Course Project – 2025

Guideline: There will be no terminal exam. Instead, an exploration oriented project is designed in order to train students' research ability (hopefully).

Basic rules:

1. Read a paper on a CCF Rank A or B conference or journal published within recent 2 years (2023-2025).
2. Describe what optimization algorithm is used for solving what optimization problem (cannot be a neural network training problem) in the paper. If the code is downloadable, you may use it. Otherwise, you have to reimplement it. It will be used as a baseline. In whichever case, make sure that its performance on the data in the paper is close to those reported in the paper. This is to prevent you from deliberately making the baseline slow.
3. Propose another algorithm different from the baseline (thus cannot be simple parameter tuning on the baseline) to solve the same problem. Compare its performance with the baseline on the same data sets.
4. Score:
   - The total score = writing score + technical score.
   - The writing score of your project report has at most 15 points.
   - The baseline has a technical score = 75 points × difficulty of your problem (the difficulty is determined by the teacher).
   - The technical score of your project report is proportional to the averaged speed of your proposed algorithm relative to the baseline counted at the same (numerical or classification) accuracy, capped by 85 points. For example, if your algorithm is in average 15% faster than the baseline on the data sets and the difficulty is 1.1, then the technical score will be $\min(75 \times 1.1 \times 1.15, 85) = 85$ points before rounding.

Upload your codes, datasets (if too large, you may share online and write the download link in your report), and project report to the course.pku.edu.cn by 23:59:59, June 15, 2025.

Requirements on the Project Report: The project report must be written in English and Latex and contain the following contents.

1. Title of the problem.
2. Name, school/department name and student ID of you.
3. Abstract. Gives succinct information on the background of the optimization problem, original and new methods to solve it, experimental results and conclusions.

4. Introduction. Include background of the optimization problem and the mathematical formulation of it.

5. Description on the original algorithm and the data sets used.

6. Details of your approach, including but not limited to explanation on your idea, mathematical deductions and pseudo codes. Be sure to fully describe any figures, tables or diagrams you include.

7. Experimental results. For each dataset, first report two numbers: the number in the paper and the number of your downloaded or re-implemented baseline, so that the teaching assistant can make sure you have a correct baseline. Then report the computing time of the baseline and your algorithm at the same (numerical or classification) accuracy. Explain what you have observed if necessary.

8. Discussions (optional). Anything you want to convey.

9. Description on where to download your code and data and how to run your code.

10. References, in particular the paper you read, with detailed publication information.

No plagiarism! Those found will all have zero scores! But you may discuss with other students. In order to prevent AI generated fake reports, **those without executable codes will also have zero scores.**