and people are all on a quest to remain relevant in the market as machine learning and deep learning algorithms are constantly being developed to perform tasks humans were once giants in. Unavoidably, artificial Intelligence is here to stay, and the competencies of machines are still being explored. However, with the pace of technological expansion and innovation, it is crucial to set in place measures, policies, and structures to control its impact on the sustainability of societies and individuals. We might not have the power to ultimately control advancements in technology, but we have the alternative of applying its benefits wisely and minimising the negative effects it might have on human jobs in the future. Therefore, the aim of this poster is not to criticise the growing advancements of AI, but to decipher areas where humans and machines could co-exist to create a sustainable future. With a focus on job security, innovation and upskilling of human competences, this poster looks extensively into an unknown future of work, where the threatening effects of unemployment and ethical biases of AI are effectively combated through an effectual collaboration between individuals, governments, schools, and firms.

Use of Explainable AI to validate bio-inspired algorithms (4.120)

Anita Applegarth Aberystwyth University

Bio-inspired algorithms, a sub-category of black-box algorithms, have grown in popularity due to their ability in solving NP-Hard problems. The desire to use these successful black-box models in critical applications such as medical diagnosis, investment recommendations, and autonomous self-driving vehicles, is increasing at a fast pace. They are not without critics, with some advocating for them to be banned in these high-stake environments. There are now hundreds of 'different' bio-inspired algorithms, but questions are being raised about their effectiveness, how to judge their performance and whether they are just a clone of a successful technique with a new name. Humans are involved in the selection and application of algorithms and if we don't trust them, we will not use them. Explainable AI (XAI) aims to provide clear and understandable explanations of a model's decision-making process. I propose to apply XAI to verify the quality of bio-inspired algorithms. While the application of XAI techniques have been developed with other machine learning models like DNNs, we can take some of these approaches and apply them to bio-inspired algorithms to help understand their decision-making process. The separate fields of XAI and bio-inspired algorithms are both growing at great speed and like most fields in artificial intelligence, they would benefit from agreed frameworks, taxonomy, and benchmarks. There have been several research papers which investigate using nature-inspired algorithms to help XAI, but using XAI to explain bio-inspired algorithms is a missed opportunity and now an urgent need.

Prevalent Mental Disorders Predictions among Adults Using Machine Learning Techniques (4.121)

BILIKIS ALAYO *Sheffield Hallam University*

The current global mental health crisis is a pressing issue, exacerbated by the COVID-19 pandemic, and impacting around one billion individuals globally. Recently, the most prevalent mental disorders, anxiety and depression, have shown significant rises of 26% and 28%, respectively, affecting individuals' overall well-being and increasing suicide risks. Researchers are using machine learning algorithms to help medical practitioners detect mental health problems early on, allowing for timely intervention and lifestyle modifications. Supervised machine learning algorithms are commonly used in this domain due to their predictive power, while unsupervised algorithms are rarely used due to their focus on feature engineering and data insight. However, both algorithms can be combined to build a mental health predictive model for effective medical interventions. This study compares supervised and unsupervised machine learning techniques for predicting adult mental illnesses. Two models were implemented using a publicly available mental health dataset from the Substance Abuse and Mental Health Services Administration's (SAMHSA) website: the first uses only the supervised algorithm to predict anxiety, depression, and posttraumatic stress disorder in adults, and the second combines both algorithms. Both models have a minimum accuracy of 60%, although the supervised classifier model performs slightly better. Overall, the research predicts common mental disorders in adults and demonstrates that an individual could have multiple mental conditions. This could aid researchers in selecting a technique for constructing predictive models that can assist mental health practitioners in underserved regions to diagnose and develop efficacious treatment strategies, thereby guaranteeing patients receive precise and efficient medical attention.

The Quantum Internet: Unleashing the power of Quantum Entanglement (4.122)

Bani Chhohan *University of Wolverhampton*

The quantum internet promises to change the world in ways we cannot imagine. It has the potential to create secure, unhackable communication. Vulnerabilities plague the current internet, but the new quantum internet can build highly secure, interconnected systems capable of transmitting quantum information. The quantum internet uses the principles of quantum mechanics, specifically superposition and entanglement, to transmit information. This is achieved through quantum bits, or qubits, which, unlike classical binary bits, can exist in multiple states simultaneously, thereby enabling the processing of vast amounts of information in parallel. Central to the quantum internet's promise is quantum key distribution (QKD), which exploits the properties of quantum mechanics to create virtually unbreakable encryption. This poster will examine the fundamentals of quantum mechanics that underpin quantum networks. We will also explore the global efforts underway to develop the necessary infrastructure for the quantum internet, highlighting innovative technologies such as quantum repeaters and experimental satellites beaming entangled pairs of photons. These technologies are critical for enabling long-distance transmission of qubits, thus overcoming one of the significant hurdles in the deployment of quantum networks. Finally, we will discuss the broader implications of quantum communications, touching on how these technologies could transform various sectors by ensuring ultra-secure data transmission, enhancing privacy, and potentially revolutionising fields such as cybersecurity, computing, and beyond. Understanding these principles and technological advancements is crucial to building a quantum future as we stand on the brink of a quantum reality.

IoT approach to address food wastage within UK schools for sustainability (4.123)

Bismah Najeeb *University of Birmingham*

There is a significant annual food wastage in UK primary schools, amounting to 80,000 Tonnes annually. This issue contributes to the broader ecological crisis and demonstrates a lack of sustainable practices in school canteens. SMART Munch is an IoT solution that aims to instil long-term sustainable practices amongst children. Our user-centred design approach led to understanding our user needs, which aided our iterative design process in developing an intuitive solution. SMART Munch will be installed as a smart dining area associated with smart bins and trays. It is designed to adjust consumption behaviours through real-time feedback to educate children aged between 7-11 years old on nutritional and healthy eating habits using interactive displays that leverage gratification and gamification for positive reinforcement. It will allow school administrators to perform actionable informed decisions based on data analyses acquired from sensors to optimise food portion control and waste management. Our evaluation encompasses heuristic analysis and user testing; it confirms the approach's effectiveness and potential for scalability. By introducing a sense of responsibility and awareness among children, Smart Munch promotes sustainable practices, positioning itself as a catalyst for societal progress in the face of ecological challenges.

The Materiality of Data: Do IT functions within organisations understand the role they can play in reducing the carbon footprint of data? (4.124)

Carly Murdoch-Dyson *Cambridge University*

Data's role in decarbonisation is understood, however the paradox is not widely discussed:-Data can support enhanced climate modelling.-The processing and storing of data is very energy intensive.The role of data in organisations is also understood:-Organisations process and store data as part of their BAU activities.-Organisations use data to support business decisions.The rising energy consumption associated with data is widely viewed as an IT industry problem, and one for the IT industry to solve, often at a technical level, and the role that individual (non-IT) organisations can play in reducing the impact of data on climate is not widely discussed. With the dramatic rise of technologies such as Artificial Intelligence and Machine Learning, which are based on the phenomenon of Big Data, organisations are increasing their reliance on data. Most organisations, across industries, will have an IT function to support them, and data management will often fall under this remit.This research seeks to explore where the perceived responsibility for addressing the impact to climate caused by data usage sits within an organisational setting, and to what extent are IT functions prioritising its remediation.

