HW3: Model for Z for the Bock et al. Paper

Michelle Chyn

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We started creating an SBM based model in class to represent the possible model used in the Bock et al. paper, but since it was mentioned in class that a SBM based on sets of 3 dependent nodes is impossible to model, I believe the method that kurtosis312 posted on github is a more viable model. Here I describe my interpretation of what was discussed, and attempt to go further and define the rest of the decision rules.

1. Sample space: $\Omega = X \times Y \times Z = \{0,1\}^{n \times n} \times \{0,1\}^n \times \{0, 2\pi\}^{n \times n \times n}$ X is the adjacency matricies where $X_{u,v} = 0$ when an edge exists and 1, when there is no edge. Y represents excitatory or inhibitory neuron. Z represents the difference in orientation of the two excitatory neurons u and v, both connected to the inhibitory neuron w. $Z_{u,v,w} = z_u - z_v$if u and v are connected to w $Z_{u,v,w} = 0$ otherwise.
2. Model space: $(x, y, z) \sim F_{XYZ} = F_{(Z|X,Y)}F_{X,Y}$Assuming that orientation preference is indpendent for each neuron $F_{XYZ} = \prod F_{(Z_{u,v,w}|X,Y)}F_{X,Y}$over u,v,w.
3. Action space: {Significant, Non-significant}
4. Decision Rule: $II : \{t(D) \sim Uniform\}$
5. Loss function: difference in p-value compared to threshold p-value
6. Risk: Expected loss