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PROJECT LOG - WEEK 3

What I wanted to learn this week

Over the last week I have continued research into probability theory and Markov chains. I have primarily used Probability,Markov Chains..[1] as my main textbook, reading the relevant section and completing the supplied exercises to test myself.

One aim from last week which I was unable to meet was developing a very basic Markov chain with primitive features. On attempting to construct this, I discovered I lacked the fundamental knowledge required for completion which led me to dedicate the remaining time to further research.

I did not plan to meet my supervisor this week as my questions at this early stage are answered in the various resources available to me.

Tasks completed

The following topics were researched this week:

1. Probability theory
    1. Trails, Samples spaces and Events
    2. Mutual Exclusivity and Collectively Exhaustive Events
    3. Probability Space
    4. Condition Probability
    5. Independent Events (single and multiple)
    6. Baye's Rule
2. Combinatories
    1. Permutations
        1. with / without replacements
    2. Combinations
        1. with / without replacements

    3. Bernoulli Trials

3. Markov Chains

    1. Overview of stochastic processes

    2. Discrete-time Markov Chains

        1. Understanding the Markov property relationship

        2. Constructing a transition probability matrix / chain matrix

    3. Parameter space

        1. discrete time parameter stochastic process

        2. continuous time parameter stochastic process

    4. Change over time

        1. Stationary / Non-Stationary

        2. Homogeneous / Non-Homogeneous

Week 4 Plan

Continue to progress through Probability,Mar..[1] completing exercises throughout. I have identified the following areas that need to be researched: Embedded Markov Chains, Chapman-Kolmogorov Equations, Hidden Markov Models amongst others. Hopefully by the middle of the week I shall be knowledgable enough to produce a basic Markov chain program.

1. William J. Stewart, 2009. Probability, Markov Chains, Queues, and Simulation: The Mathematical Basis of Performance Modeling. Edition. Princeton University Press.