MECH-4500-60 Artificial Intelligence & Machine Learning: Project Proposal

Assignment Overview

This assignment asks you to produce a formal proposal describing your intended project for this course. You can choose to work on a project related to your work or otherwise choose a topic that interests you, and that you feel confident you can accomplish during this course. Mind you, at this stage, you need to have your thoughts together on what you plan to do and the steps to fulfill that mission. However, your final product may differ from the initial proposal, which is okay. This proposal is to ensure you have a topic in mind (a problem to solve), know what others have done in this area to solve the problem (literature review), have an idea about where and how to obtain the data you will be using (data collection), have an idea of what model you will be using (model selection), know how you would like to tune your model and evaluate its performance, and finally what you expect to get out of this project?

Team Formation

For this project, you must work in a team of 2 members unless odd numbers of students are enrolled.

You must notify your instructor via email of the people you choose to work with as a team. An email from one of the members for each team would suffice with a cc of other members. The email must have the subject line as follows:

"GENG-4500 – W2024 – Project Team Members"

The body of the email must be in the following format:

"Dear Dr. Rahimi,

We, hereby, submit our team members for the course project for GENG-4500 - W2024 as follows:

[First member's first name, middle name, last name]

[Second member's first name, middle name, last name]

[A short paragraph on why you chose to work together and what are the strengths of each member that can help the team's success as a whole.]

Regards,

[Names]"

NOTE 1: if the instructor does not receive team formation requests from students **by the deadline set in the**

course syllabus, you will be automatically paired with another student to work with or if odd number of students are enrolled in the course, will have to work individually if no other students are there to pair with.

NOTE 2: The team members will receive the same grade for the project regardless of individual efforts made toward completing the project. Therefore, you are encouraged to choose members you are confident will help you with the project and have previously worked with. Otherwise, going solo is an option for you to pursue.

NOTE 3: If you are working in teams, only 1 member of the team needs to submit the project package via learning management system (LMS). Note that the package name must include all team members. The instructor will create Teams/Groups for the finalized members so that the graded reports are distributed to all group members.

Reporting Requirements:

Your project report MUST be submitted electronically via LMS as a single zip file, with the following naming convention: LASTNAME_Firstname_GENG4500_proposal_YYYY.zip where YYYY is the year for the course. For example, RAHIMI_Afshin_GENG4500_proposal_2024.zip.

Formatting, Referencing and Citation Style (FRCS): IEEE Conference Paper for A4 size and 2-column format. You must use the Microsoft Word version as you are required to submit both the DocX and PDF versions of your report.

- This is an **individual/group** project.
- The style of the document should be in FRCS format. Make sure you follow the instructions provided in the resource at the end of this document. If you have any questions, always ask!
- The report should be a **maximum of 6 pages** for every page with a number in the FRCS format, only excluding the appendices; anything else will count toward the page limit. Be as concise as possible while clearly communicating your thought process and findings. Appendices do not count towards this length constraint.
- Ensure all figures are of sufficient size and clarity to be easily read. Outputs should be generated as vector files rather than using screenshots (see the documentation for details). Free PostScript to vector formats such as .svg, .emf, and .eps is available online; look for Inkscape software; if you have difficulty finding one, come to see me during office hours, and I will help you. Screen captures are not acceptable in your report.

- Observe standard technical writing conventions – label all figures, put data in tables, etc.
- Use three significant figures for all results and comparisons between numbers.

Assignment Goals

This assignment has three interrelated goals:

1. To help you develop an effective plan for your project, consider context, questions, sources, timeline, and broader implications.
2. To give you practice working with the Project Proposal as an academic genre.
3. To provide an opportunity for working on stylistics and effective academic discourse.

Proposal Requirements and Structure

It should be in the FRCS format Word/PDF document and include the following sections with the following subheaders:

1. Introduction

This introduction should be designed to interest your reader in your topic and proposal and provide some historical context for your project. You need to identify the problem you are trying to solve and how it came across your mind. At the end of this section, you need to transition to the literature review.