To what extent does the integration of Generative AI impact the perceived value of computing as a subject or discipline among secondary school students (4.125)

Carrie Anne Philbin King's College London

The rapid progress of generative artificial intelligence (AI) is fundamentally reshaping traditional perspectives on knowledge and skills, with profound implications for computing education. This necessitates a thorough examination of the relevance and timeliness of computing as a subject, especially for secondary school students who are making critical decisions about their future qualifications. A 'within subjects' empirical study of two school classes is proposed that explores the effects of integrating generative AI in creating digital art on secondary students' perceptions of the value of computing, programming self-concepts and beliefs, and creative expression.

Sleep Chronicles - Can We Crack The Sleep Code? (4.126)

Cherie Vartika Stephen King's College London

Sleep, a fundamental aspect of human physiology, plays a crucial role in overall well-being, cognitive function, and health. This project explores the intricate relationship between lifestyle factors and sleep patterns, proposing a novel hybrid neural network model. By integrating traditional time-series analysis with advanced Recurrent Neural Network and Long Short-Term Memory layers, the model aims to offer a comprehensive understanding of the nuanced dynamics shaping our sleep behaviours. The study adopts a holistic approach, considering variables such as physical activity, disorders, stress levels, age, sleep duration and other relevant lifestyle elements. It utilizes sleep index metrics like the Pittsburgh Sleep Quality Index, Epworth Sleepiness Scale, Insomnia Severity Index and other such indexes for a comprehensive sleep health assessment. The incorporation of RNN and LSTM layers is a key feature, empowering the model to discern temporal dependencies and long-range influences. This capability allows for a nuanced examination of how sleep patterns evolve over time. The primary goal is not only to achieve high predictive accuracy but also to enhance interpretability, shedding light on influential factors governing sleep outcomes. This research has far-reaching implications for personalized health interventions, as addressing lifestyle factors affecting sleep can positively impact various aspects, including mental health, memory consolidation, and the decreased risk of chronic conditions. The proposed model emerges as a promising avenue for advancing precision in sleep pattern predictions, contributing significantly to the evolving landscape of sleep research.

The Fabric of Data: Tailoring the Future of Fashion with Data-Driven Digital Twins (4.127)

Dorsa Samavi *Manchester Metropolitan University*

The advent of digital twins in the fashion industry presents a theoretical avenue for reducing return rates and, consequently, the carbon footprint associated with these returns. This research explores the premise that digital twin technology, through its advanced virtual representations of clothing and accessories, can enhance consumer purchasing accuracy and satisfaction. By providing an immersive preview of fashion items, digital twins have the potential to diminish the frequency of returns, a process typically accompanied by significant carbon emissions due to transportation and packaging. From a data science viewpoint, the research constructs a theoretical model, drawing upon interdisciplinary academic literature to explore the implications of digital twins for consumer behaviour and supply chain management. The central hypothesis posits that digital twins may significantly improve the online shopping experience by offering an interactive and detailed preview of products, which could lead to a better match between purchased items and consumer expectations. Although the study does not engage in empirical data analysis, it suggests that digital twin technology holds the potential to generate a wealth of consumer interaction data. This data, when analysed, could yield predictive insights for enhancing product design, customisation, and inventory control, thereby reducing unnecessary returns and their associated carbon emissions. By situating the discussion within the context of data science and sustainability, the research underscores the transformative potential of digital twins to act as a catalyst for a more data-informed and environmentally responsible fashion industry. It posits that the strategic use of digital twins could contribute to a paradigm shift in consumer purchasing patterns, ultimately fostering a more sustainable lifecycle for fashion products.

Beyond hearing loss: Experience sounds with AI (4.128)

Eleni Kougioumtzi *University of Oxford*

For individuals experiencing hearing loss, navigating daily life can be challenging, especially when routine situations involve environmental sounds like a doorbell, a baby crying, an alarm, a dog barking, or even a knock on the door. Existing solutions often concentrate on specific scenarios, such as light-based doorbells or alarms, and require installation in chosen locations, limiting their adaptability in diverse settings. But what happens when someone finds themselves in an unfamiliar environment? Can technology bridge this gap? This proposal introduces an innovative AI-driven system designed to process real-time surrounding sounds and identify those that truly matter. By employing sound processing algorithms and machine learning models, the system continually monitors the environment, recognising key sounds. Users can also specify their homes, workplaces, or any other familiar environment. This allows the model to learn which sounds are meaningful in each setting and personalise its results accordingly. Subsequently, a user-friendly wristband, equipped with a display screen and adjustable vibrations, provides customisable alerts for the identified sounds. The device ensures users receive information in a way tailored to their preferences and priorities. In contrast to traditional solutions limited to particular places and scenarios, this dynamic AI-based approach can effectively assist people with hearing loss to stay aware of noteworthy events both in familiar and novel settings, paving the way for a more inclusive future.

Personalized Treatment Plans for Sickle Cell Disease: Revolutionising Healthcare through AI and Machine Learning (4.132)

Grace Abuo University of Wolverhampton

Personalized Treatment Plans for Sickle Cell Disease: Revolutionizing Healthcare through AI and Machine Learning. Sickle cell disease (SCD) is a hereditary blood disorder that affects millions globally, causing pain, organ damage, and a reduced lifespan. Traditional treatment approaches have often taken a one-size-fits-all approach, but advancements in Artificial Intelligence (AI) and Machine Learning (ML) are now ushering in a new era of personalized medicine tailored to the unique genetic makeup and severity of each individual's condition. AI and ML algorithms have proven to be invaluable tools in analysing vast datasets, including genomic information, to identify patterns and correlations that may influence the progression and treatment response in SCD patients. By integrating an individual's specific genetic information into the treatment plan, healthcare providers can optimize interventions, minimizing adverse effects and maximizing therapeutic benefits. The severity of SCD varies significantly among patients, and AI algorithms excel at analysing complex datasets to predict disease progression and recommend interventions. These technologies enable healthcare professionals to stratify patients into risk categories, allowing for a more targeted approach to treatment. Personalized treatment plans leverage AI to continuously analyse real-time patient data, adapting interventions based on dynamic changes in the individual's health status. This ensures that the treatment approach remains current, effective, and minimizes the risk of complications. AI and ML integration in personalized SCD treatment plans is a ground breaking healthcare advancement. These technologies reduce side effects and enhance patient quality of life, heralding a transformative era in healthcare that offers hope for those with SCD.

'Emerging Technologies': Privacy and Security in Online Social Networks (4.133)

Havilah Oriazowan *Edge Hill University*

'Emerging Technologies': Privacy and Security in Online Social Networks Havilah Oriazowan (Edge Hill University) 2024 The rapid evolution of emerging technologies has significantly transformed the landscape of social networks, presenting both unprecedented opportunities and challenges, particularly in the realms of privacy and security. This theoretical explores the intricate interplay between these evolving technologies and the fundamental aspects of safeguarding user privacy and ensuring robust security measures on social platforms. In the digital age, the proliferation of artificial intelligence, blockchain, and Internet of Things (IoT) technologies has given rise to many innovative features on social networks. While these advancements enhance user experience, they also raise critical concerns regarding the protection of sensitive personal information. Machine learning algorithms, for instance, play a pivotal role in content creation and targeted advertising, necessitating a delicate balance between customization and privacy preservation. Simultaneously, the advent of decentralized technologies, such as blockchain, introduces novel approaches to enhance security and user control over data. Blockchain's immutability and cryptographic principles hold promise in mitigating risks associated with data breaches and unauthorized access. However, implementing these technologies on a mass scale demands careful consideration of scalability, usability, and interoperability. This theoretical delves into ongoing research and developments addressing the intricate relationship between emerging technologies and the preservation of privacy and security on social networks. It emphasizes the need for interdisciplinary collaboration among technologists, policymakers, and ethicists to formulate comprehensive frameworks that foster innovation while safeguarding user rights in an increasingly interconnected digital society.

