# Assignment 4 - Mean Connectome - Duo Xu

2015年3月2日 23:33

We have a connectome dataset $D = \{G_1, G_2, \cdots, G_i, \cdots, G_n\}$, each $G_i(V, E_i, W)$ has the same number of vertices (could be voxels) which associated with same sets of vertex attribute $W = \{M1, S1, \text{dorsal hippocampus}, \text{ventral hippocampus}, \cdots\}^k$, and $E_i$ describes the connection between each vertex pair $E_i \in \{0, 1\}^{n \times n}$

Fit $SBM_k^n(\vec{\rho}, \vec{B})$ to $D$, where $k$ equals the number of categories in $W$ and the vertices are clustered accordingly. Using maximum likelihood method to find $\vec{\theta}_i$ in $\vec{B}_i \sim Bern(\vec{\theta}_i)$

Assuming the prior distribution $\vec{\theta} \sim Beta(\vec{a}, \vec{b})$, where hyperparameters $\vec{a}$ and $\vec{b}$ can be estimated from connectomes of people who have been identified as normal.

Decision rule $\delta$ using Bayesian inference. $\delta(D) = p(\vec{\theta}|D) = Beta(\vec{\theta}|\vec{a}+\vec{n}_1, \vec{b}+\vec{n}_0)$, where $\vec{n}_1$ are the total number of occurance of edge for every pair of clusters, while $\vec{n}_0$ are that of the absence of edge.

Risk function: $E[L(\vec{\theta}, \hat{\vec{\theta}})] = r(\vec{\theta}, \delta(D))$