

Clustering vertices of a graph statistical decision theoretical problem statement

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1. Sample Space

$$\Omega = \{G: G = (E, V, Y)\}$$

The sample space includes all graphs with vertices V and labeled edges E . Y includes the vector labels $Y \in \{0,1\}^n$

2. Model

$$P = \{P_\theta : \theta \in \Theta\}$$

For the stochastic block model:

$$P = SBM_n^k(\rho, \beta)$$

$$\rho \in \delta_2$$

$$\beta \in (0,1)^{2 \times 2}$$

3. Action Space

$$A = \{Y \in \{0,1\}^n\}$$

A makes the decisions for each vertex and labels them with Y .

4. Loss Function

$$L: G_n \times A \rightarrow R_+$$

5. Risk Function

$$R: A \times A \times P \rightarrow R_+$$