Homework 2

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Statistical Connectomics

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Creating a Statistical Model - 6 general Steps

1. Sample Space: Ξ
2. Model: $P = \{P_\theta : \theta \in \Theta\}$
3. Action Space: $\mathcal{A} = \{a_1, ...\}$
4. Decision Rule or Estimator: $\Phi = \{\Xi \rightarrow \mathcal{A}\}$
5. Loss Function: Squared loss $l : P \times \mathcal{A} \rightarrow \mathbb{R}_+$
6. Risk Functional: $R : \mathcal{L} \times \Phi \times P \rightarrow \mathbb{R}_+$

Analizing a neuroscience paper

Paper: Functional brain network efficiency predicts intelligence. Langer, Nicolas; Pedroni, Andreas; Gianotti, Lorena R R; Hnggi, Jrgen; Knoch, Daria; Jncke, Lutz

0.1 Sample Space

$$\mathcal{G}_n = (\mathcal{V}, \mathcal{E}, \mathcal{Y})$$
$$\mathcal{V} = \{v_1, ..., v - n\}$$
$$\mathcal{E} = \{e_{11}, ..., e_{nn}\}$$
$$\mathcal{Y} = \{0, 1\}^n$$

0.2 Model

SBM

0.3 Action Space

$$\mathcal{A} = \{y \in (0,1)^n\}$$

0.4 Decision Rule Class

Bayes Rules??

0.5 Loss Function

$$l : \mathcal{G}_n \times \mathcal{A} \to \mathbb{R}_+$$

$$l : \sum_{i=1}^{n} \mathbb{I}\{\hat{y}_i = y_i\}$$

0.6 Risk Functional

Mean Square Error (MSE) $\sum P \int (t-y)^2$