Alan Juliano

Homework 4: Mean Connectome

Sample Space

The sample space can be represented using the n x n adjacency matrix:

$$\boldsymbol{A} = \{\mathbf{0}, \mathbf{1}\}^{\boldsymbol{nxn}}$$

Model

The Bernoulli model will be implemented. The distribution matrix for our Bernoulli model is $(0,1)^{nxn}$

$$\mathbf{A_{uv} \sim Bern(p_{uv})}$$

This models the existence of an edge.

Action Space

The action space generates the possible outcomes. Like the sample space mentioned above, the action space is also an adjacency matrix

$$(\mathbf{0}, \mathbf{1})^{\boldsymbol{nxn}}$$

Decision Rule

The decision rule is the sum

$$\check{p} = \sum_{i=1}^{n} A^{(i)}$$

This model finds the p_{uv} value that maximizes the loss function and consequently estimates the value of p.

Loss Function

The loss function is given by the loss function of the Bernoulli distribution.

$$l = \prod_{i=1}^{n} P_{uv}^{Auv}(1 - P_{uv})^{1-Auv}$$

Risk Function

The risk function is the espected value of the loss function

$$R = E[l]$$