

Project Guidelines

In this project, you are required to define a real-world engineering problem and solve it by applying a machine learning algorithm. The problem and solution are of your choice. This is a chance for you to develop an engineering project close to the real-world. Guidelines and requirements are detailed in the following sections; however, there is intentional ambiguity and uncertainty in the project to test your decision-making and critical thinking skills.

Learning Outcomes

1. Practice of written communication skills
2. Define an engineering problem
3. Practice applying machine learning concepts
4. Research machine learning solutions outside the scope of the course

Rules

The following are rules to be followed to be considered for full credit. The term “rules” implies regulations that **must** be followed to be considered for full credit.

1. The project must be done in groups of 3. No groups of 2 or 4 will be allowed, unless necessary (integer-division-wise) one group of 2 will be permitted.
2. The project topic is of your own choosing.
3. The solution to the problem you define should be a machine learning application.
4. The machine learning solution should go through an improvement process. The primary solution can be an idea discussed in the course, and should be refined to introduce a concept **not** discussed in the course. Don't only show a problem and a solution. At least two alternatives must be discussed, and the rationale behind the final solution should be justified.
5. You are allowed to use a dataset available on the internet while referencing it well in your report.
6. The project is not required to be new/novel/not done before. You are encouraged to think independently about ideas, then search the internet on what has been done in machine learning course projects. However, you cannot copy code or your report as this is considered plagiarism and is a violation of the University of Toronto academic code of conduct.
7. In case, conflict arises between team members regarding the project topic and specifics or tasks, it is expected to be managed within the group. Teaching team will not intervene to resolve conflicts.

Guidelines

The following are guidelines that help you organize the project and meet expectations. The term “guidelines” implies recommendations to ensure a smooth experience developing the project with teammates.

1. Use the Piazza post “Find a project partner” or other means to form a group of 3.
2. Reach out to your teammates to discuss the project topic, potential machine learning solutions and the availability of datasets to help you train a machine learning model.
3. Brainstorm ideas and use the internet to help you clearly define the scope of your project.
4. Write 200 words (or less) to describe the engineering problem you plan to solve, the motivations of your project, why is it a problem that can be solved using machine learning, and briefly how you intend to use machine learning to solve the engineering problem explained. The abstract will be marked on the problem statement, motivation to use machine learning, the machine learning methods you intent to use and clear writing.
5. Start developing the machine learning solution to solve the problem at hand.
6. Gather results that test your machine learning model. You should decide on your own metrics to evaluate your own work.
7. Write a report that follows the template posted on Quercus under “Project Report Template”. [The report should not exceed 4 pages.](#) [The references page is not included.](#) Do not use Microsoft Word.
8. The report should have the following sections: an Abstract, Introduction, System Design, Results, and Concluding Remarks in your report. Details of what is expected in each section is written in the template.
9. The report should be technically sound, and not casually mention decisions without justifying them. Hiding **some** technical details is acceptable as details will be there in your source code. For example, the report should not mention that you used NumPy, but it should mention that you used stochastic gradient descent with a learning rate of 0.0001.
10. Write well. Presentation including quality of writing, figures and organization accounts for a significant part of your grade. If your grader doesn’t understand your writing, that will severely impact your grade.
11. You are required to also upload the source code used to solve your problem. You should compress the source files into a .zip and upload on Quercus.
12. We recommend documenting who did what to ensure if conflict arises there is enough evidence to resolve it.

Deliverables and Grading

Table 1 summarizes the deliverables and their deadlines. Deadlines are strict. All submissions will be through Quercus.

Table 1: Deadlines and Grade

Deliverable	Deadline	Grade
Project Proposal (200 words)	November 14, 2024 at 11:59 PM	5%
Project Report (4 pages + references)	December 7, 2024 at 11:59 PM	10%
Source Code	December 7, 2024 at 11:59 PM	5%
-	-	20%

Your project proposal and project report will be marked on how well they follow the rules and guidelines in this document. Source code will be marked to check technical details are taken into account. Any submitted material will be cross checked with material on the internet to check for plagiarism. It's not worth it to copy code or reports.