COMS30017 Computational Neuroscience

Week 6 Problem sheet

Video 1

- Draw example spike patterns and sketch the results of how different methods to estimate the firing rate. Give examples of how changing the parameters of the firing rate estimates (e.g. bandwidth/bin-size) affects the estimates.

Video 2

- Find a paper on a higher visual cortical area (I'd suggest V4) online. What does the paper tell us about receptive fields in V4?

Video 3

- Write a short paragraph on the differences between rod and cone cells, using the material in the lectures and your own research.

Video 4

- Draw the simple-cell equivalent of week6-video4-slide6 (Text-fig 4 from Hubel and Wiesel, J Physiol, 1962)
- Draw a model of how complex cell selectivity might emerge from inputs from simple-cells.

Video 5

- In a Kohonen map, write down the value of C that keeps the weight vectors of unit length.
- What happens in a Kohonen map if we keep giving the same input?