ACMS 80770-03: Deep Learning with Graphs
Homework 2

Handed out: Sunday, October 9, 2022
Due: Friday, October 14, 2022 10:00 PM

Notes:

- Use the provided latex file to submit your written work.

- Upload the written work (PDF only) directly to Gradescope.

- Once detected, copying and pasting from classmates are regarded as a violation of the honor code.

Problem 1: Normalized Cut (NCut) clustering objective is defined as

$$R^{\text{NCut}}\left(\mathcal{A}_1, \ldots, \mathcal{A}_K\right) = \frac{1}{2} \sum_{k=1}^{K} \frac{\left|(v_i, v_j) \in E : v_i \in \mathcal{A}_k, v_j \in \overline{\mathcal{A}}_k\right|}{\text{vol}\left(\mathcal{A}_k\right)}, \tag{1}$$

where

$$\text{vol}\left(\mathcal{A}_k\right) = \sum_{v_i \in \mathcal{A}_k} d_i. \tag{2}$$

For the case of $k = 2$, show that the minimization of NCut can be approximated as a normalized spectral clustering.