Group 2: Project 1

1) Implement the normalization function (Equation 10 in Carandini & Heeger, 2012) and show how this function removes redundancy in an input (i.e., by decorrelating the pixels).

2) Show how the normalization function induces winner-take-all competition in a population of neurons tuned to different orientations (see Figure 3e in Carandini & Heeger, 2012).

3) Implement the adaptation version of normalization (Equation 12 in Carandini & Heeger, 2012) and show how this produces light adaptation in the retina.

4) Discuss the empirical evidence for normalization in the visual system.

5) Discuss the possible biological mechanisms that could give rise to normalization.

References:

Carandini, M. & Heeger, D.J. (2012). Normalization as a canonical neural operation. *Nature Reviews Neuroscience, 13,* 51-62.