

Final Project

Overview

The project in our course is of great importance as it provides you with the opportunity to have hands-on experience with deep neural networks and conduct research at a small scale by yourselves. It may involve covering fields that were not covered by a paper, suggesting improvements, applying methods on different scenarios, etc. The project will be conducted in triplets.

The overall project includes a project proposal, project milestone, report + code submission, and an in-class oral (10 minutes) presentation. Attendance is mandatory for all the presentations (not just your own). Points will be reduced for attending only part of it. Active attendance is expected, including participation in the Q&A of other presentations.

Timeline

All submissions are due at 11:59 pm.

- Project proposal submission – 10/7/2024
- Project milestone submission - 11/20/2024
- Report and code submission – 12/19/2024
- Project presentation days – in-class on December 3rd, December 5th and December 6th (makeup session on Friday 12:15-1:30pm). You are expected to attend all sessions, but sign up to present only in one of the sessions. Note that students will be presenting on Friday, only if both Tuesday and Thursday sessions are fully booked.

Papers

The first thing you need to do is to find a relevant paper of interest. For inspiration, you may also look at recent deep learning publications from top-tier conferences and journals such as

- [CVPR](#): IEEE Conference on Computer Vision and Pattern Recognition
- [ICCV](#): International Conference on Computer Vision
- [ECCV](#): European Conference on Computer Vision
- [SIGGRAPH](#): Computer Graphics and Interactive Techniques
- [ACL](#): Association for Computational Linguistics
- [NAACL](#): North American Chapter of the ACL
- [EMNLP](#): Empirical Methods in Natural Language Processing
- [COLM](#): Conference on Language Modeling
- [NeurIPS](#): Neural Information Processing Systems
- [ICLR](#): International Conference on Learning Representations
- [ICML](#): International Conference on Machine Learning

Regardless of which conference you choose a paper from, you should restrict your search such that your chosen paper is within the fields of Computer Vision, NLP or Computer Graphics (papers outside of this scope will only be approved in unique circumstances). We will also provide students with a (limited) list of potential projects on the course Canvas page. You are welcome to take a closer look at these, if you'd like. In any case, your submitted proposal must follow the guidelines provided below.

Project Proposal

The project proposal should be 1-2 paragraphs. Your proposal should include:

- a. Student net IDs and names
- b. What paper/papers did you choose?
- c. What is the problem that you will be investigating? Why is it interesting?
- d. What data will you use?
- e. What method/model will you use? Are there any existing implementations? If so, in which libraries are they written?
- f. How will you evaluate the results?
- g. What will be the innovation in your project? Though this may change while working on the project, it is important to have a goal from the beginning

Submit your proposal as a PDF file through Gradescope. The proposals will be reviewed and approved after the submission date. If we think there is an issue with the proposal (e.g., the project is not reasonable within your compute constraints), we will ask for a revision and only grade the revised version.

Milestone

The project milestone should provide a rough skeleton for the project report (see detailed guidelines below). It needs to be written using the [ACM template](#), and should be at least 2-3 pages long. The milestone should include:

- a. Student net IDs and names
- b. What is the problem that you are investigating? What paper/papers are you basing your investigation on?
- c. A formal description of your problem, including the data and evaluation metrics you will be using.
- d. What method are you using? You should provide an explicit formal description of the method.
- e. Preliminary results obtained by the deadline

Report

Your final report should be around 10 pages long, and structured like a paper (in English) using the [ACM template](#). Latex/lyx is recommended but not obligatory.

The following is a suggested structure for your report, as well as the rubric that we will follow when evaluating reports. You do not necessarily have to organize your report using these sections in this order, but that would likely be a good starting point for most projects.

- **Title, Author(s), net ids.**
- **Abstract:** Briefly describe your problem, approach, and key results. Should be no more than 300 words.
- **Introduction (8%):** Describe the problem you are working on, why it's important, and an overview of your results
- **Related Work (8%):** Discuss published work that relates to your project. How is your approach similar or different from others?
- **Data (5%):** Describe the data you are working with for your project. What type of data is it? Where did it come from? How much data are you working with? Did you have to do any preprocessing, filtering, or other special treatment to use this data in your project?
- **Methods (23%):** Discuss your approach for solving the problems that you set up in the introduction. Why is your approach the right thing to do? Did you consider alternative approaches? You should demonstrate that you have applied ideas and skills built up during the semester to tackle your problem of choice. It may be helpful to include figures, diagrams, or tables to describe your method or compare it with other methods.
- **Experiments (20%):** Discuss the experiments that you performed to demonstrate that your approach solves the problem. The exact experiments will vary depending on the project, but you might compare with previously published methods, perform an ablation study to determine the impact of various components of your system, experiment with different hyperparameters or architectural choices, use visualization techniques to gain insight into how your model works, discuss common failure modes of your model, etc. You should include graphs, tables, or other figures to illustrate your experimental results.
- **Conclusion (3%)** Summarize your key results - what have you learned? Suggest ideas for future extensions or new applications of your ideas.
- **Writing / Formatting (3%)** Is your paper clearly written and nicely formatted?
- **Appendix (20%)** should include at least all the coding you have done. As known, most papers have a github with relevant code. To gain the full points, you should either apply a big change to the code with your improvements, or convert it to a different library (from tensorflow to

PyTorch or vice versa). Be sure to mention all links to the code parts you have collected online.

The remaining 10% of your final project submission will come from your in-class presentations.

Presentation Day

Further details will be posted near the event. You should make a 10 minute presentation of your work. **Note that all team members should participate in the presentation. Important:** taking part in only part of the day, will result in point deduction.

Submission

You should submit a single PDF file with the report to Gradescope. Additionally, you should share a Google Drive folder similar to the course exercises. It should include a readme file and all other code related files. Both requirements should be fulfilled by the due date specified.

Final remarks

Sounds like a lot of work? It's not! Start and you will see for yourself.

One last thing: Do not be afraid, and do not be intimidated by the papers you read. Even if they appear as hard at the beginning, after several rounds of reading, everything typically becomes much clearer. If this is not the case, it is most likely that it is because of poor writing by the authors. Keep in mind that in most cases, the person who wrote the paper is not different or more capable compared to you.

Project examples

The required project is quite similar (though not exactly the same) to the one at:

<http://cs231n.stanford.edu/project.html>

This website has many report examples, which you may look at for inspiration.

Good luck!