
Project

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A major component of this course consists of an in-depth project on a topic of your choosing. These projects will be done in groups of 3–5 students. The project will have several graded components, including a detailed (written) project proposal, a written report, and a short 5 minute video. **The project proposal is due on September 28, 2020 and the written report and videos will be due on November 24, 2020.**

The topic for the project is up to you – you may choose to center your project around a particular problem/dataset that you have encountered in your research or elsewhere online, you could do a more theoretical investigation of some aspect related to machine learning, or you might instead choose to do a more in-depth investigation of some area of machine learning not covered in this course. Please feel free to consult early and often with Prof. Bloch regarding the choice of the project topic. In general, a good project is one in which you have to read a few papers in depth and do a bit of programming.

Note that the project is worth 20% of your overall grade, and is to be graded out of a total of 40 possible points, as described in the sections below.

1 Project proposal

The first main deliverable for the final project is the project proposal to be submitted via Gradescope on September 28, 2020. Please submit only a single proposal – any student in the group can upload the proposal, and as long as it lists the names of all group members then all members will receive credit (Gradescope has a smart way to do this). The proposal should contain the following information.

- **Project summary:** Using a maximum of one page, the first page of your proposal should summarize the project by clearly indicating what you plan to do. You should include sufficient background so that anyone taking this class should be capable of understanding (at a high-level) what you are planning on doing. The goal here is to convince me why the problem you are addressing is important and why the outcome of your project will be interesting.
- **Detailed project description:** In this section you should provide a more detailed description of the necessary background and specific objectives of your project. Include citations to any papers/books you are planning on building on, and feel free to include any preliminary results if you happen to already have them. This section should be at most three pages of text (including references/figures) and is intended to give you a bit more room to fully flesh out your ideas if you cannot fit them entirely within the one page summary. You should treat the summary as a stand-alone document, and the detailed description should not be a “follow-up” section but a full, self-contained, description of your project. It is fine to repeat some of the language from the summary if you would like. You should also feel no pressure to make this three full pages. If you can say what you want to say in one or two pages, then this might not be very different from the summary, and that is fine.
- **List of tasks/collaboration plan:** In this section I would like you to provide an enumerated list of the tasks you believe will be required to successfully complete the project. Tasks can

include learning about pre-requisite background subjects, reading specific papers, implementing particular algorithms, acquiring/processing a data set, or anything else that you believe will be necessary for the project. You may also include tasks related to preparing/editing the final project video and writeup. For each task, include the following information:

- *Task*: A detailed statement of the task to be accomplished. Your statement should ideally be specific enough that you will be able to clearly measure when it has been finished. “Read papers X and Y” is better than “Learn about field Z”.
- *Leader(s)*: Which team member(s) will be primarily responsible for accomplishing this task. (It is fine if all team members are planning to contribute to all aspects of the project, but please designate one or at most two people to be the leaders for each task).
- *Deadline*: A tentative deadline for when you would like to have this task accomplished.
- *Importance*: A brief statement (can be only a sentence or two) as to the overall importance of this task. Some tasks are critical, meaning that it is hard to see how the project will be complete without it, whereas other tasks are more “optional” items that you would like to get to if you have the time. For each task, state if it is a critical or optional task. If later tasks depend on it as a prerequisite, state this.
- *Potential challenges*: A list of things that you think might “go wrong” and what, if anything, you plan to do to avoid/overcome these challenges and/or what you would do if you can’t get past them.

There is no page limit for this section, but I’m not expecting more than a page or so.

Your document should be single-spaced with a font size of 12pt or higher and margins no smaller than 1 inch. The proposal will be graded out of 10 possible points, which will be assigned as follows.

