Week 6 Reflection

* **What have I learnt this week?**

This week was focused on the way complex systems evolve in time, by analysing various processes such as Markov models, random walks and modelling the spread of information, technologies, beliefs and diseases

The idea of path dependence was relevant to everyday life and suggested that everything that happens in the present moment will directly depend on the preceding moments. After reflecting on this concept it was clear that our economic success today has merely depended on previous outcomes. This made me reflect on how choices made years ago have impacted the way we live, consumer behaviour and much more. This concept could easily be applied to any real life situation such as common laws and technology.

Another interesting outcome I have learned this week was the concept of modelling through broadcasts, diffusion and contagion. While all these models were insightful and taught me something, the contagion model was unique to me and proved to be the most interesting. Relating to the relevant COVID pandemic, this model explained key differences between an SIR model and contagion model, claiming that after an individual has been affected they still hold the possibility of recovery.

**What do I 'now know' that I did not before?**

The significance of the bass model was something I was unfamiliar with prior to attending this workshop. When learning about the several models used in communication, information systems and marketing, it was interesting to note how these are all summed up in a simple model, known as the bass model. Another concept I was unfamiliar with until the workshop, was ‘random walks’. These are mathematical models which appear almost everywhere, from google search engines, finance or even explaining biological movements. It was interesting to label a stock market as a ‘random walk’, as changes in price are always ongoing and simply unpredictable. With changes going gup and down, the stock market was a clear example of a random walk which was a theory/concept I was previously unfamiliar with.

**What insights have I gained?**

A powerful insight i gained was during the discussion on how we can look at the world with ‘markovian eyes’. This was interesting as individuals observe the world differently daily, and by understanding what markovian models are, we can apply this to the way we perceive basic things, such as voting or student enrolments. When understanding something as basic as student enrolments, we can apply the markovian model to this scenario where we assign two transition probabilities and populate the matrix, which will give us information on those students who go to school versus those who don’t. After looking at standard applications of this model, it was insightful to learn the complexity that this model has on more significant examples. For instance, when analysing medical diagnoses, the likelihood of treatments for certain diseases can be better understood and developed. This is through treatments and recording whether their particular reactions are positive or negative, and therefore convey whether the treatment is successful. If so, assigning probabilities if the treatment works or not will be useful in the future.

* **What theory proved to be useful and why? What have I learnt from this?**

When exploring the topic of ‘riots’, the Granovetter Riot Model was introduced and proved to be useful in understanding how riots work. The model to explain this is based on thresholds, whereby any individual who exceeds the threshold will ultimately take action and participate. By using two examples, where Town A is filled with low threshold people versus Town B which has higher threshold people, where we can decipher when a riot would occur and when it wouldn’t. After discussing this example, I understood the importance of this riot model as we can not only understand the importance of an entire distribution, not only the mean. This model was also useful for understanding the circumstances which need to occur before a riot can start such as creating a large enough population of people that would be willing to start the riot.