Utilizing Machine Learning for Sustainable Emission Reduction: A Pathway to Net Zero Greenhouse Gas Emissions (4.134)

Ifeyinwa Jessica Igwebuike *Manchester Metropolitan University*

Title: 'Utilizing Machine Learning for Sustainable Emission Reduction: A Pathway to Net Zero Greenhouse Gas Emissions' Abstract: This research project aims to play a pivotal role in advancing a sustainable pathway toward achieving net zero greenhouse gas emissions. Our focus lies in harnessing the potential of machine learning models to predict and mitigate emissions across various regions. By utilizing sophisticated computational techniques, we seek to enhance the accuracy and efficiency of emission predictions, enabling targeted interventions for emission reduction. The methodology integrates machine learning algorithms to analyze complex datasets containing diverse environmental factors and emission sources. Through this interdisciplinary approach, the study aims to uncover patterns and relationships within the data, providing valuable insights into emission dynamics at local and regional scales. These insights will inform the development of tailored strategies and interventions, fostering a more effective and region-specific approach toward achieving net zero emissions. Furthermore, the research project prioritizes the scalability and applicability of the proposed machine-learning models. Considering the unique characteristics and challenges of different regions, our study aims to facilitate the adoption of sustainable practices that align with the specific needs of each locale. The goal is to create a comprehensive and adaptable framework that contributes significantly to the global pursuit of a sustainable and net zero future, leveraging machine learning to transform the landscape of emission prediction and reduction.

Approaching the English NLP singularity: is it too late for low-resource languages? (4.135)

Jacqueline Rowe *University of Sheffield*

In recent years, large language models (LLMs) have advanced significantly, showing huge improvements in NLP benchmarking tasks and downstream applications. Yet this progress is unevenly distributed across the world's 7,000 languages, with many lacking any NLP resources or research at all. This poster illustrates the limitations of the multilingual capabilities of five large multilingual LLMs (GPT-3, LLaMA, LaMDA, mBERT and BLOOM), showing that their training datasets include only a few dozen non-English languages and remain heavily weighted towards English tokens. The poster traces the history of low-resource NLP research, explaining the utility of techniques like transfer learning, oversampling and data augmentation for enhancing model performance. While these methods hold promise, they are often not competitive with LLM performance in English; and research in this area increasingly relies on adapting English-centric LLMs to low resource languages rather than curating high-quality linguistic data for training of smaller, language-specific models. This disparity between NLP capabilities in English and other languages is dramatically accelerating the erosion of minority languages, as people must increasingly assimilate to English language and norms in order to enjoy the benefits of NLP technologies. To avoid an English NLP 'singularity', the poster argues that increased investment in diverse linguistic resources and high-performance NLP systems in low resource contexts is crucial. Such research will be relevant not only for minority language speakers but for a vast range of data-sparse tasks and problems.

How AI-BCI (Brain-Computer Interface) in VR (Virtual Reality) Aids Emotion Regulation in High-Pressure Individuals (4.136)

Jiahong Han *University of Bath*

This article discusses the feasibility of verifying the combination of functional magnetic resonance imaging (fMRI), affective BCI (Brain-Computer Interface) and VR (Virtual Reality) systems for emotion regulation (ER) and stress relief in high-pressure populations. This article aims to recruit 5 male and 5 female participants from the same major and grade who are in a long-term high-pressure state. Affective BCI will be used to detect brain signal activity, and VR will be used to provide positive brainwave feedback to the participants. After the experiment, participants will be asked to fill out stress measurement forms and other forms, and the experimental data will be analyzed using statistics software. We ensure participant rights, adhere to ethics, and safeguard data. It is expected that this experimental system can help alleviate the psychological stress of the experimenter when affective BCI detects that the experimenter is in a stress state and can significantly observe real-time feedback results in the Electroencephalogram (EEG) through the positive feedback of VR brainwaves.

Swarm Intelligence for Forest Fire Boundary Detection (4.137)

Jumaira Miller Swansea University

The devastating ecological, socio-economical, and atmospheric damage of forest fires is widely acknowledged. Over the last decade, the effects of forest fires have only been exacerbated by the feedback loop of climate change and forest fires. The need for fast and reliable systems for early forest fire detection has become ever more urgent. Whilst extensive research has been done in fire confirmation, relatively insufficient work has been done to develop efficient fire search algorithms. This gap in research is the area to which our work contributes. This practical urgency to address and mitigate the impact of forest fires is the first motivation for this project. One of the persisting challenges - even amongst the technological advancements in the hardware of UAVs - is the need for efficient detection algorithms. This urgency demands fast and reliable detection motivated the use of drones over satellites as the main technology for this research. This project proposes using Swarm Intelligent algorithms, based on the flocking algorithm, to create composite behaviours for effective forest fire boundary search. Using Swarm Intelligence based algorithms for search, a team of unmanned aerial vehicles was coordinated using a decentralised and fully automated system. Two such composite behaviours have been developed. The proposed behaviours have been implemented and tested through simulation using Unity's Game Engine. Based on the criteria of improving search time and producing precise results, a search behaviour based on thermal sensors resulted in faster and more reliable results than a behaviour which relied on visual sensors.

Extracting quantitative methods from biomedical research papers using Generative AI (4.138)

Lucy Porte with Jingyu Du, *UCL*

Biomedical students and their supervisors often need to search through the literature to find the right experiment to perform for their area of interest. However, the materials and method sections aren't always written up clearly and under obvious headings meaning the student might spend a lot of time finding a suitable experiment, and when they do there might not actually be enough quantitative detail to reproduce the experiment properly. This wastes time in the lab and eats up resources. We have created a model using ChatGPT that can extract material and method sections from papers according to a specific framework, and then evaluate how good the paper is in terms of quantitative detail and how well it matches the given framework. It can also estimate how long it will take the student to complete the experiment and create a Gantt chart based on this. This way, the student can easily choose a suitable method and start planning their work straight away. We are hoping to convert the model from a ChatGPT based one into one of our own making. We can then add in more features, such as integrating with Pubmed MeSH or Web of Science to further streamline the experiment search and selection process. Overall we hope to help biomedical students find, perform and write up reliable, quantitative and reproducible methods.

