Defence of Artificial Intelligence (AI) Algorithms, 6 April 2021

Aimed at professionals who are practitioners or experts, around thirty-five people attended an insightful webinar on the evening of the 6 April 2021 – The Defence of AI Algorithms. In this talk, Dr Nira Chamberlain presented the challenges of AI both technically and culturally through research, personal experience and case studies.

Nira is listed by the Science Council as 'one of the UK's top 100 Scientist' and in 2015 joined the elite list of distinguish mathematicians who featured in the biographical reference book Who's Who. As well as this, Nira is one of the few British Mathematicians to feature in the Encyclopaedia of Mathematics & Society.

Nira opened his presentation with a flash-back to 2012, his last APM presentation – the Defence of the Monte Carlo simulation. He then explained the differences and similarities between human intelligence and artificial intelligence. Both are similar in that they make decisions based upon imperfect information. The differences being, humans will use emotions and or feelings to support/test this decision and AI does not. As demonstrated in a case study later in the presentation, this could make AI, when left unmanaged, seem to be 'ruthless' in its quest to fulfil the mission it has been set. This is where the ethical questions get raised, and is one of the key factors why Nira highlighted, through-out his presentation, that AI will not replace humans – it's best purpose is to augment and enhance what a human can do.

Nira then gave a brief history of AI and how it has developed in the last thirty years or so. Some twenty-four years ago, AI was advanced enough to enable a computer, Deep Blue to defeat the World Chess Champion for the first time. This has led to increasing belief that AI is becoming better at Humans at decision making, supported by computers beating humans in the game 'Go' and also in a simulated dog-fight with a human pilot. This, for me, demonstrates the potential that AI can bring, and led Nira to the benefits AI has already brought to society:

1. Improved Healthcare
2. Enhanced Data Management
3. Navigation
4. Cybersecurity
5. Machine Orientated manufacturing
6. Weather Forecasting
7. Interactive experience
8. Social Impact

The increased use of AI across many industrial sectors has generated a significant number of lesson, the most significant being that people/humans are essential if AI is to be effective – humans design the AI algorithm, provide the creativity and also the data-sets that the AI needs to function and make decisions. This gives rise to the 'garbage-in, garbage-out' phrase – if the AI algorithm is using bad data, the outputs derived utilising AI will be as equally as bad. The case study used by Nira to bring this to life focussed upon an Energy company that used an AI Algorithm to predict which customers remain loyal. The model initially worked very well. However, the same model was used for the next two years, with-out a refresh of the data-set within

it. The world moved on, but the model had not - it was out of date and lost its predictive power!

This brought Nira to one of the key discussion points surrounding the use of AI – ethics. 'Do we trust AI to make the right decision'? He highlighted that those who actually understand the algorithms and logic behind AI algorithms know that there are a lot of kinks and flaws to them. Humans are needed to interpret and test the results and the underlying models to ensure that they are consistent and repeatable (e.g. not random!). The message here is that AI can be used to enhance testing of new equipment from a modelling perspective (e.g. an aeroplane jet engine) but that the results are not conclusive enough to be used in isolation – prototypes and multiple physical tests are also required to prove the safe operation and required performance levels of the jet engine before it is used commercially.

Nira's final case study described an AI algorithm that was built to play business "war" games with the objective of purely to win! In this case, the key objective for the AI algorithm (representing an Energy Provider) was to increase its market share. AI monitored the health and performance of the market and competitors for a period of time before adopting a strategy aimed at putting all of its competitors out of business. To do this, it identified 'good' customers - those who were wealthy and paid on time and those that didn't pay on time. AI then ensured that it targeted all 'good' customers and jettisoned those that had experienced payment problems to competitors in order to put them out of business. However, this also meant that a lot of the population were left without the ability to access gas and electricity…….

Ultimately the AI algorithm chose who could and could not have access to Gas and Electricity which would be a humanitarian disaster… and proves why humans are required to be in the loop to interpret the impact of decisions made by AI. On the positive, this simulated exercise using AI was used to gain a better understanding of how it would perform when given the objective of 'winning' as a business. It also highlighted the risk factors associated with this happening in the real world – without putting companies out of business and depriving people of energy!

Concluding his presentation, Nira reinforced that AI Algorithms have great potential, and that AI needs People, Processes and Principles in order to realise this potential.

Dr Nira Chamberlain is the Professional Head of Discipline for Data Science for SNC Lavalin Atkins. He is regarded as one of the UK's leading professional mathematicians, is the President of the Institute of Mathematics and its Application (IMA) and is a Visiting Fellow of Loughborough University Mathematical Sciences Department. In 2019 the Inclusive Tech Alliance named Nira as one of the Top 100 Most Influential Black, Asian and Minority Ethnic leaders in the UK's Tech.

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