## Week 1 – Ethical Issues in Statistics and Data Science

1. How are the models that we’ve used in this course so far (and in this specialisation more broadly) based on the process of induction?
   1. Induction in the reading is defined as the process of extracting general rules from specific examples. This is one of the primary objectives when developing any explanatory or predictive machine learning or statistical model. When developing a machine learning or statistical model, you are using pre-existing data to help the model identify what is different about different classes (classification) or levels (regression) in the outcome variable, and hope that the patterns learned are general enough that they can be applied to future examples.
2. “The fact that machine learning is ‘evidence-based’ by no means ensures that it will lead to accurate, reliable, or fair decisions. Provide 2-3 examples of this claim.
   1. A classic and relevant case of this is ChatGPT. It was trained predominantly on internet-based text, which means that its generative content will be biased towards the cultures, languages and perspectives most predominant in the data that it/GPT3.5 (ChatGPT was a fine-tuned GPT3.5) was trained on.
   2. In 2014, Amazon developed and began using a machine learning algorithm to review applicant resumes and identify the top 5 candidates for a specified technical position. However, because the tech industry had been largely male-dominated (and hence so was the training data), Amazon realised just 12 months later that the algorithm was biased towards men and systematically discriminating against female applicants. Ultimately, Amazon shut down the algorithm when it became clear that no effort to fix the issue was going to work.
3. Do you believe that Amazon's same-day delivery system mention on page 3-4 is unfair or unjust? Why or why not?
   1. I’m not entirely sure. From my perspective, there is a tendency these days for people to be more outspoken about perceived inequality and discrimination and I do believe it has gone a little too far in some situations. However, Amazon is a business and its primary objective is always going to be cost and efficiency, not offering the most equitable service.
4. What is the machine learning loop? Do you think that the machine learning loop, given in figure 1, applies to statistical modelling? Justify your answer.
   1. The machine learning loop is a model of how a machine learning model produces outputs. It starts with measurement – the reduction of the state of the world into a dataset (tabular/images/text etc), moving on to summarising the patterns in the data through the development of a model, then the actions/results of the model’s predictions, and finally model refinement through feedback.
   2. Yes, I do believe it applies to statistical modelling insofar as data is used to train a model and then the analyst will adapt and refine the model based on feedback from stakeholders etc on the quality of the output. Unlike machine learning models in production however, statistical models typically (in my opinion) don’t used feedback from users to refine and adapt the inner workings to improve predictions.