Decision Theroetic for Mean Connectome

akim1

March 3, 2015

Sample space The sample space is given by the adjacency matrix:

$$A = \{0, 1\}^{n \times n}$$

Model The model for the existence of an edge is given by the Bernoulli.

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

Action space Action space is the parameter space of the Bernoulli distribution:

$$\mathscr{A} = [0, 1]^{n \times n}$$

The average represents the probability of an edge existing.

Decision rule class The decision rule class is to maximize the loss function.

Loss The loss function is given by the likelihood of the Bernoulli:

$$l_{uv} = \prod p_{uv}^{a_{uv}} (1 - p_{uv})^{1 - a_u v} + \epsilon/m^2$$

where a_{uv} is the number of occurrences of an edge being observed. The last term is a factor to account for the fact that likelihood is zero when the probability is 0 or 1.

Risk As previously, the risk is defined as the expectation value of the los.

$$E\{l_{uv}\}$$