

COMPX556 – Project (50%)

For the project, we will follow a similar approach as we did for the assignment, but you can have more choice and flexibility as to the algorithm you focus on and the problem you want to solve, and it is expected that the analysis will be deeper. The theme of the assignment will be **parallelisation**.

Like before, you may work in pairs. Please make sure that every source code file and the report has the details of both partners in the format *name_ID_name_ID*. Any programming language can be used. No existing metaheuristic code can be used for this assignment.

The following are the steps you need to take:

- Select one algorithm or a family of algorithms that we have looked at. The only restrictions are that you may not pick Local Search or the algorithm you used in the assignment.
- Decide on the focus of your investigation. The theme here is parallelisation so you should make sure that your programming language supports concurrent programming and you know how to use it. The aim of the project is to compare the serial version of your algorithm to at least one method of parallelisation. The exact number of methods will depend on how complex the implementation of the parallelisation is, so make a sensible choice. You may use an existing parallel version of an algorithm or you may make up your own. You will need to set up an experimental framework that will enable you compare algorithm performances properly by performing multiple runs.
- Next, pick a problem. We have covered several in the videos, but there are many, many potential other problems out there. A good problem is clearly one that cannot be solved with an efficient algorithm and brute force already (hence the need to use metaheuristics). You can find problems to work on by searching on Google Scholar, or you could pick a difficult problem from a previous course, or you could search up a catalogue of NP-Hard problems... the choice is yours! Ideally you will have at least three different problem instances of increasing difficulty to work like we did in the assignment, but you may have more (e.g. 10) or less (e.g 1) depending on the nature of problem and how much compute time required.
- Once the focus and problem is decided, the next task will be to conduct your experiments. Experiments should be conducted in a statistically sensible way so that you can draw valid conclusions. The minimum statistics needed are best and average case performance, with fair parameter optimisation being applied to both the serial and parallel versions of the algorithm, along with speedup statistics.
- Finally, write up the report. Since you will need to describe the problem and the investigation in more detail this time, the report length will be longer: 4-6 pages of IEEE double column format.

Deliverables

Code (30 marks)

-- made available on github; share with my github account: mmayo888

Video (10 marks; required to get marks for the Code section)

-- Provide a video demonstration and walkthrough of your code of about 15 minutes; this should be linked to in the report

Report (60 marks)

-- 4-6 pages IEEE format; provide links to the code and video in the report and submit only the report via moodle.