COMS30017 Computational Neuroscience

Week 5 Problem sheet

Video 1

- Design an experiment in which you can pharmacologically block a protein involved in LTP and use behavioural assays that would support the role of LTP in learning.
    - How would you assess the performance of animals?
    - Describe the difficulties with interpreting the results of such an experiment, why it is hard to conclude from it that LTP is sufficient for learning.
    - If you had the opportunity to do in electrophysiological recordings, how would you do them to give further support to your previous results (assuming they were positive)?
- Find a paper on topics in the video (e.g. HM, inception, or the Morris water maze), and write brief notes on it.

Video 2

- Discuss limitations of path integration as a navigational strategy.

Video 3

- Discuss the notional conflict between pattern completion and separation.
- How would we obtain total pattern completion (all inputs lead to completely overlapping output), and total pattern separation (all inputs lead to completely non-overlapping output). Is it possible or desirable to implement complete separation?

Video 4

- Consider the effect on the energy of flipping a single input, x_i. Thus, show that asynchronous evolution always reduces the energy.