Dancing braids (4.139)

Mair Allen-Williams *Birkbeck, University of London*

A topological braid is a mathematical formalism based on the physical braids of interwoven strands with which we are all familiar. These abstract braid models can be used to represent a wide range of everyday structures, from chord progressions to cardiovascular flows -- and path data for moving particles. A 'set-based' country dance is a structured dance for a fixed number of dancers, with building blocks of standard figures such as the 'reel', in which dancers interweave along a serpentine track. This project will model dancers' tracks with braids, allowing us to exploit the mathematical structure inherent in the braid model to analyse dances. This model will expose properties that might not be evident from the dance floor and offer new insights about relationships between dances. Our approach uses annular, or 'maypole', braids: the patterns that would be created on an imagined maypole in the centre of the dance. Taking the matlab library 'braidlab' as a base, we are (1) building a codebase to generate path data from a figure description or video; (2) extending the braidlab library to generate annular braids from path data; (3) using the existing library of functions to explore properties of these braids. For example: classifying figures by 'braid equivalence', or categorising dances by their topological entropy. Besides the obvious mathematical interest of the braid model, maypole braids and dancing naturally make for a visually attractive poster! References: - Topological braids: <https://doi.org/10.1007/978-3-031-04790-9> - Maypole braids: <https://divisbyzero.com/2009/05/04/the-maypole-braid-group/> - Braidlab: <https://arxiv.org/abs/1410.0849> - Scottish country dancing figures: <https://my.strathspey.org/dd/formation/>

Will AI Analytics Supersede Traditional Analytics in Supply Chain Management? (4.140)

Maria Rosa Elena Agulto *Middlesex University*

The process of managing the whole flow of products and services, from raw materials to the final product in the customer's hands, is known as supply chain management (SCM). To guarantee that goods are delivered effectively and economically, tasks like sourcing, production, inventory management, and transportation need to be coordinated. With the globalization of SCM, smart decision-making is vital and heavily relies on data analytics that can reduce operational costs and maximize profit through high-yield production output. Traditional analytics summarizes historical data and identifies trends with spreadsheets, statistical software, and dashboards, which is familiar to many analysts but requires manual effort. Artificial Intelligence (AI) analytics utilizes machine learning and AI algorithms for trend analysis and automate tasks, which can take on complex relationships, generate predictive insights, and enable real-time monitoring but most likely need expertise or training to carry out in the organization. According to the Forbes Advisory Survey of 600 business owners in 2023, 40% of the entrepreneurs use AI for inventory management specifically and 30% of them use AI for supply chain operations in general. Although AI analytics is the future of SCM, traditional analytics is still its base knowledge. A hybrid strategy that incorporates the best features of traditional and AI analytics can be an effective tactical approach. Businesses can obtain deeper insights and make better decisions by combining conventional methods with the predictive power of AI. This will result in a supply chain that is more resilient, efficient, and sustainable. This poster will give an overview of how AI analytics have been used in SCM, and how these compare to a hybrid strategy.

Enhancing Rehabilitation through Brain-Computer Interface: Motor Imagery (4.141)

Maryam Khodaparast *University of Liverpool*

Stroke occurs when there's an interruption in blood flow to the brain, leading to long-term disabilities in survivors. Among stroke survivors, the specific challenges are often linked to limp, which is the weakness or inability to move one or more parts of the body. This research focuses on Brain-Computer Interface (BCI), centering on the processing of brain signals for the detection of desired movements. This research tackles challenges by exploring BCIs, offering a novel rehabilitation avenue via brain signal processing. Leveraging both Support Vector Machines (SVM) and Convolutional Neural Networks with Long Short-Term Memory (CNN-LSTM) architectures, our research aims to create a robust system that interprets electroencephalogram (EEG) signals associated with motor imagery. A Brain-Computer Interface is a technology that enables users to interact with computers by using brain signals to predict abstract aspects of cognitive states. These AI-powered BCIs allow users to control various instruments, such as wheelchairs and assistive devices. Artificial intelligence and machine learning have gained significant attention for developing BCI applications, especially in medical fields. In this research, our primary objective was to enhance both computational efficiency and accuracy in our model. To achieve this dual goal, we opted for a simpler model, which significantly reduced the computational cost and processing time. Despite its simplicity, our results contribute significantly to rehabilitation research, with a strong Kappa value of 0.79 evaluation affirming the reliability of the BCI system's classifications. The test accuracy reached an impressive 84.33%.

Mindful Engagement in the Digital Era: AI Solutions for Attention Span Enhancement (4.142)

Mercy Kanyi Aston University

In the age of non-stop technological advancement, infinite different things are calling for our attention. The internet, being an endless pit of content, has led to a noticeable decline in attention spans, new forms of addiction and noticeable behaviour change. The age of distraction and addiction as referred to by researchers has been brought about by things such as video games, movies, online shopping and social media. Studies have revealed the negative effects of these platforms the most outstanding one being reduced attention span. One study reveals the currently common short video trend has been a major factor in the cause of reduced attention span among social media users. individuals in the study acknowledged the inability to focus on different tasks in their daily lives stemming from spending long hours scrolling through short video content. Additionally, studies have revealed that adolescents exposed to long periods of internet use have demonstrated aggressive behaviour accompanied by short attention spans which affects their studies. This study investigates the possibility of applying Artificial Intelligence (AI) as a mitigating factor for this challenge. The primary goal is to use machine learning to study and analyse human engagement and behavioural patterns, to formulate personalized strategies that will foster adaptive learning platforms and gamified cognitive exercises tailored to the unique needs of users. A viewpoint that the issues of addiction and reduced concentration span can be solved through the conjunction of human cognition with AI is proposed. The outlined approach seeks to improve brain function while mitigating the adverse effects of contemporary distractions, thus promoting an active and receptive society amidst the endless influx of internet data.

Silent Screams in Cyberspace: Assessing Technology-Facilitated Gender-Based Violence against Women. (4.144)

Moradeke Adeleye *University of Wolverhampton*

Despite the transformative potential of digital platforms uncovering the tremendous opportunities that now exist for women in the digital world, a concerning and evolving issue emerges; technology-facilitated gender violence. Women are vulnerable and susceptible to several forms of online harassment, abuse, and discrimination. The extent and intricacies of this problem remain is not adequately understood, hindering the development of effective preventative measures and interventions. There is severe underreporting of online violence as only 1 in 4 women reporting violent acts to the platform where they took place and only 14% reporting to a protective agency. Also, there is a dearth of comprehensive data and literature on prevalence and forms of technology-facilitated gender violence especially in low- or middle-income countries (LMIC) like Nigeria. Furthermore, keeping up with developing risks becomes more challenging due to the ever-evolving nature of digital platforms. This study aims to bridge these knowledge gaps by examining the complicated interaction between gender-based violence and technology in Nigeria. It systematically explores the role and impact of technology on gender-based violence against women. It aims to assess the extent to which digital tools facilitate violence against women. Simultaneously, it examines the intrinsic potential of technology to empower and protect women. The study also aims to evaluate the effectiveness of current interventions. This will pave way for well-informed strategies and interventions aimed at mitigating the multifaceted challenges faced by women in the digital space, whilst also empowering and protecting them.

KidCoder: Teaching Computational Thinking Concepts Through Stories, Apps, and Play (4.146)

Naomi Felix *University of Manchester*

Computer Science (CS) education is a relatively unexplored field within the vast discipline of CS. The lack of focus on CS education can be seen especially in the UK, with the Computing national curriculum being unchanging since its introduction in 2013. Yet, technological developments since then have grown exponentially - the rise in social media's popularity, the introduction of wearable technologies and, of course, the endless applications of Artificial Intelligence. Such technologies are simply second nature to this generation of children and during these fundamental ages, cognitive development occurs. However, a newfound consequence of this is a substantial susceptibility to long-term influence by modern technologies. Therefore, how can one not see the glaring importance of bridging the gap between CS education and the CS skills required to navigate the dynamic 21st Century? This study focuses on research conducted to teach computational thinking concepts, the foundations of CS, to children aged 8-11 (UK Key Stage 2), using every day, task-based scenarios, delivered through a mobile application. Through this, our aim was to leverage the ways children witness CS outside of school to create a learning cycle between the classroom and life, whilst making learning in the classroom more relatable and engaging. Results of the study show an overall increase in understanding of the concepts after using the application and a high level of engagement. Pupils were better able to apply their CT understanding beyond the classroom and teachers also showed enthusiasm towards the benefits of using the application in lessons.

