

Statistical Connectomics

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February 17, 2015

Example with Kmeans using Stochastic Block Model

Sample Space: $\mathcal{G}_n = (\mathcal{V}, \mathcal{E}, Y)$

Where $\mathcal{V} = \{v_1, v_2, \dots, v_n\}$ is the set of n vertice

\mathcal{E} = Potential edges $\{e_{11}, \dots, e_{nn}\}$

$Y = \{0, 1\}^n$ which are n sets of $\{0, 1\}$ vectors

Model P: $SBM_n^k(\vec{\rho}, \vec{\beta})$ where $\vec{\rho} \in \Delta_2$ and $\vec{\beta} \in (0, 1)^{2 \times 2}$

Action Space: $\mathcal{A} = \{y \in \{0, 1\}^n\}$

Loss Function: $\mathcal{L} : \mathcal{G}_n \times \mathcal{A} \rightarrow \mathbb{R}_+$

An example for kmeans could be a total of how many vectors came to the 'truth':

$$\mathcal{L} = \sum_1^n I_{\hat{y}=y}$$

Risk Function: $A \times \mathcal{A} \times P$. This is the probability of getting a loss.

$R : P \times \mathcal{L} \rightarrow \mathbb{R}_+$. An example could be the expectation of the loss function $E_p[\mathcal{L}]$