

ECE 9309/9039: Machine Learning

Final Project Information

Thursday, January 25, 2024

This course project will prepare you to apply state-of-the-art machine-learning techniques to solve real-world problems. In this project, groups are expected to select a project topic, implement/analyze, and optimize machine/deep learning models on a dataset to investigate an engineering problem, and finally submit a final report along with the software codes (in Python).

Project Goal

The project is aimed to enhance your grasp of machine learning concepts and empower you with the capacity to apply them effectively. It is a practical means to utilize the knowledge acquired in this course while refining and advancing your existing skills.

Project Arrangements

- The course project is worth 40% of the total final grade.
- The project should be conducted in groups. All group members should be enrolled in the same course section (Section 2). Groups of four students are responsible for working equally and ensuring that each member contributes equally to the project. A group of two students is not accepted.
- The instructor may interview the group members individually; accordingly, members may not receive the same grades.
- For students who have already taken the ECE 9603/9063 Data Analytics Foundation course, the project scope should be significantly distinct from the project delivered to the ECE 9603/9063 Data Analytics Foundation course. The plagiarism check will be done on all submitted projects to check the degree of similarity.
- The project has three deliverables:
 - Select a topic and submit a **project proposal** (1 page).
 - Due date: **February 15, 2024, at 11:00 PM**. Please submit the proposal through the OWL course website.
 - **A group's video presentation (30%).**
 - **Final project report and code submission (70%). Due date: April 8, 2024, at 11:00 PM.**
- The project deliverables must be in digital format where the files should be readable by the following applications:
 - **MS WORD, PowerPoint, and/or Excel.**

- Acrobat Reader (PDF files)
- QuickTime or VLC player
- Eclipse or Visual Studio Code
- Any deliverables not readable by the above-listed applications will not be graded and will receive a zero mark for that portion. Please get this right first.
- The project folder should be named `Group<number>_Project_2024_Section2<Team_Lead_ID>`. The project folder should be zipped.
- You need to submit ONE zipped file that includes all deliverables according to the instructions on the project handout.
- Your responsibility is to ensure that the zipped file of your submitted work and any other files contained within it are not empty or damaged and submitted on time. You can submit your file many times; if you do, I'll presume the most recent submission is the one you want me to grade.
- If you forget to submit your work, this is the group's responsibility.
- Your report should be well-organized. The figures must be numbered & titled, and each must have a description. Do not lose grades for being unorganized.
- Your submitted files must be consistent with OWL submission specifications.
- Please remember that just one submission for your course project is required and sufficient; numerous versions of the same project are forbidden.
- Remember that the grading is done on our machines and not yours.
- Any submission by email will NOT be accepted.

Note – It is understood by all parties concerned that the course instructor assumes no responsibility for project failure or an impasse resulting from the selected project idea and that the risk is entirely that of the proposing team. In the worst case, this could result in a mediocre project mark.

Part I - Selecting a Project

Your first task is to select a project from a public dataset that tackles an engineering problem. Please note that groups cannot choose datasets used for tutorials and learning purposes. Once the topic is selected, groups should submit a one-page project proposal describing the main idea, datasets, project milestones, and expected deliverables to the course instructor for approval. Please visit the examples of potential public datasets in the links below:

<https://www.kaggle.com/datasets>

<https://archive.ics.uci.edu/ml/index.php>

Please note that the chosen datasets cannot be too simple. After you select a project and dataset, please submit the dataset link and the group member names to the instructor for approval using the following Google form: <https://forms.gle/4wBySniFFTD36xpd6>

- Due date: February 9, 2024, at 11:00 PM.
- Additional instructions might be shared on OWL later.

P.S. Only projects accepted by the course instructor will be permitted to proceed.

Part II - Groups' video presentations

Each team will create a video presentation that includes a description of the project, methodology, implementation, and finally, showing the results and the main remarks. The presentation should also utilize the slides' specifications below.

All the team members must participate in the video presentation. A presentation slides will be made with the following specifications:

- Equitable presentation-workload sharing matters, as well.
- The presentation must be in MP4 format. Any other video format will not be accepted. The presentation must not exceed ten minutes (DO NOT GO OVER 10 minutes).

PowerPoint Slides Specifications

- Make sure to show the logical partitioning of the work among the team members: who championed which part? You can label your portion with initials or select an icon to represent yourself.
- You need to prepare a set of slides to structure your video presentation. The first slide will include ONLY the project title and the names of your group members.
- Include citations in the slides, if needed. You can add a single slide at the end of the presentation to list your references.
- The presentation format is important (style, use of fonts, images)
 - Do **not** include fancy, glittering slide designs – keep them organized but straightforward, please. Black text on a transparent (white) background. Multi-colored text is OK, e.g., to highlight specific terms.

Part III - Final Project Report and Code Submission

Groups should submit a final project report of a 4-page double-column in any IEEE format. You can find the templates for MS Word/LaTeX markups in the link below:

<https://journals.ieeeauthorcenter.ieee.org/create-your-ieee-journal-article/authoring-tools->

[and-templates/tools-for-ieee-authors/ieee-article-templates/](#)

Attached to the report, please add an appendix that describes what each group member worked on and contributed to the project. Also, a link to a GitHub repository with the code for your final project is required. Please have a look at the GitHub website: <https://github.com/>

Project Evaluation

Each deliverable of your project will be evaluated based on several factors:

- The extensiveness of the study and experiments.
- A project that produces a more intelligent system by combining several ML techniques or a project that involves well-designed experiments and thorough analysis of the experimental results.
- The projects that nicely incorporate more complex models and real-world applications.
- The writing style and the clarity of the written paper & code.

