Project Requirements*

Shangtong Zhang

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1 Goals

There are three goals in this final project. **First**, it provides an opportunity to practice what we learn in class about learning theory and algorithms. **Second**, it encourages you to think about something beyond the course materials. **Third**, it provides you with an opportunity to practice scientific writing.

2 Project Types

You can choose any of the following 2 types of project ideas.

Application project. Pick an application problem that interests you and explore how to find the best learning algorithms to solve it.

Algorithmic project. Pick a machine learning problem, then (1) develop a new algorithm to solve this problem or (2) design a variant of an existing algorithm that can provide a better solution.

You can solo the project or form a team. All team members share the same project grades. A team can have **up to 4 members**.

3 Project Proposal (10 points)

Please include all team names and emails in the author list. A project proposal should include the following sections.

- Problem definition. Usually, an easy way to provide a problem definition is to specify
  - the input of the problem (1 point): e.g., in text classification, the input is usually a document or sentence;
  - the output of the problem (1 point): e.g., in text classification, the output is the label set of the input text;
  - the motivation for choosing this problem (1 point).
- Proposed idea (2 points). It depends on the type of your project.
  - If it is an application project, the proposed idea should be a concrete plan of exploring some learning algorithms to solve this problem
  - If it is an algorithmic project, the proposed idea should identify the challenge of solving the machine learning problem and also the common limitation of existing algorithms
- Expected outcome (1 point). Briefly describe what you would like to see after finishing this project.
- Related works (3 points). You should be able to identify at least **3 related works** in this section. For each related work,

*This document is adapted from the previous edition of CS6316 offered by Prof. Yangfeng Ji and Stanford CS 229.

  - describe why the work in this paper can be used to solve the proposed problem if it is an application project
  - describe what are the specific issues of the work proposed in this paper and how your proposed idea can address these issues if it is an algorithmic project
- Datasets (0.5 point). Describe the dataset(s) that you will use in the project.
- Timeline (0.5 point). describe what you plan to in every two weeks till the end of the semester.

4 Project Presentation (8 points)

Please use Zoom (or any other meeting app) to record an **8-minute** presentation with all team members, which means everyone on the team should talk about something during the presentation. Please upload the recorded video on Canvas. Each group only needs to upload one copy.

In the presentation, please include the following components.

- Introduction (2 points)
  - A brief explanation of problem definition.
  - The motivation of why you worked on this problem.
- Proposed methods (4 points)
  - A description of the proposed methods.
  - A highlight of a few interesting results/observations from experiments (it is not necessary to present all the results here)
- Conclusion and future work (2 points)
  - A brief conclusion based on the proposed methods and the experimental results
  - If there is an opportunity to improve your current work (not prior work), what would you like to do, and why do you think it will improve the current work?

5 Project Report (10 points)

In the final report, please include the following sections.

- Problem definition. You can reuse the corresponding section from the project proposal.
- Related work. You can reuse the corresponding section from the project proposal.
- Proposed ideas. You can reuse the corresponding section from the project proposal.
- Experiments
  - Experiment setup (2 points). Please describe the information related to experiment setup, such as data sets and preprocessing, hyper-parameters, optimization methods, etc.
  - Experiment results (3 points). Please list the important results from the experiments.
  - Results analysis (3 points). Explain whether the results meet your expectations? If the results are expected and good, please identify the important factors that lead to success. Otherwise, please identify the unexpected issues in the proposed ideas.
- Conclusion (2 points). A short conclusion about what you have learned from this project.