- **Project summary/description [4 points]**
 - Do these sections clearly explain what your proposed project will consist of?
 - Do they adequately motivate why the topic is interesting?
 - Do they explain all necessary background information and define all necessary notation in a way that would be clear to an average member of this class?
- **Project plan [4 points]**
 - Does the project plan/task list clearly explain the proposed plan of attack?
 - Are tasks clearly defined in a measurable way?
 - Are the tasks realistic?
 - Have the authors considered all relevant contingencies/challenges?
- **Overall clarity/quality of proposal [2 points]**
 - Do the ideas in the proposal flow together in a clear/logical manner?
 - Is the document free of typos and spelling/grammatical errors?
 - Are all figures legible?

2 Project video

The next main deliverable for the final project is the 5 *min* project video to be delivered before November 24, 2020. There is no preferred way to deliver the video, a link to an online repository of your choice will work. The video should summarize your project, providing a clear context and description of what you have done.

The video will be graded out of 15 possible points, which will be assigned as follows.

- **Video quality [5 points]:** The video should
 - have a clear title and list of project team members,
 - be visually appealing and professional,
 - make use of visuals to enhance the information,
 - be free from typos/errors,
 - clearly convey the results of the project in a way that is accessible to anyone in the class.
- **Presentation quality [5 points]** As a presenter, you should
 - be able to introduce the project in a quick summary of 30 seconds or less,
 - be able to provide a more detailed description in less than 5 minutes,
 - present your video in a clear/organized/understandable manner,
 - speak clearly and distinctly.
- **Technical contents [5 points]:** Finally, your video should address
 - the motivation for why you selected the particular problem you chose,
 - a sufficient amount of background information so that anyone in the class will be able to understand what you did,
 - a high-level description of your technical approach, highlighting why your approach is appropriate and any particularly creative/original aspects to your work,
 - what you have accomplished (so far),
 - details such as how you selected any unknown parameters and how you dealt with validation/evaluation of your algorithm,
 - indications of which team member(s) were responsible for which portions of the project.

3 Final project report

The final report for the project should be submitted by November 24, 2020. The report and the video should be uploaded to Gradescope and Canvas, respectively. Please submit only a single report/video per group – any student in the group can upload the documents, and as long as it lists the names of all group members then all members will receive credit. The report must be single-spaced with a font-size of 12pt or higher, margins no smaller than 1 inch, and can be a maximum of 6 pages including figures and references. I will read/grade only the **first 6 pages** of whatever you send me, so do not exceed this limit. If you have accomplished a lot, it may sound difficult to fit everything into this page limit, but 6 pages is already a lot more than you will often get, and concisely summarizing the result of a complex project is a tremendously important skill. Also, if you can say everything in fewer pages, that is all the better. There is no page minimum.

The final report must contain the following elements.

- **Project summary:** Using a maximum of one page, the first page of your final report should summarize the project by clearly indicating what you accomplished. You should include sufficient background so that anyone taking this class should be capable of understanding (at a high-level) what the problem is, why it is interesting, and what you ultimately did. (Note: You do not have to devote the entire first page to this summary. Your detailed description can start on the first page after the summary if you would like.)
- **Detailed description:** The rest of the report should provide a detailed description of the project including an introduction/motivation, background for the problem, technical details of the approach taken, results, and discussion/conclusions. The detailed description should also include, either as a separate section or integrated into the writeup, an indication of which team member(s) were primarily responsible for which portions of the project.

The final report will be graded out of 15 possible points, which will be assigned as follows.

- **Professionalism [3 points]**
 - Is the report attractive, legible, and free of typos/grammatical errors?
 - Does it make appropriate use of figures?
 - Did you follow the above instructions?
- **Overall writing quality [3 points]**
 - Is the report clear and easy to read?
 - Are all concepts adequately defined?
 - Do all ideas flow together in a clear/logical manner?
- **Technical merit [9 points]**
 - What is the overall quality of the work performed for the project?
 - Is the problem particularly novel/interesting?
 - Is the approach taken appropriate and well-justified in the report?
 - Are there aspects of the project that are particularly creating/original?