MITRO 209:
Project

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In this lab, we are going to implement the main algorithms for computing densest subgraphs we saw during our course. You should submit the code (in C/C++,Java or Python) as well as a short report in pdf (max 5 pages) containing the plots requested in the text of the exercise together with the answers to the questions. You will be evaluated according to how efficient is your code (C? Python? which data structures?) and how well you explained what you did (e.g. including a picture of the data structure you used might help). You should also discuss whether the results are expected or not and if not motivate why you might have obtained different results than what you had expected. Any "interesting findings" will also be appreciated. You should send an email to `sozio@telecom-paristech.fr` with subject "MITRO2020: project". The project can be done in groups of maximum two people. Each group should send just one single email with the name of the people involved in the project. We will be more demanding with projects made by two people. The project consists of two parts as follows.

Implement the 2-approximation algorithm for the densest subgraph problem (slide 10 of the slides on finding densest subgraphs). The running time of your algorithm should be linear (in the size of the input graph) in the worst-case. You should explain which data structures you used and how things have been implemented. It should be clear what you did even without reading the code. Consider 5 graphs with different size from `http://snap.stanford.edu/data/index.html`.

1. Plot the running time of your algorithm as a function of the input size. You should try to give evidence that your algorithm has indeed linear running time.

2. Report the density of the subgraphs you found as well the number of nodes in each of the subgraphs.

Plagiarism: If we suspect that students copied their code or their reports from other students, all the students involved will receive 0 points for this lab and a penalty at the final mark for this course.