TCSL7390 Social Network Analysis
Assignment 3

Note: Refrain from using pre-written code or solutions from the internet, including AI language models (like LLMs), to compose your queries. Ensure that your submissions are entirely your own work, and avoid copying or sharing code with your classmates. The evaluation process will include a plagiarism check.

Please submit one zip file (named as <roll no.>.zip), which will consist of two files 1) the full code in Python script (convert the notebook into Python file) and 2) A report that will explain the theory and output. Late submissions are allowed. However, the marks you obtain will be calculated based on buffer days remaining. You can use the networkx python library for the same.

Task- Generate a Barabási-Albert graph with a size ranging from 1,000 to 10,000 nodes. Explore the process of information spreading across this network. Carry out a series of Monte Carlo simulations to analyze this phenomenon.

1. Independent Cascade Model (ICM) of diffusion. Set an initial active node (30 random) and estimate the total active nodes after the simulations. Use at least 10000 runs. Consider propagation/diffusion probability to be any random value between 0.05 to 0.15.

2. Linear Threshold Model (LTM) of diffusion. Set an initial active node (30 random) and estimate the total active nodes after the simulations. Take random values for b and theta.

3. Seed Selection: Use a greedy algorithm to select 20 seed/most influencing nodes. Return the final information spread of these 20 nodes. Verify how much it is different as compared to 20 random nodes. Use both ICM/LTM as your underlying model.