CSE543T: Algorithms for Nonlinear Optimization

Course Information

1. The objective of the course is to get familiar with optimization theory, learn nonlinear optimization algorithms, and apply nonlinear optimization techniques to solve real-world problems. As a computer science course, we emphasize on the applications of optimization algorithms in data science and machine learning.

2. The required textbook for this course is:

   Nonlinear Programming, 2nd Edition, Dimitri Bertsekas, Athena Scientific, 1999.

3. The course entails a mixture of lectures by the instructor/TA and presentations by students. The course is organized into three modules:

   - unconstrained optimization
   - constrained optimization
   - duality and discrete optimization

Each module consists of a few lectures, followed by a few presentations on selected topics. A tentative schedule is attached.

4. Each presentation will be done by a team of students. You will be randomly assigned to one team. Note the following guidance for the presentation:

   - Each presentation takes one lecture slot and is expected to be 70-80 minutes, followed by a 5-10 minute Q&A session. As a rule of thumb, each team should prepare about 80-150 pages of slides.

- For each presentation, we provide one or two links as a starting point for studying the topic. However, the team is expected to perform extensive literature survey and prepare a comprehensive and up-to-date lecture on the topic. You should clearly explain the problem, its optimization formulation, the methods for solving the optimization problem, and discuss recent applications and results.

- All team members should work together to study the topic, search the literature, read papers, and make PPT slides.

- Every team member should attend the presentation and speak during the presentation.

- All students in the class should attend all the presentations. The TA will take attendance. You are encouraged to ask questions during and after the presentation.

- Each presentation will be graded by its organization, content, technical quality, presentation skills, clarity, coverage, length, and ability to answer questions.

4. There will be two homeworks, one course project, and one take-home final exam.

5. The final grade of the course consists of:
- Course presentation (30%)
- Homeworks (10%)
- Course project (30%)
- Final exam (20%)
- Attendance (10%)