If you have any questions, please contact the course instructor.

Good Luck!

Appendix A

Managing Your Project

Teamwork and Project Management

Team members need to split the project work into practical activities/tasks and ensure each member has a meaningful and essential role. Thus, all team members must participate in all project activities, and no single student should be responsible for them. Although it is acceptable to request assistance from colleagues who are more trained or have more experience in a specific matter, each team member must be accountable for all project parts, including their own.

Project Management is primarily concerned with the organizational aspects of effective teamwork. The team members can select a "team leader" to lead project coordination efforts or split up coordination roles. The following are some of the parts of the process:

- Organizing group meetings and keeping track of deadlines
- Managing shared resources (such as website, dataset, software repository, etc.)
- Integrating individual contributions coherently and resolving ambiguities and conflicting information, including
 - Organizing different sections into a project report representing the entire team.
 - Proofreading the collated report to ensure consistent layout, font styles, section numbering, and language style.
 - Overseeing the integration efforts for different parts of the project.
- Anything else that affects everyone on the team.

You have already experienced how challenging it is to work in a team. Here are some recommendations for teamwork (none of which are required!):

- Select the team leader as the focal point. Individual skills and capabilities should be discussed.
- Establish the meeting's agenda and time constraints. After the task responsibilities have been established, have each student report on their progress on their assignment since the previous meeting. It would help if you were at the start of the meeting. Everyone should hand out versions of their past or present work. Team members should be encouraged to communicate frequently and collaborate to solve problems.
- Decide how the team will communicate via email, Slack, a blog, or instant messenger. Send copies to others as you work on your project and request feedback and suggestions. Please do not wait until everything is polished and perfect; instead, inform them that this is a draft and when the next version will be available.
- Make every effort to ensure everyone on the team is comfortable with each other's contributions; be open about any complaints. Avoiding problems by being friendly and professional in your discussions is a good concept. However, it would help if you were

honest about any issues that pop up because they will affect your final grade.

- If you are unable to attend team meetings in the days leading up to a project deadline (due to travel, illness, etc.), contact all team members as soon as possible and strive to participate to the best of your abilities.
- Prepare for disaster scenarios: team members usually depend on one another's efforts. Set specific internal deadlines for providing individual components (far ahead of the actual deadline) so that if one team member fails to produce, the others will have enough time to step in and finish the job.
- In general, if you're unsure, communicate! It's OK to have redundancy. Every time you send an email relevant to the project, make a copy for everyone on the team. Please don't presume they're uninterested or don't understand what you're talking about. Recognize any electronic communication that is primarily directed at you.
- Meetings with your team should be planned to include:
 - Report on the status of the project since the last meeting.
 - Come up with specific action items after discussing the tasks that must be completed.
 - Find a time to allocate duties, prepare the portions that each person is accountable for, and ask questions to ensure that everyone is on the same page.
- Tools to assist in the organizing of teamwork include:
 - **Doodle** is a time-management and meeting-scheduling application.
 - **Slack** is a messaging application that allows you to communicate with groups of people using your computer or mobile phone.
 - **ProjectLibre** is a planning and tracking software.
 - **Google Drive** is a cloud-based storage service.
- It is inappropriate to claim that "**no one requested me to do this or that**" or that "**I accomplished everything that was asked of me.**" Each team member should be proactive rather than passively waiting for assignments to be handed in. Instead of asking others what should be done, take the initiative and suggest what should be done to ensure the success of your project.
- Take advantage of every opportunity to redistribute and/or rotate tasks, and make your suggestions known! It's sometimes more challenging to define the problem and determine what needs to be done than execute it. As a result, all team members must participate rather than rely solely on the team leader to define the problem and assign tasks.

What if your team is not functioning well?

If you find that your team isn't working well together or that it's having a negative impact on your project's performance (and your final grade), you should attempt to talk to the other team members about it. If the "problematic" team member(s) (including the team leader) refuse to comply, you should speak with the course lecturer about your concerns as soon as possible. To know more, you can review Appendix B.

Appendix B

Conflict Resolution Procedure

Group Work, Responsibility, and Peer Reviews

This project is teamwork. Individuals in the team collaboratively create different parts of the system into an integrated whole. All the group members are thus expected to contribute earnestly according to the plan.

If a team member has a complaint such that in their interpretation:

- There is a significant complaint from the rest of the team (not only one person);
- The complaint is made to the instructor in writing – by the rest of the team -- at the time of the occurrence of the negative situation.
- There will be a peer review form distributed among the team members, and
- After a preliminary inquiry by the instructor, the instructor is "convinced" that the situation warrants a review. The instructor's decision is final and may not be appealed.

The project mark given to the individuals in the team is the base project mark adjusted by peer-review feedback received from the group.

- The peer-review penalty is as follows -- % grade of the overall project mark reduced:
 - Minor infraction: 10%
 - Significant infraction but not considered major: 30%
 - Major infraction: 70%

Note:

- All interpretations will be made by the instructor and may not be appealed.
- A second-time infraction for the same person will automatically lead to a "major infraction" if the previous case was assessed at "minor or significant" levels.
- If the previous case was assessed as a "major infraction," this will automatically result in a zero mark for the project for the person concerned.
- The best policy is to collaborate for the team's success.