ECS414/614 Network Science Theory and Applications
2025-26-I Term
Assignment 2
Date posted: 15 October 2025
Due date: 10 November 2025

Problem statement

Network creation:
Create a stock market network using the data from Indian Stock market. For the purpose of network creation, refer to Section 3 of [1] and/or section 2 of [2]. You need to collect data for Indian stock market only. The network should have a minimum of 100 nodes (stocks) and cover multiple sectors of economy, however a larger network is preferred and encouraged.

You may download the data from yahoo finance using the python package yfinance (other similar tools/ packages are also welcome).

If you decide to create a network of n nodes, it is best to pick top n companies in terms of market capitalization. List of top n companies by market capitalization listed in National Stock Exchange (NSE) is readily available, the link to which is provided in the table below.

Value of n	**Link**
Top 100 companies	https://www.niftyindices.com/IndexConstituent/ind_nifty100list.csv
Top 200 companies	https://www.niftyindices.com/IndexConstituent/ind_nifty200list.csv
Top 500 companies	https://nsearchives.nseindia.com/content/indices/ind_nifty500list.csv
All companies listed in NSE	https://nsearchives.nseindia.com/content/equities/EQUITY_L.csv

You should download the data only once and use the local copy for experimentation, please do not bombard yahoo server (where data is originally stored) with multiple requests every time you debug or refine your code.

Data analysis:
Once the network has been created, analyze the network using various concepts covered in the class. You may calculate and report various centrality scores of nodes, local clustering coefficient values, similarity scores, assortative mixing based on degrees, degree distribution of the network, etc.

As you change the parameters for network creation, the network and hence these values will change. Conduct a study of how these values change when we change the network.

Deliverable:
Each student needs to submit a report (soft-copy) detailing the process of network creation, experiments conducted, and results achieved. Submission link will be posted later.

Evaluation criteria:

Quality of dataset collected and used, analysis of the data based on concepts covered in the class, quality and quantity of meaningful results (and its interpretation).

Make sure that you include all usual components in the report such as problem statement, methodology (including functions/code snippets used), results (plots/tables) and interpretation, conclusion, and other sections as you deem suitable.

References:

[1] Chi, K. Tse, Jing Liu, and Francis CM Lau. "A network perspective of the stock market." *Journal of Empirical Finance* 17.4 (2010): 659-667.
[2] Moghadam, Hadi Esmaeilpour, et al. "Complex networks analysis in Iran stock market: The application of centrality." *Physica A: Statistical Mechanics and its Applications* 531 (2019): 121800.