Advancing Mental Healthcare through Longitudinal Empathy Development in Conversational Agents. (4.147)

Obianuko Joy Chinenye *Edge Hill University*

Advancing Mental Healthcare through Longitudinal Empathy Development in Conversational Agents. Obianuko Joy Chinenye (Edge Hill University) 2024 The increasing prevalence of mental health issues demands creative approaches to raise the standard and accessibility of care. Although they have great potential, conversational agents do not yet possess enough emotional intelligence to be of much use. Based on insights from developmental psychology, this work develops a novel longitudinal computational framework to simulate the gradual development of empathy in virtual agents. Thoroughly selected multimodal datasets representing the empathy growth between therapist and client will be provided. This data allows for the transfer of socio-emotional information using pretraining foundation models. Over thousands of training sessions, graded progress in compassion, rapport-building, and counselling abilities will be scaffolded by personalised reinforcement learning algorithms with manually designed reward functions. As agents progress along the developmental arc from emotional recognition to nuanced empathy and therapeutic. Throughout the training phases, end users and mental health professionals will provide qualitative feedback through focus groups and semi-structured interviews. Model introspection methods such as GradCAM will shed light on areas that require improvement and illustrate how the agents' thinking has evolved. Ethics guidelines will guarantee appropriate data curation, testing, and deployment procedures. With the integration of AI, psychology, and human-computer interaction approaches, this ambitious multidisciplinary approach has the potential to create conversational agents with advanced emotional intelligence specifically designed for mental healthcare. The anticipated discoveries may also contribute to a broader, multidisciplinary comprehension of the social cognitive processes that underlie the development of human empathy.

Reviving Connections: VR's Personal Response to Elderly Loneliness (4.149)

Osatohanmwun Bera Ogunbor *University of Wolverhampton*

Loneliness is a pervasive issue among adults, particularly within the age group of 50 and above. Addressing this concern is vital for the well-being of my target group. Existing research highlights the profound impact of loneliness on mental health and overall quality of life for adults. A comprehensive survey conducted by the National Institute on Aging found that 30% of individuals aged 50 and older reported experiencing loneliness regularly. This survey underscores the urgency of tackling this issue among our target age group. Studies emphasize the heightened risk of conditions like depression and cognitive decline associated with prolonged social isolation. Research indicates that immersive VR experiences can significantly enhance social connections and reduce feelings of isolation. Studies, such as the one conducted by the Journal of Gerontology, have specifically focused on adults in the 50+ age group and have highlighted the positive impact of VR interventions on mental well-being. My virtual reality (VR) solution provides an innovative approach to alleviate loneliness among adults. For instance, beyond the joy it brings, my VR solution has significant health advantages. Using familiar songs to soothe Alzheimer's patients or creating lifelike 3D representations of distant loved ones via VR alleviates depression and fosters a sense of closeness. My VR solution emerges as a promising tool to combat loneliness, offering a tangible benefit to the mental health of adults. This not only improves their immediate well-being but also holds potential for preventing or mitigating conditions like Alzheimer's in the long run. By fostering social engagement, my VR solution contributes to a healthier future for individuals facing the challenges of aging, including the risk of Alzheimer's disease. With the support of existing research, surveys, and real-world examples, this approach is well-positioned to address the pressing issue of elderly loneliness.

MLOps implementation in Azure for Insurance cross-selling use case (4.150)

Patricia Inyang *Aston University*

An estimated 85% of artificial intelligence (AI) and machine learning (ML) projects fail to produce return for businesses. This is due to the intricate processes, infrastructures and cross-functional discipline necessary to deploy and maintain optimal ML models in real-world production environments. This project addresses this challenge by implementing Machine Learning Operations (MLOps) which applies DevOps practices to automate the end-to-end machine learning cycle within Azure Machine Learning (AML). The use case involved the development of a cross-selling Insurance model to predict existing health insurance policyholders responses ('Interested' or 'Not interested') to newly offered vehicle insurance policy. The methodology progressed beyond the experimentation phase, which encompassed data pre-processing, model training and evaluation, resulting in a logistic regression model with a performance Recall of 85.9%. AML Python SDK V2 and Command line interface (CLI) were utilised to build and test modular scripts, which were subsequently configured as AML components and linked through pipelines. The three pipelines executed model training to deployment of model to an AML managed Batch-endpoint, RAI insight dashboard setup, and batch inference job submission. The MLOps pipelines were automated using GitHub action workflows, facilitating continuous integration and continuous delivery of improvements to the production environment. Azure service principal credential enabled secure authentication between GitHub and the AML workspace, facilitating automated execution of production workloads. The MLOps system implemented currently operates at a 3rd maturity level, with full maturity achievable when the deployed model is continuously operated, monitored for real-life data, and detects issues such as data and model drifts.

Success Rate of non-mathematics/science background students in Artificial Intelligence (4.151)

Pere-ere Ogunbanjo *University of Wolverhampton*

With the speed at which technology broadens and the worldwide acceptance rate of Artificial Intelligence (AI), there is a growing interest on the subject even from people with non-mathematics or science foundations. AI continues to increasingly play pivotal roles in various sectors so there is a need to understand how individuals from diverse non-mathematic/science academic backgrounds fare in AI-related studies and professions. The study examines the academic achievement and skill development of people without traditional STEM backgrounds who are entering the field of Artificial Intelligence. The findings suggest that while mathematics and science proficiency can be advantageous, it is not necessarily a prerequisite for success in AI. Factors such as adaptability, creativity, determination, smart work and interdisciplinary collaborations also contribute significantly to the achievements of non-traditional STEM students in AI. Through a comprehensive review of case studies and surveys, the poster unveils academic outcomes of non stem backgrounds students while addressing areas of improvement considering factors such as prior programming experience and adaptability to mathematical concepts. It emphasizes the adaptability of non-STEM students and their capacity to contribute to the AI field with the right support and tailored educational pathways. The abstract concludes by advocating for inclusive AI educational frameworks that recognize and leverage the diverse talents of students, irrespective of their foundational backgrounds. The findings provide valuable insights for educators, policymakers, and industry stakeholders striving to foster a more inclusive and successful AI ecosystem.

Femtech Traffic Analysis (4.152)

Phoebe Owen *Keele University*

The collection and retention of personal data from digital services is a contentious issue; whilst it can be beneficial to improving user experience and contributing to large-scale research projects, if misused it can lead to the breaching of data protection laws or even unintentional access by threat actors. Healthcare services in particular process and store sensitive and personally identifiable data that if processed incorrectly could have significant consequences to the user. Many mobile applications offering healthcare services include comprehensive privacy policies that detail what user data is to be collected and stored, and any further transmission of that data to partnered entities such as research groups. The user can sometimes be prevented from accessing the application without having agreed to any relevant policies first, which can be prohibitively long or verbose to reduce ease of comprehension. It is largely unknown whether most privacy policies accurately reflect which user data are collected compared to what they consent to sharing, most commonly due to a lack of transparency. This project aims to collect and process test data being shared from Android-based healthcare apps, using a virtual rooted Android phone, and analyse whether any sensitive or personally-identifiable data is present. In particular, the project will compare a range of wearable technology applications within the female healthcare sector (referred to as 'Femtech'), with a final aim of creating a software artefact that can analyse data from any Femtech application and confirm the presence of any sensitive user data. Femtech applications include, for example, period or fertility tracker applications that utilise health data such as heart rate or body temperature to improve their services. This data is typically collected through a connected wearable device, such as a smart watch. This project's success will be evaluated by the ability to decrypt and view the data allowing identification of any personal data included and the ability to create a script that can automate this decryption process.