2. Literature Review

In this section, you need to provide a background on the problem and how others have tried to solve the same or similar problems. You also need to identify the strengths and weaknesses of the methods others have used and how you hope and plan to address those issues. This is the section where you need to use your in-text citations most and have an appealing flow in the context. There must be at least five (5) peer-reviewed references in this section (Wikipedia is not academic and peer-reviewed, so not many of the blogs and web pages are).

3. Methodology

In this section, you should discuss the methods and sources you will use to conduct your project, including specific references to sites, databases, key texts, or authors that you feel will be crucial to your project. **You must use Python as the programming language of choice**. Make sure you have the following section in your methods section:

- Gathering data
- Preparing that data
- Choosing a model
- Training
- Evaluation
- Hyperparameter tuning
- Prediction.

For more information on these steps and how you need to incorporate them, you can either ask me or check this weblink (https://towardsdatascience.com/the-7-steps-of-machine-learning-2877d7e5548e).

4. Timeline

Include a timeline for your project, using the dates from the syllabus as the foundation for your plan: In addition, set up certain milestones (by day or by week) that you will accomplish to keep yourself on track; it should reflect some awareness of the demands of your time outside of class, as well as the different stages in the process (going to the library, taking notes, going to the writing center, reviewing sources, etc.). You may also want to include other notable time commitments (significant midterms, a trip to visit family, etc.). This needs to be in a Gantt Chart Form.

5. Conclusion

In your conclusion, address the "So What?" of this project. That is, what are you hoping to achieve and why does what you are investigating matter as more than an academic exercise? Why should your audience want to read it? Why does it matter?

6. References

You need to have at least 5 credible sources. Using Zotero is strongly recommended as it can save you tons of time and make sure you are doing your citations correctly and efficiently. You'll also need to have a references section at the end of the proposal, with the citations in FRCS format. Any in-text citations should also follow FRCS guidelines.

7. Appendices

This section needs to include any additional material that is needed for the report to be self-sustainable but cannot fit in the page limit of the paper. **Your sample data and code files would go here**. If you have extensive derivations, look-up tables, code, supplementary equations, etc., they all go here in their respective subsection numbered either numerically "Appendix 1, 2, 3…" or alphabetically "Appendix A, B, C…". When including code, make sure your code is colored and indented properly. You can use Microsoft VS Code or Online Code Beautifiers (for example This one) for this.

Submission file:

- Submit your project as a single ZIP file. This file should contain
  - Your report's original file (Word document, etc.)
  - All supporting plots, figures, and tables that are required for the original report
  - PDF version of your report that should run on any computer and look the same
  - All your Coding files and data sources or data samples with instructions (instruction.txt) for someone to run and get the same results. All in structured folders under (Code folder)
  - Any supporting document that could be helpful to validate your work
- See *Figure 1* for a visual structure of how the Zip file should be organized.

