Course Project: Guideline

Summary

In the course project, you are required to define an ***engineering* problem** and develop a solution **based on *machine learning***. The problem and solution are of your choice. This is a chance for you to develop an engineering project for a real-world problem.

Guidelines and **requirements** are detailed in the sequel. Nonetheless, there is *intentional* ambiguity and uncertainty in the project to give room for enhancing your *decision-making* and *critical-thinking* skills.

Learning Outcomes

1. Practice of **scientific writing** and enhancing **communication skills**
2. **Formulate** a real-world problem from an **engineering perspective**
3. Practice **applying tools from machine learning** to real-world problems
4. Advance your **research skills** in finding (machine learning) solutions outside the scope of the course

Rules and Regulations

IMPORTANT
*Some students are taking this course along with **ECE1508: Applied Deep Learning.** Note that you **cannot** present the same project in both courses. Any overlap between the projects should be discussed in advance with the instructor and TAs.*

The following rules are to be followed for full credit

1. The project **must** be done in groups of 4. No group of 3 or less will be allowed, unless **necessary,** *e.g., integer-division-wise, dropout of a group member or so.*
2. The project topic is of your own choice.
3. The solution to the problem you define **must** be **based on *machine learning.***
4. The ***machine learning solution*** should go through an **improvement process**. A primary solution can be an idea discussed in the course or something simple. You should refine this

solution via **machine learning** either via *a tool taught in the course* or *something out of the course content*. ***Do not simply show a problem and a solution:*** explain why this solution is chosen and what does it do as compared to the primary solution.

5. You are allowed to use a dataset available on the internet while referencing it in your report.
6. The project is **not** required to be ***new/novel/not-done-before***. You are encouraged to use solutions available in the literature as a scientific research or technical project. However, you **cannot copy code or text from these projects** as this is considered plagiarism and is a violation of the University of Toronto academic code of conduct. Any code or text used in the project, e.g., as the baseline, should be **properly cited** and **will not** be counted as the project work.
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.

1. Use the Piazza post **"Find a project partner"** or other means to form a group of 4.
2. Reach out to your teammates to discuss the project topic, potential machine learning solutions and the availability of datasets to help you develop your solution.
3. Brainstorm ideas and use online libraries to define the scope of your project.
4. Write **200 words (or less)** to highlight the problem you plan to solve, the **motivation** of your project, **why solve it via machine learning**, and **briefly how** you intend to solve the problem. This is similar to a conference paper abstract, but without having results or conclusions.
5. Start developing the machine learning solution to solve the problem at hand.
6. Gather results that validate your solution. You should decide on your own metrics to evaluate your own work.
7. Write a report that follows the template posted on Quercus as **"Project Report Template"**. The report **should not exceed 5 pages**. **Do not use Microsoft Word.**
8. The report should have the following sections: an **Abstract**, **Introduction**, **Design**, **Results**, and **Concluding Remarks**. 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. Your files should be **annotated well** OR/AND be **provided by a README file**.
12. We recommend documenting who did what to ensure if conflict arises there is enough evidence to resolve it.

Attention
*In engineering and science, this is a common practice that one solution **does not work** or **what you implement does not give the expected results**. So, if your solution/implementation does not give any improvement, does not answer the problem you had initially, or does not return the same result as you expect from the literature, it's **all OK**! You can still submit your project and it will be marked taking all the items mentioned above. You **should never** by any means try to fake results or copy from online resources! **An incomplete course project would never be worse than fake results or a copied project!***

Deliverables and Grading

The following table summarizes the deliverables and their shares in the total grade. Please follow the **deadlines** as mentioned in the Quercus page of the course, as the **are strict**. All submissions will be through Quercus.

Deliverable	***Grade***
Project Proposal (200 words)	5%
Project Report (5 pages)	10%
Source Code	5%
Total	**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.