Artificial Intelligence-Generated Imagery: Unveiling the Adverse Effects on Human Well-being (4.153)

Rashmi Patil *University of Birmingham*

Artificial intelligence (AI) has well developed within the last few years; its advancement can be seen in all places. One such place is AI being used in generating images. In recent years, there has been a rise in AI-generated images. AI can enhance human creativity and simplify the creation of art and images. But it can spread damaging stereotypes and unrealistic beauty standards, which can have an impact on people's self-esteem and society. Due to the easy availability of the AI tool, which is text-to-image, this tool has been used in an unethical manner. Using this tool, unrealistic and damaging images, known as deep fakes, are generated. These images are hard to distinguish, and their authenticity is too. These images can be used to spread fake news or information, which might affect political and economic aspects. And also, these AI-generated images are stereotypical, harmful, and toxic too; the wide distribution of them online may affect one's mental and physical health, as well as the thinking perspective of society. The purpose of my study was to conduct a literature review and see how much research has been done and the outcomes of such studies. Key words used to identify such studies are 'AI-generated images,' 'deep fakes,' and 'AI-affecting humans.'. The findings of this review are that AI-generated images are negatively affecting human psychology. Which in turn has led humans to have less confidence and self-esteem. Although AI has advanced significantly, it's crucial to understand its limitations and the drawbacks of using it in some situations.

A beat for everyone: Redefining DJing with Multi-Agent Systems (4.154)

Rebecca Shruti Soren *King's College London*

In the dynamic world of event entertainment, catering to diverse musical preferences and maintaining an engaging atmosphere is a complex feat. Multi-agent systems (MAS), with applications in robotics, finance, transportation, and entertainment, offer a revolutionary approach to DJing. A multi-agent DJ system utilizes properties and concepts from MAS to create an inclusive and enjoyable musical atmosphere. The system consists of individual agents that represent different musical styles, genres, or preferences. Each agent has its own expertise and knowledge about music, allowing them to make decisions based on their individual perceptions and objectives. Through communication and coordination, the agents work together to create a personalized playlist for each individual and adapt the music selection to the preferences and energy of the crowd in real-time. The DJ environment is ideal for a MAS due to its interactive nature, with agents constantly making decisions based on the crowd's reactions. Mechanisms like real-time data analysis and feedback systems enable the MAS DJ to adapt to changes in the crowd's mood, ensuring an enjoyable experience for all. Incorporating a MAS enhances the overall musical atmosphere by leveraging the collective intelligence and diversity of the agents. The benefits of a MAS DJ system are numerous, including increased engagement and satisfaction from the crowd, reduced workload for event planners, and potential revenue growth.

Insect Inspired Reverse Pheromone Signalling for Traffic Optimisation (4.155)

Sakshi Saraff *University of Bristol*

The rapid growth of the human population in the modern world has amplified the demand for transportation, especially in urban areas, leading to increased traffic congestion. This not only inconveniences the masses but also contributes to global air pollution due to the prolonged running of cars in traffic jams. Addressing this, our study introduces a decentralised traffic routing method using the reverse pheromone model, which coordinates vehicles at junctions, substantially improves network fluidity and reduces congestion-related emissions. This model aligns well with the motivation of leveraging swarm intelligence and multi-agent systems to develop solutions that promote transportation sustainability. There is potential to reduce emissions (and journey times) in cities by choosing routes that minimise congestion. We are running experiments to see if there can be a reduction in congestion by letting cars share information about the delays they are experiencing. This analysis helps to see if the picture changes when each car has a target arrival time and target destination by using Reinforcement Learning Algorithms. Through Monte Carlo simulations on a Manhattan-style grid network, we create a realistic model that is spatially aware of the city and can gauge the areas which are more densely populated during certain times of the day than others. Given the current technological landscape, the model's implementation seems feasible and beneficial, even with partial vehicle upgrades. This provides practical pathways for gradual integration with existing infrastructure.

Leveraging Machine Learning to Redesign the Banking App for Improved personalisation (4.156)

Sarah Tucker *London South Bank University*

There is a growing need for banks to personalise their services to support their customers amid the ongoing cost of living crisis. Traditional banking apps, while offering insights into transactions, lack a proactive approach in addressing users' spending habits, potentially leading to financial strain. To bridge this gap, a new mobile banking app will be developed that not only categorises transactions but actively employs machine learning algorithms to monitor and guide users towards optimising their spending. The project's central focus is the introduction of a Behavioural Spending Analysis feature, where the app will scrutinise users' spending patterns, identify trends, irregularities, and suggest areas for improvement in financial behaviour, leveraging the power of machine learning algorithms. Real-time Spending Alerts will notify users when they are spending too quickly or nearing budget limits, accompanied by machine-learned suggestions to coach the customer to stay within budget. The app will provide a user-friendly Financial Health Insights dashboard, offering a comprehensive overview of users' financial well-being with actionable recommendations for savings. Furthermore, Tailored Service Recommendations based on the spending data for personalised bank services that meets individual customer needs, encouraging users to explore additional services. The app aims to empower customers, fostering a healthier and more informed approach to personal finance. Customers benefit from personalised financial guidance and preventive measures against overspending while offering the bank increased customer engagement, data-driven personalisation, risk mitigation, a competitive edge, and cross-selling opportunities. Successful implementation requires robust security measures and effective communication to ensure user trust and adoption.

Beyond Reflection: A Raspberry Pi-Powered Smart Mirror with Alexa and Facial Recognition (4.157)

Shweta Kakade *University of Sheffield*

The undergraduate project titled 'Smart Mirror with Alexa Integration and Facial Recognition' aimed to design and develop an innovative interactive mirror interface. Leveraging Raspberry Pi as the core computing platform, the system integrated various functionalities including displaying real-time date, time, weather updates, and a to-do list on the mirror's surface. This provided users with convenient access to essential information during their daily routines. The inclusion of Amazon's Alexa voice assistant expanded the usability of the smart mirror, enabling users to interact with it through voice commands for tasks such as setting reminders, checking the weather, or controlling connected smart home devices. This voice-activated feature enhanced the user experience by offering hands-free interaction with the mirror, aligning with the growing trend of smart home technology adoption. Furthermore, the project incorporated facial recognition technology using OpenCV, allowing for personalized user experiences. By recognizing individuals standing in front of the mirror, the system could customize displayed information or settings based on pre-defined user preferences. This added a layer of personalization and security to the smart mirror, making it a tailored experience for each user. The integration of these technologies into a single platform provided a proof-of-concept for the feasibility and practicality of smart mirrors as interactive home devices. The project not only demonstrated technical proficiency in hardware integration and software development but also showcased the potential for enhancing everyday interactions through innovative human-computer interfaces. Overall, the smart mirror project represents a significant step forward in the realm of smart home technology and human-computer interaction.

