SI251: Convex Optimization
Course Projects, **Autumn 2022**

Instructor: Ye Shi

Projects can be done in a **group of up to three students**. Projects will be evaluated based on a combination of:

- In-class presentation: prepare an oral presentation with slides (< 10 min). Focus on high-level ideas, and leave most technical details to your report. Good slides *do not* have a huge amount of text. Good slides *do have* lots of figures/pictures/illustrations and so on. The purpose of the slides is to provide graphic aids for describing it to someone.

- A written report (end of 16-th week): you are expected to submit a final project report (*up to 8 pages* with unlimited appendix and reference, using the Latex template (NIPS format) in blackboard) summarizing your findings and contributions. You must turn in an electronic copy.

Suggestions for technical write-ups

This is an important part of the learning exercise. Please spend time on your write-up so that your work is well-motivated, described precisely, and your results/conclusions are clear. Some ideas to keep in mind:

- The introduction should set up the problem (e.g., why is it interesting? important?) and provide some context for what work has been done in the past (e.g., what is known? what is open? what are deficiencies of current approaches?)

- The methods/results section should describe clearly what you did (e.g., enough details for someone to re-implement what you did, if needed), provide some summary tables or figures that illustrate your results, along with some descriptive interpretation.

- The discussion/conclusion section should summarize what you learned, what worked well/what didn't, what you might do if you were to continue to work on this project, and so on.

Organizations of projects

The project needs include the following two parts:

- Part I-Literature Review: we will provide a list of related papers not covered in the lectures, and the literature review should involve in-depth summaries and exposition of one of these papers. Specifically, you should read a number of papers in your selected topic, teach yourself, summarize your findings, provide numerical experiments and theoretic analysis (i.e., convergence analysis and/or statistical analysis).

Ye Shi is with the School of Information Science and Technology, ShanghaiTech University, Shanghai, China (e-mail: shiye@shanghaitech.edu.cn).

- Part II-Original Research: it can be either theoretic or experimental (ideally a mix of the two). You are encouraged to make contributions by finding new applications, novel algorithms, or providing new theoretical analysis, etc. If you try to do original research, please do not propose an overly ambitious project that cannot be completed by the end of the semester, and do not be too lured by generality. Focus on the simplest scenarios that can capture the issues you'd like to address.

If you would like to discuss some of your ideas, feel free to talk with me and/or TAs. We are happy to give you some guidance.

References