Econometrics **August 20, 2023**

Topic 19: Community Detection

by Sai Zhang

Key points: .

Disclaimer: *The note is built on Prof. Jinchi Lv's lectures of the course at USC, DSO 607, High-Dimensional Statistics and Big Data Problems.*

19.1 Stochastic Block Model

Consider an undirected graph G, with nodes V and edges E. Let

- n be a positive integer: the number of **vertices**
- k be a positive integer: the number of **communities**
- $p = (p_1, \cdots, p_k)$ be a probability vector on $\{1, \cdots, k\} := [k]$: the **prior** on the k communities
- W be a $k \times k$ symmetric matrix with entries $W_{ij} \in [0, 1]$: the matrix of **connectivity probabilities**

Definition 19.1.1: Stochastic Block Model