Modelling and Analysis of Complex Networks

Exercise 2

Due: 13:00 on Oct. 4, 2024

The maximum score of this assignment is: **16 points**. Please submit the assignment in any readable data format (.txt, .doc, .pdf, .md ...) and submit the assignment before the deadline. If you have additional information concerning your answers, please also upload the document to the Moodle, or include the link to the document in your answers (e.g., link to your Github repository). Please indicate your team number in your submission.

Now let's explore more about the two datasets we have: Facebook-Ego and Twitter-Ego. The following questions can be answered with the help of Snap.py and NetworkX. You may also use other packages to deal with the problem. Please answer the following questions on both of the networks you have and submit your executable code. **($2 \times (1 + 1 + 2 + 1 + 1 + 2) = 16$ points)**

(a) What is the degree distribution of the network? Please plot the distribution and attach it to your answer sheet.

(b) According to the degree distribution, what is the main difference between the chosen network and a random network with the same number of nodes? What may cause the difference?

(c) What is the average path length of the network?

(d) Please randomly choose 5 nodes from the network, and calculate the clustering coefficients of these nodes, respectively.

(e) What is the average clustering coefficient?

(f) Please list the nodes which compose the largest component in the network.