Lecture Introduction to Network Science
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Assignment 10 – Node Classification

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Question 1

Answer the following questions:

a) Which assumptions did we establish in our node classification models?

b) Which two variants of node classification via label propagation exist?

c) In which sense is the Correct-and-Smooth (C&S) model superior to the label propagation model?

Question 2

Consider the network visualized in Figure 1 with red (class 0) and blue (class 1) nodes representing already labelled nodes.

a) Give the corresponding transition probability matrix $\mathbf{T}$ and the initial class probability matrix $\mathbf{Y}^{(0)}$ as defined on Slide 17.

b) Give the updated class probability matrix $\mathbf{Y}^{(1)}$ after the first iteration using the **synchronous** update rule.

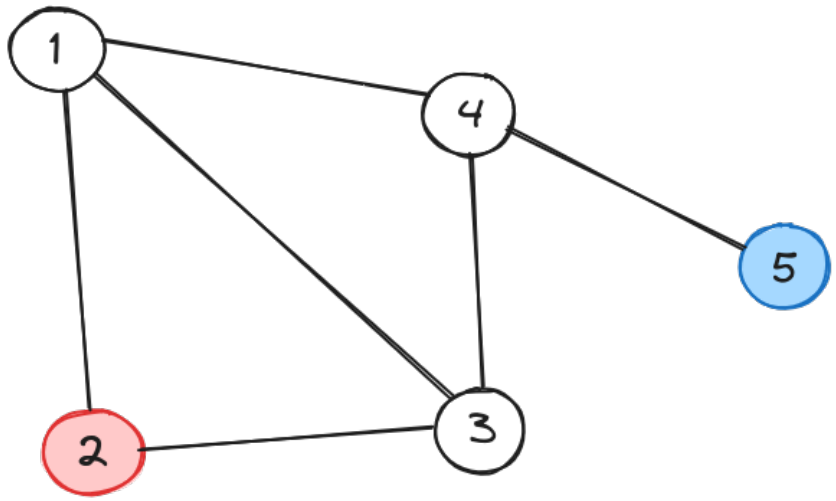

Figure 1: Example network for semi-supervised node classification.

Question 3

In this task we want to implement a simplified version of the C&S model. Your program should take as input an undirected network (we ignore node features for now), and for simplicity we also assume that we are already given the soft predictions of some base line predictor.

That is, you only need to implement the correct step and the smooth step. You can test your implementation with the example network given in the lecture.