

CS-584 Machine Learning Project

The project can be *theory-oriented* and *application-oriented*. Group work and discussion is encouraged. However, the efforts from each member of team should be clearly documented in the project report. A smaller team will get higher scores if the projects are in the same quality. It is strongly recommended to use LaTeX to format the project report, and use the ACM SIG or CVPR template.

Theory

- Maximum group size: 3
- Focus: Study theoretical properties of new machine learning algorithms.
- Choose a paper from NIPS or ICML
- Complete a term paper that surveys the area, and show detailed proof.
- Implement the algorithm and verify the theoretical properties (synthetic datasets can be used).
- Bonus: use the algorithm to solve a real-world problem (apply on a real-world dataset and get empirical results).

Application

- Maximum group size: 3
- Focus: Implement and compare different algorithms to solve a real-world problem.
- If you are interested in computer vision, choose a paper from CVPR or ECCV or ICCV and start with reading some CVPR/ICCV/ECCV papers.
- Other application: data can be from Kaggle and refer to some KDD papers.
- Bonus: derive theoretical properties of the algorithms.

Important Dates

- Proposal due: Oct 1, 2022
- Intermediate project report due: Nov 1, 2022
- Tentative Final project presentation: Nov 9 / Nov 11 / Nov 16 / Nov 18 / Nov 30 / Dec 2, 2022
- Final project report due: Dec 2, 2022

Deliverables

Code

The code (proposal, report, and program) should be maintained in GitHub, with commits reflecting the efforts from each team member.

Project proposal

Project proposal (1-2 pages) should cover:

- Project title
- Team members
- Description of the problem.
- A brief survey of what have been done and how the proposed work is different.
- Preliminary plan (milestones) and Reference (a list of papers)

Intermediate Project Report

The intermediate project report (3-5 pages) should cover:

- a high quality introduction and problem description
- description of the data used in the project
- what have you done so far
- what remains to be done

Final Project Report

The final project report (8-10 pages) should cover:

- Introduction: including a summary of the problem, previous work, methods, and results.
- Problem description: including a detailed description of the problem you try to address methodology.
 - Theory: details of technical proof.
 - Application: detailed description of methods used.
- Results: including a detailed description of your observations from the experiments
- Conclusions and future work: including a brief summary of the main contributions of the project and the lessons you learn from the project, as well as a list of some potential future work.

Final Project Presentation

- 5-8 minutes
- Describe the motivation and problem description
- Briefly present the intuition behind the technical details (methodology)
 - Theory: Algorithm and proof sketch of major properties
 - Application: Algorithm and results (you can use a demo)