PROJECT

First, please select **one** of the following alternative projects to conduct computer simulations.

1. Investigate a network or a set of networks that contains at least 100 hundred nodes. You can formulate a network by collecting data by your own. You must clearly explain how the network is formulated and the rationale that you constructed such a graph (the notations of nodes and edges).
(1) Perform some computer simulations (by using whatever computer software or programming language) on the formulated graphs to analyze the network properties (such as node-degree distribution, average shortest path-length, clustering coefficient,etc.) and dynamical behaviors (such as robustness against intentional attack and random attack, etc.).

(2) Calculate the node coreness in the formulated graphs;

(3) Draw necessary figures and/or tables to demonstrate your simulation results and to support your observations;

(4) To have extra bonus, you can develop a small system (including friendly interfaces, or graphic demonstrations) to show the layout of the networks you constructed.

2.Take any one of those typical complex network models that you have learned from this course, such as the Erdos-Renyi random graph model, Watts-Strogatz small-world network model, Newman-Watts small-world network model, Barabasi-Albert scale-free network model, extended Barabasi-Albertscale-free network model, or else.
(1) Propose your own model by changing only one technical step in the modeling of the network you have chosen above, such as initial condition, rewiring method, attachment criterion, connectivity probability, or else. Explain your rationale for making the change;

(2) Perform some computer simulations (by using whatever computer software or programming language), to a certain network size and step size that are large enough to show some basic features (whatever features you can observe) of your new model. Draw necessary figures and/or tables to demonstrate your simulation results and to support your observations;

(3) Also, perform some computer simulations on the original model, chosen above, and then compare the original model and your new model for their essential similarities and differences in terms of network properties (such as node-degree distribution, average shortest path-length, clustering coefficient, etc.) and dynamical behaviors (such as robustness against intentional attack and random attack, etc.). Draw necessary figures and/or tables to demonstrate your comparison results.

Second, write a **Report** to summarize your project that you have selected.
The report should be written in such a way that a reader can understand what you have done and how to do it. That is, all detailed information should be provided and described clearly, so that anyone who wants to verify your model and simulations can reproduce them easily. The report does not have to be long (generally, a typed report has 10-20 pages including figures; no need to go beyond 20 pages unless it is necessary).

Third, prepare a **PPT** to demonstrate your basic modeling methods (or algorithms), observations, and discussions.

Organization format: three students per team. This project is conducted in a teamwork. There is a leader in every team who needs to invites two members to join in his team. The entire process of project must be carried out in our system(http://cosine.ienkel.com/#/index). You can learn about how to use the system in the file readme.doc.

Students can report any bugs of the system any time in our qq group.

This project is due in class on Monday, 21 Oct. 2019

Submit the hard copy of your Report to TA (YU Qiong and REN Lang); Wrap the soft copy of your report, the PPT and your source codes in only one file (named by your name + student ID) in .zip format (including a readme.txt file for explanations to the program settings if necessary), and submit it to complexnetwork19@sina.cn**.**

This project is due in class on Monday, 21 Oct. 2019