Can We Develop An Unmanned Sushi Kaiten Restaurant? Let's Take A Step Forward! (4.159)

Stephanie Cheong *Middlesex University*

In recent years, the number of automated or unmanned restaurants and shops is steadily increasing. Throughout Japan, there are 116 branches of an unmanned meat shop (Ouchi de Oniku). Family Mart, a popular convenience store in Japan, plans to open 1000 unmanned stores by the end of 2024. In the USA, the self-claimed 'fully-autonomous restaurant' is powered by AI and robots to flip burgers and cook the fries. In China, unmanned restaurants are also popular, where ordering food is done through apps and dishes served by robots or conveyor belts. In most cases, this seems to be the solution to shortage of manpower. Apart from that, having an autonomous system decreases errors and increases efficiency. Sushi kaiten restaurants are the first restaurants to use the conveyor belt to present food to the customers. Though very convenient, it cannot be considered unmanned yet. Human workers are still needed to keep track of the number of sushi on the conveyor belt and to replenish the dishes. This poster presents a prototype of a part of an automated sushi conveyor belt that I have developed. The automated system checks the number of plates of a certain type of sushi that is lacking on the conveyor belt using a QR scanner, and then pushes out the sushi from the kitchen. A pair of photoelectric sensors detect vacant spaces on the conveyor belt before the push happens. Customers are able to momentarily slow down the sushi belt via a button at their tables to pick the sushi off the belt. A microcontroller is used to control this conveyor belt system.

Optimizing the performance of risk prediction model for diabetes using ensemble techniques (4.160)

Sukurat Salam *Teesside University*

Abstract This research seeks to develop an optimized model for predicting the risk of diabetes in individuals using modifiable behavioral risk factors. The study uses advanced preprocessing techniques to improve the data quality and apply ensemble machine learning models to achieve an improved predictive tool. The process commences with exploratory data analysis, and correlations between critical behavioral factors and diabetes status are unveiled. Subsequent steps involved data preprocessing, outlier detection using the iForest method, class imbalance handling, and feature selection to identify relevant behavioral risk factors. The 13 behavioral risk factors essential for the prediction of diabetes risk were obtained using a data-driven approach without any laboratory test. The model development process involves the training of some supervised classifier models first, this includes KNN, multinomial logistics regression, gaussian naive Bayes, decision tree, and support vector classifier. Followed by the second stage where different ensemble methods were used to combine 2 or more classifiers to optimize the performance of the model. The stacking method turns out to be the best method with an average accuracy of 99.40%, KFold score of 97.87%, f1-score of 98.41%, and ROC AUC score of 99.70%. Through rigorous pre-processing steps and ensemble methods, the research achieved a high-performing predictive model with an accuracy of 99.40%. Additionally, a user-friendly web-based application integrating the optimized model was developed for real-time diabetes risk assessment. This work contributes a robust predictive framework and practical application, serving as a significant advancement in diabetes risk prediction and proactive healthcare management.

Revolutionizing Legal Literacy Through Generative AI (4.161)

Temitope Adeyelu *University of Wolverhampton*

In today's ever-changing global environment, the need for easy access to legal guidance is becoming more critical than ever before. Many people have been robbed of their rights because of ignorance of the law and the absence of easily accessible law dissemination tools. Many regrettable situations may have been avoided if there was a quick way to educate people about their legal rights. I, myself, have been in such a situation where a lack of awareness as regards my legal rights put me in an unsafe situation. Hence, it is essential that a solution that provides swift and accessible legal guidance to empower individuals is made available. My proposed solution to this problem is a generative AI, similar to ChatGPT, designed to empower individuals with legal literacy. Imagine an AI tool capable of providing tailored legal advice, enlightening users on their rights in various situations. This innovative technology aims to bridge the gap between legal complexities and the layperson's understanding, particularly in regions with limited access to legal resources. By leveraging the capabilities of generative AI, this solution envisions a user-friendly interface that engages users in natural language conversations, unraveling the intricacies of legal frameworks applicable to their specific circumstances. The poster will explore the technical architecture, ethical considerations, and potential societal impacts of developing a generative legal AI. It will underscore the importance of democratizing legal knowledge and promoting legal literacy to foster a more informed and empowered society.

Day-Ahead Energy Price Prediction for Irish Single Electricity Market: A Two-Stage Model Approach for Enhanced Accuracy (4.162)

Thi Hong Nhung Nguyen *Middlesex University*

Accurately predicting electricity prices is crucial for informed decision-making in market-oriented environments. However, the complexity of the drivers and sharp fluctuations in prices make it challenging. This study proposes a two-stage model that uses the Lightweight Gradient Boosting Machine (LightGBM) to improve forecast accuracy. The model first classifies prices as low or high using a classifier and then uses a regressor to provide detailed day-ahead price predictions. This approach aims to capture the nuanced characteristics of electricity prices, particularly in response to sudden price spikes in energy markets that can significantly impact forecast accuracy. By categorizing prices and making separate predictions for each subset, the model is expected to predict more accurately for extreme spikes. Enappsys, a specialized Market Data Platform that offers comprehensive data and insights into European energy markets, provides data for this project. The project focuses on forecasting day-ahead energy prices for ISEM (Ireland's Integrated Single Electricity Market), a novel wholesale electricity market for the island of Ireland. The model-based feature selection techniques are implemented to identify key influencing factors. These include historical prices, demand, renewable generation, gas prices, and weather variables. A comparison with Enappsys's forecasts over the last six months demonstrates the superior predictive capabilities of the proposed model, as evaluated by metrics including Mean Absolute Error (MAE), Symmetric Mean Absolute Percentage Error (SMAPE), and Root Mean Square Error (RMSE). These findings highlight the potential of the proposed model to significantly improve electricity price forecasting for ISEM and enhance decision-making for market participants.

From Risk to Resilience: How to detect Account Takeover? (4.163)

Thu Thao Le (Alex) *Middlesex University*

Account Takeover (ATO) is a type of fraud where a fraudster uses stolen passwords to get into other people's accounts on social media, banking, and other platforms. This unlawful practice not only poses a threat to privacy but also exposes victims to potential financial losses. According to the 2023 Half Year Fraud Update by UK Finance, a staggering £33.1 million was lost, averaging approximately £500 per case, attributing a significant portion to Card ID theft and ATO was recognised as a major cause. The increase in ATO is really concerning, with a huge 354% rise globally in one year from H2 2022, happening in different industries, especially fintech and food and beverage, according to the Swift Report (2023). Despite the existence of Two-Factor Authentication (2FA) as a procedure to strengthen account security, its adoption remains suboptimal, especially in less sensitive or non-financial accounts. For instance, in July 2021, only 2.6% of active users on X (Twitter) had implemented 2FA, according to X's Account Security Report (2022). Similarly, only about 4% of Facebook's monthly users had activated 2FA in 2021, as reported by Lili (2021). Therefore, it is necessary for organisations to detect ATO as soon as it happens. The poster aims to present established solutions, such as leveraging individual user historical data and scrutinising network interconnections across multiple accounts. It also aims to give a comprehensive overview of modern ATO detections, showing their implementations in different industries and identifying persisting challenges and suggestions in this evolving landscape.