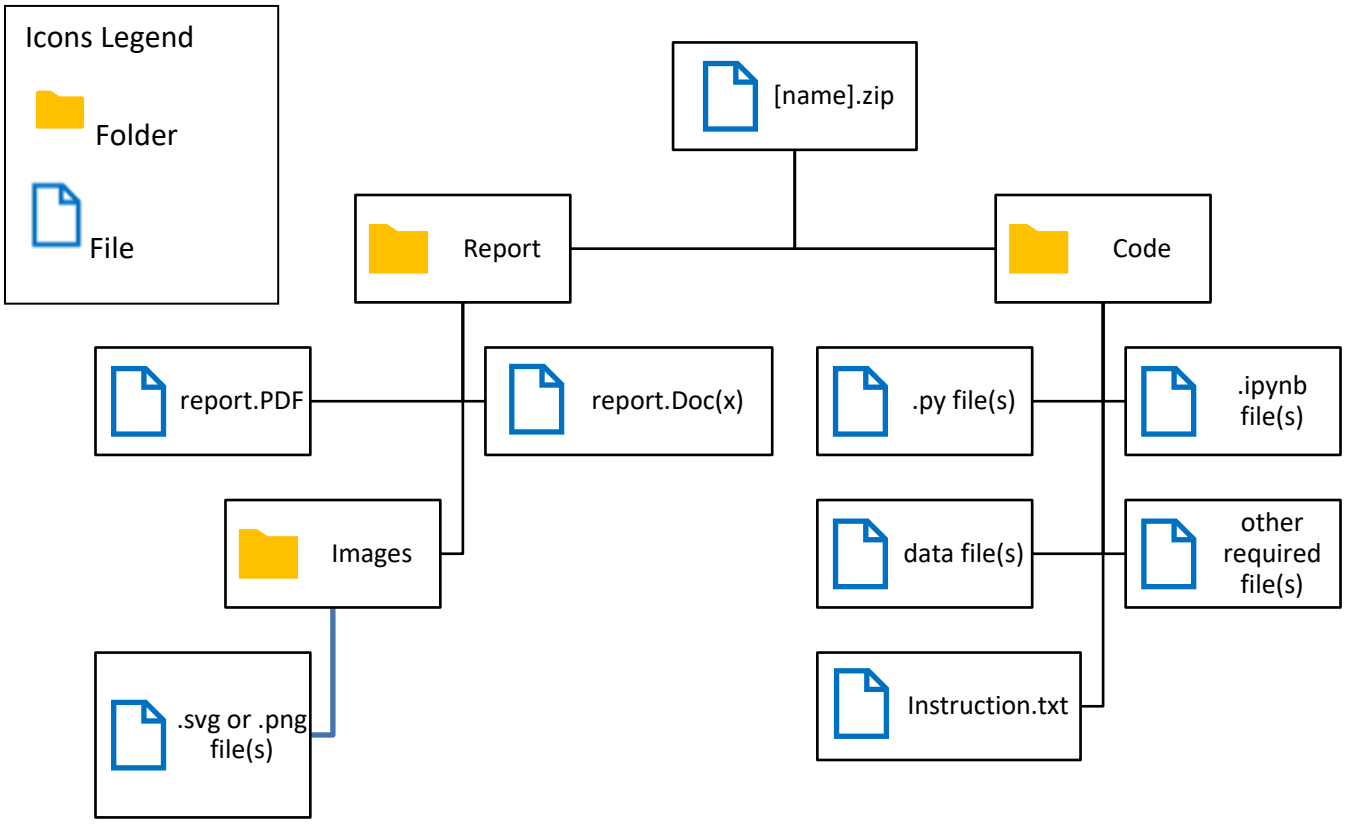

Figure 1. Structure of the .zip file to be submitted

Penalties

You will be penalized for the following:

Page overage

For each page over the page limit, you will be deducted 10% of the total grade. This is to ensure all are evaluated on a fair basis. Please note that your line spacing needs to adhere to the FRCS, and the page limit will be checked in that format.

Late submissions

The penalty for late submission is 10% for the total mark deduction for each day, up to 3 days, after which the mark for this component of the course will be ZERO. Note that partial marks are not awarded for hours and minutes during late submission.

Name Conventions

The penalty for violating naming conventions required for the project are 5% of the total mark deduction for each violation/mistake, up to 15% maximum.

Grading Rubric:

See separate rubric PDF.

Useful Resources

You can use the following resources to familiarize yourself with the process and tools to help you accomplish more in less time:

a. **Tips for writing a good proposal**

https://www.mcgill.ca/gps/students/research-tracking/proposals

b. **Zotero for citations**

https://www.zotero.org/

c. **Dr. Rahimi's YouTube channel**

youtube.com/@arahimi

Documents Checklist

- ☐ Used the template provided for the report
- ☐ The cover page is included and in FRCS format
- ☐ All sections are included and in FRCS format
- ☐ Credible references are used when necessary and with a minimum number required
- ☐ In-text and Bibliographies are included and are in FRCS format
- ☐ Length is within the allowed page limit
- ☐ Document style is in FRCS format
- ☐ All file contents are included in the proper format and structure
- ☐ All graphics (plots, diagrams, etc.) are in vector format where possible
- ☐ All file naming conventions are adhered to