Statistical Connectomics HW#6

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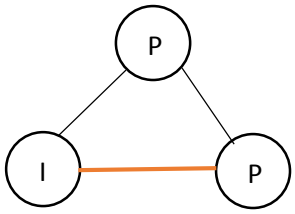
The Fino 2011 paper looked into the selectivity of GABAergic interneurons when connecting to Pyramidal Cells. They examined whether an interneurons that was connected to a network of Pyramidal cells, preferred that network over other networks. In class we discussed some models around the general idea of:



We want to be able to test whether the probability of the red edge changes given the other 2 edges.

A possible way of testing this is too redefine nodes as come combination of connected neurons. Nodes could be every connected triplet where 2 of the 3 are connected pyramidal cells and the last one is a GABAergic interneuron. Another more effective way would be to have a stochastic block model. Nodes could be defined as pairs of primary cells that were connected in one block, pairs of primacy cells that are unconnected in another block, and interneurons individually comprising a third block. In this case, the edges would be connects between pairs of primary cells and interneurons. The model can be sampled by randomly connecting primary cells with a probability P and then splitting the pairs of primary cells into two blocks based on if they are connected or not. The inhibitory interneurons edges to the primary neuron blocks would then be randomly assigned based on some probabilities. The interneurons could have a different probability when connecting to different blocks of primary cells or they could have the same probability. If the model where edges from the interneurons are sampled with a different probability of connection to connected pairs v unconnected pairs has a lower risk than a model where the edges of interneurons are sampled with the same probability to all pairs of primary cells, then there is a higher likelihood that connections to connected primary cells are different from connections to unconnected primary cells.