From Hallucination to Precision: The Evolution of Text Generation (4.164)

Tran Phuoc Thinh Nguyen *Middlesex University*

Generative Artificial Intelligence (AI) has revolutionised the way machines process and generate human-like content but raised concerns regarding the trustworthiness of generated content, as instances of hallucination (outputs that are nonsensical or inaccurate) and outdated information have been observed. Retrieval-augmented generation (RAG) has emerged as a promising solution to enhance the accuracy and reliability of generative AI models by integrating external knowledge sources. RAG can enhance LLM with domain-specific information or an organisation's internal knowledge base without the need of retraining the model. This poster will present a comprehensive survey of RAG, focusing on its application to large language models (LLMs) to produce timely, accurate, and contextually grounded information. It will explore the combination of several state-of-the-art techniques to create a pipeline that demonstrates reasoning capability of LLM and provides answers with citations to increase credibility. This work contributes to the ongoing dialogue on the responsible and effective deployment of generative AI in real life.

Assessing the Impact of Data Analytics on Operational Efficiency and Customer Experience in Banking (4.165)

Upekkha Ahangama Ranawakage *University of the West of England*

In the rapidly evolving landscape of the banking industry, data analytics may have a transformative influence on operational efficiency and customer experience. In this research, I have investigated the differences among banking operations with data analytics and ancient banking processes. Many banks operate on legacy systems that were implemented in the past. Integrating modern data analytics tools with these systems can be challenging and leading to inefficiencies. However, Data analytics enables banks to automate and streamline various operational processes. This study examines the rapid development of banking systems with the use of data analytics tools and operations. By analyzing data, banks can identify inefficiencies, optimize workflows, leading to increased operational efficiency. Not only that it enables banks to analyze customer behavior, preferences, and transaction histories. This information allows for personalized product recommendations and tailored financial advice, enhancing the overall customer experience. This study will underline the importance of data analysis in the banking field and the fast growth of technology in the banking sector. However, implementing data analytics in banking requires a strategic approach and careful consideration of various factors. Starting with pilot projects, focusing on customer-centric analysis, staying agile and iterative are some of the main facts from them. Finally, this study will corroborate that as the banking industry continues to evolve, embracing data analytics is not just a technological imperative but a strategic necessity for those seeking to thrive in the digital era.

'Hopfield Networks, Bat Recognition and Beyond' Using biologically inspired models in bioacoustic analysis. (4.166)

Wendy Lomas *University of Wolverhampton*

Described as a revolutionary 'sonic microscope' (Bakker, 2022), the combination of digital recorders and bioacoustic analysis is a non-invasive sustainable method increasingly used for ecological discovery, monitoring, and conservation. Commercial classification software analyses the large datasets collected with varying degrees of accuracy (Tabak et al., 2021). Confidence in these algorithms also varies widely between individual ecologists (Fox, 2020). Furthermore, inevitable preprocessing of the publicly available data means that bias and information loss occurs, making evaluation of models developed using these datasets, limited in terms of performance on raw signals. This project demonstrates the use of artificial intelligence to process, store and recognise bioacoustic signals. A large public dataset (Bertran Ferrer, 2019) of bat echolocation calls is used for model development in Python; a Hopfield network, a biologically inspired recurrent neural network (RNN), is produced as proof of concept for tuneable bat recognition software. Testing is completed on raw data - collected on professional devices used within the bioacoustics field, an Echometer Touch 2 Pro and Song Meter Mini - ensuring robustness of application. Further potential for species identification is explored by testing the algorithm with signals collected from a broader range of frequencies and habitats (terrestrial and underwater) using these recorders and an AudioMoth. Finally, research possibilities are examined for monitoring subtle biodiversity indices and changes using the signals and RNNs. These changes could constitute the loss of a 'voice' from a soundscape niche, or decreasing acoustic complexity as ecosystem health degrades, and are critical challenges impacting all on a warming planet.

Research on Message Passing algorithm for Complex Question Answering over Knowledge Graphs (4.167)

Xinyue Tang *University of Sheffield*

Knowledge Graph (KG) is structured in a graph-based manner and can link data of different patterns, which make it one of the important data sources for Knowledge Graph Question and Answer systems (KGQA). The adequate development of simple KGQA has resulted in satisfactory performance. However, complex questions, requiring the extraction of multiple triples in the KG, present challenges in graph traversal and aggregation. The current KGQA systems struggle to achieve multi-hop reasoning ability, hindering the realization of a complex KGQA system with satisfactory performance. This study thoroughly explores the evolving landscape of KGQA, emphasizing the significance and challenges posed by intricate queries. A detailed overview of various algorithms sets the stage for the experimental phase. The study focuses on a message passing-based complex KGQA algorithm, integrating insights from multi-hop reasoning technology. The research not only reproduces and enhances a high-performing message passing-based algorithm but also sheds light on the challenges associated with multi-hop reasoning. Analyzing experimental results across various indices, including algorithm time consumption, confirms enhanced processing speed and validates the reasonableness of the algorithm design. Comparative analysis with other algorithms strengthens the findings. This research contributes to the ongoing development of KGQA, providing nuanced insights into complex scenarios and offering practical advancements in the broader landscape of natural language processing.

Can machine learning algorithms and diabetes mellitus part ways? (4.168)

Yetunde Oluwakemi Obakeye *University of Wolverhampton*

Diabetes Mellitus (DM) is a public health disorder and a chronic disease that affects people in thousands, it occurs when the bloodstream has higher levels of sugar than normal which can be a result of some factors such as lifestyle, genetics, and environment. The distribution of diabetes reveals clear trends by age, gender, ethnicity, and urbanisation, indicating how this disease affects people depending on their demographic characteristics and living location. Early detection of diabetes mellitus is crucial to prevent the onset of complications such as cardiovascular diseases, diabetic retinopathy (damage to the eye due to diabetes), diabetic nephropathy (damage to the kidney due to diabetes), and foot damage among many others. One of the best and most effective tools for predicting diabetes Mellitus in the body is the application of machine learning models. This poster will demonstrate the use of supervised machine learning algorithms in no particular order: Artificial Neural Network (ANN), Decision Tree (DN) and Support Vector Machine (SVM), Logistic Regression and Ensemble methods to produce models that will predict Diabetes Mellitus. These models will be trained and tested using the Centers for Disease Control and Prevention (CDC) dataset for the Behavioural Risk Factor Surveillance System (BRFSS) to be sourced from an online resource known as Kaggle. The performance between these models will be compared and examined based on Accuracy, Sensitivity, and Specificity. It is expected that the model with the highest accuracy between 85% and 99% with a specificity higher than 85% will demonstrate the proposed research's effectiveness

Find Your Future: The Pathway to Your Perfect School (4.169)

Zipporah Ebede *Sheffield Hallam University*

This work presents a content-based recommendation system designed to assist international students in selecting appropriate UK universities for their postgraduate education. Our intelligent approach transforms the complex decision-making process by providing personalized recommendations that cater to the individual's academic interests, financial limitations, and career aspirations, as opposed to the conventional static search tools that depend on generic rankings. This study effectively integrates a diverse dataset from 132 universities in the United Kingdom, encompassing 20 crucial factors that impact decision-making, ranging from tuition fees to post-graduate prospects. Utilizing this diverse dataset, we developed a K-Nearest Neighbors (KNN)-based model that accurately predicts personalized university recommendations for applicants compared to conventional methods, matching each student's unique preferences and constraints across various decision-making scenarios. Our approach streamlines the process of exploring universities in order to assist students in making well-informed decisions that align with their specific requirements and constraints. The developed system is scalable and serves as a crucial foundation for the future of machine learning in connecting students with personalized academic opportunities. By providing personalized, data-driven recommendations, this system serves as a powerful tool to connect prospective students with the academic opportunities that best fit their needs and goals.

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