

MIE 324 Project Structure, Timeline and Grading
Fall 2018

The project in this course is an opportunity to develop a machine learning application in an area of your own choosing. It also provides the chance to do a full engineering project that is much closer to real-world engineering and research than most course assignments that you've done so far. While this project has some structure, you will be required to deal with the ambiguity and significant decision making that make up the life of a real engineering practitioner.

That makes it harder than most things you've done so far, but it comes with these significant benefits:

1. The only way to really become an engineer is to do what real engineers do, which includes understanding the difficulties of open-ended goals and projects. Even if it doesn't go well, and you spend time reflecting on why that was so, you will be taking an important step towards becoming a professional engineer.
2. You will have an opportunity to practice the ever-crucial oral and written communication skills that an engineer needs to operate successfully. You might not think that communication is important, but if so, you're wrong. 😊
3. When I have interviewed people for full-time jobs, internships, and for graduate school, the most important question I ask is to have them tell me about a major project they did. This is such a project.
4. If you were to have a video of yourself presenting your project, and you think that video has sufficient quality, you can put a link to it on your personal LinkedIn page. LinkedIn has taken the place of a personal CV or resumé, and such a video would be a compelling statement of what you are capable of. Rather than the usual simple listings of skills and previous jobs, it brings who you are to life.

Project Rules

1. Projects must be done in groups of 2. You may select your own partner. No groups of 3 will be allowed, but if there is an odd number of students, just one group of three will be permitted.
2. The project must make use of machine learning, as taught in this course, and the training, validation and testing of some kind of ML system should form an important part of the project.
3. The project topic is of your own choosing. It must be unique within the class. No two projects can be on the same topic, as determined by a 'uniqueness approval' step in the project.
4. There should be some data collection that is a meaningful part of the training process. You will not be able to use a known data set that has already been used by many others.
5. University of Toronto rules on plagiarism apply. We are aware that there are many machine learning projects already posted on the internet, and these will be checked for plagiarism.

- All teams must use a specific GitHub Repository provided to them to store their source code throughout the term. Note that the University *does not* claim any ownership of the software produced.

Timeline and Deliverables

The project has several steps and deliverables, listed in the table below. The following sections provide more detail.

Date	Item	Description
08-Oct-18	Project Discussion in Class	Overview of Project
12-Oct-18	Team Forming Deadline	Select Project Partner; agree on working approach; email instructor with names
23-Oct-18	Uniqueness Approval Deadline	Team Must have received 'uniqueness approval' email from instructor
29-Oct-18	Project Proposal Due	Written Document and Slides for Presentation
Oct 30 - Nov 2	In-Class Proposal Presentations	4 Minute in-class presentation of Proposal by Team
Nov 13 - Nov 16	In-Class Progress Presentations	4 Minute in-class presentation by Team on First Milestones
Nov 27 - Dec 4	In-Class (and Tutorial) Final Presentations	Presentation of Final Project
02-Dec-18	Final Report Due	Authored by both Team Members
02-Dec-18	Individual Report Due	One Report per Team Member
Dec 3 - Dec 6	Individual Interviews	One-on-One interview with Instructor

Uniqueness Approval

Once you and your partner have formed a team, you should brainstorm ideas for what your project topic should be. Once you have that idea, send an email to the instructor – Jonathan.Rose@ece.utoronto.ca with a one to two sentence description of the topic. The instructor will either respond with 'you have uniqueness approval' (meaning no-one else has proposed a similar topic) or 'please try again, that topic is taken.' You must have received uniqueness approval by the deadline above.

Project Proposal

This is a document with a maximum of 1200 words that contains the following sections:

1. Introduction – what the goal of the project is, and why it is of interest/is important.
2. Source of Data – where you will obtain the data and which part of it you will collect and/or label yourself.
3. Overall Structure of your software – provide a top-level [block diagram](#) of the software as you foresee it, and give a short description of the individual blocks.
4. Plan – provide list of tasks and time you estimate for each.
5. Risks – what can you foresee that might go wrong in the project?
6. Things to Learn – what, if anything you need to learn to proceed?
7. Ethical Issues – very briefly, describe any ethical issues you see around the general topic.

The word limit is hard: There is a 1% penalty for every word in excess of the 1200 limit. Please count the words in your document, compute the penalty, and put it on the front page. These are not included in the word count, nor are pictures or references.

[In Class Proposal Presentations](#)

The team will make a four-minute presentation, using projected slides, in class, based on your proposal, but with some differences:

1. Introduction – what & why
2. Source of Data – where it comes from & what you'll collect/label
3. Overall Structure of your software – [block diagram](#) & description of blocks
4. Risks – what can you foresee that might go wrong in the project?
5. What will be ready to present at Progress presentation week of November 12

The slides for every team is due at the same time as the written document. For fairness (so no team has the advantage of extra preparation time), the order of presentation will be chosen randomly, and will not be given out in advance.

There is be a maximum of 8 slides, including the title slide. The **minimum** font size is 20.

[In-Class Progress Presentations](#)

The team will make a five-minute presentation that includes the following things:

- Quickly describe the goal and motivation (what & why)
- Describe what data you have collected so far
- Describe your model(s) and at least one result from training of the data
- Demonstrate how the 'machine' you're going to train will be used
- Describe what work remains to be done together with your plan to achieve it

In-Class Final Presentation

The team will make a six minute final presentation, with the following:

- Goal and Motivation (what & why)
- Description of Overall software structure
- Describe the machine learning model
- Give the results of Training
- Demonstration of the complete project
- Key Learnings – what would you do differently?

Final Team Report

This is a document with a maximum of 2000 words, and has the following sections:

- Goal and Motivation (what & why)
- Description of Overall software structure
- Sources of Data
 - Describe where you found and collected your data
 - Describe how you made it usable
- Training, Validation and Test
 - A description of how your (models) were trained and how well they work
- Ethical Issues
 - Describe at least one ethical issue that arises in the project or the field that the project resides in.
- Key Learnings – what would you do differently?

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Individual Report

This is a maximum 500-word document that describes your contribution to the project.

The word limit is hard: There is a 1% penalty for every word in excess of the 500 limit. Please count the words in your document, compute the penalty, and put it on the front page. These are not included in the word count, nor are pictures or references.

Individual Interview

The individual interview with the instructor is a 20-minute discussion/question answering session. Come prepared to explain all aspects of your project and to answer questions about it. The interviews will take place in the same period as the final project presentations.