Statistical Connectomics HW #3

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The Model

Sample Space: $\Xi_n = \mathcal{X} \times \mathcal{Y} \times \mathcal{Z}$
Here, $\mathcal{X} = (0,1)^{n \times n}$ and is all the graphs with n nodes/neurons. $\mathcal{Y} = \{I, E\}^n$ is the categorization of each neuron (excitatory or inhibitory). $\mathcal{Z}$ is the distribution of the tuning properties. We can look at multiple possibilities for defining $\mathcal{Z}$.

The model we chose to use was a stochastic block model, $SBM(\rho(\mathcal{Z}), \beta(\mathcal{Z}))$.

Defining for $\mathcal{Z}$

$\mathcal{Z}$ could be $(0, 2\pi)^n$ or $[8]^n$ as in the block paper. Another possibility could be to have it based on other factors where the model is:
$\mathcal{Z} = (0,1)^{18 \times n}$. Each node has 18 weights ranging from 0 to 1. The 18 numbers reflect the response to 18 range of angles, so a weight for the average response to angles $(0, 10]$, a weight for $(10, 20] \ldots (170, 180]$.
This is still coarse but it also captures some of the continuous changes over the range of angles.

The Parameters, ρ and β

For $\rho \in \Delta_{18}$, we can define $\rho : z \to \Delta$ where each neuron is mapped to a group based on where which 10 degrees has the largest average response.
In the case of $\beta \in (0,1)^{n \times n}$, it would still be independent of Z. The responses of the neurons would have to be independent of the connections. It could just be defined by a Bernoulli distribution.