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Statistical Connectomics: Homework 2

Statistical Decision Theoretic for Stochastic Block Model

1. **Sample Space**

   Our sample space consists of all vertices, edges, and vector labels.
   a. G = (V,E,Y)
      i. V= number of vertices – $\{V_1,....,V_n\}$
      ii. E = number of edges- $\{E_1,....,E_n\}$
      iii. Y = vector labels $\{0,1\}^n$ - each vertex as a label 0 or 1
2. **Model**

   J=SBM^k_n(p,B,…) for k = 2
   a. $\rho \in \delta_2$
   b. $\beta \in (0,1)^{2X2}$
3. **Action Space**

   A = { y $\in \{0,1\}^n$} – This is the assignments of the cluster
4. **Decision Rule Class**
   a. The decision rule class is determined by the method of clustering
5. **Loss Function**
   a. Using the adjusted rand index, we get the cost of the associated action
   $l: G_n \, x$ A $\rightarrow$ R$_+$
   $l = \sum_{i=1}^{n}(\Theta)\hat{y}_i = y_i$
6. **Risk Function**
   a. The risk function is as followed
      i. $R = J * l$
         1. This can be interpreted as the expectation of the loss function
            a. $R = E[l]$