Experimental Study Term Paper - Network Science 2020

What we expect

We expect you to perform an experimental evaluation of different algorithms for a Network Science problem and write a term paper on your experimental study. This term paper should at least have a short introduction, describe your experiments, include a high-level description of the algorithms tested (with proper citations), and include a discussion on your results.

You are allowed, and encouraged, to use existing implementations of the algorithms you study. However, we require that you implement at least one algorithm by yourself. For problems for which many implementations are readily available we expect more focus on a good and broader (more algorithms) comparison. In case you have an experimental setup that requires you to program everything yourself only a few algorithms suffice. In this case, think about (and report on) what algorithms you want to implement and why.

Students must individually write their own term paper (and implement at least one algorithm). However, you are allowed to discuss your experimental setup and analysis with your fellow students.

You can focus on one of two directions for your experiments:

1. Perform a comparative study of known algorithms for a Network Science problem.
2. Make a modification to a known algorithm (or think of an entirely new one) and compare its behaviour to the current best algorithm(s) for a given Network Science problem.

Of course, for a high grade, you are allowed to do both. However, keep in mind that it is better to do one thing right that two things half.

Doing your experiments and reporting on them in a scientifically sound manner is a very important part of the experimental study term paper. You should, when applicable, report on:

1. the hypothesis you are testing (or that part of the experiment is exploratory);
2. the instances gathered and why you have chosen these instances (is there for your experiments a relevant ground truth?);
3. algorithms and specific implementations that are used?
4. relevant parameter values and/or other important algorithm properties;
5. the measure you choose to evaluate algorithm performance and why you have chosen these;
6. possibly any other important part of your experimental setup;
7. results of the experiment;
8. analysis of the results, preferably including a statistical analysis;
9. conclusions you draw from the experiment.

A nice paper with guidelines on doing such experiments and reporting on them is the following: Angriman et al. Guidelines for Experimental Algorithmics in Network Analysis.

Setting up your experiments in such a way that a peer-reviewer and your teachers can reproduce your results is highly recommended, e.g., use scripts.

Your term paper should be 5-8 pages long (just like the literature term paper), excluding bibliography and possibly and appendix containing more detailed experimental results, on A4 paper with 1-inchmargins, 11-pt font, single-spaced. We recommend using LaTeX. Your grade will be lowered by 1 for each page over or under the page limit.