

PROJECT – COMP 4107 NEURAL NETWORKS

The project is an opportunity for you to select a problem you are interested in and solve it using neural networks. The project must involve a practical implementation to solve the problem and should include some validation of how well your solution works. The project may be in any application domain. The project must use neural networks however, it does not need to use methods covered during class. The implementation may be completed using any programming language you choose.

Note that it is recommended to do a project that has some novel aspect. Implementing a well-known solution to a well-known problem is not very interesting because lots of people have done it before. Consider novel variants of the network, novel datasets, novel pre-processing or post-processing methods, etc..

The project may be completed individually, or it may be completed in small groups of two or three students. It is expected that the project should be similar in workload to approximately five assignments if completed individually. The expectations will depend on group size (i.e. expectations will be greater for groups of three students vs. groups of two students vs. individually).

The project should contain three components: a proposal, a demonstration, and a report.

Proposal

Proposal due date: 2025-02-24

The proposal is a document that outlines the topic of your project. Effectively, the proposal should describe why the scope of the project is appropriate for this course. The course instructor will provide feedback on the proposal following submission. Students are encouraged to be as detailed as possible in the proposal. The more details provided in the proposal, the more detailed feedback you will receive.

The proposal should contain the following elements:

1. Front matter (title of project, course code, names/student numbers of all group members)
2. Introduction and background on the problem.
3. Proposed objective(s) for the project.
4. Proposed method(s) from neural networks.
5. Dataset to be used (if applicable).
6. Proposed validation/analysis strategy.
7. Description of the novelty of the project.
8. Weekly schedule indicating project milestones to be completed each week.
9. Your availability for the project demonstration during the last week of class (provide at least five one-hour time slots on at least two different days and preference for in-person or online).
10. Whether your project requires access to GPU resources through the School of Computer Science (details here: <https://carleton.ca/scs/tech-support/cuda-gpu-computing/#hardware>).

Page limit for proposals: 2 pages

Please use a standard page format (i.e. page size 8.5" x 11", minimum ½" margins, minimum font size 10, no condensed fonts or spacing). Please submit the proposal as a PDF file.

Proposals are to be submitted electronically through Brightspace. It is your responsibility to ensure that your proposal is submitted properly. Students may submit the proposal earlier to receive earlier feedback on the proposal.

The proposal is worth 10% of the project grade.

Demonstration

Demonstration date: 2025-04-02 to 2025-04-08 (to be arranged individually)

The project will be demonstrated to the instructor or teaching assistants during a live (in-person or online) 13-minute demonstration session. The demonstration allows students to showcase their implementation, demonstrate their implementation working on some examples, and allows the instructor or teaching assistants to ask questions about the project. Students must be prepared to show both their code and a working version of their implementation during the demonstration.

The demonstration should be targeted toward teaching assistants (i.e. students who have completed a course in neural networks). The demonstration should not assume that teaching assistants are already familiar with the specifics of the problem addressed in of your project.

Time limit for demonstrations: 13 minutes (10 minutes for demonstration + 3 minutes for questions)

Specific timeslots will be assigned by the course instructor with consideration to availability/preferences indicated in the project proposal.

You will be responsible for ensuring that any technology related to your demonstration functions appropriately. Any excessive setup/takedown time will count towards your allocated demonstration time.

The demonstration is worth 30% of the project grade.

Report

Report due date: 2025-04-08

The project report is a document that describes your project in detail. The report should be targeted toward the teaching assistants (i.e. students who have completed a course in neural networks). The report should not assume that teaching assistants are already familiar with the specifics of the problem addressed in your project. Source code should not be included with the project report.

The report should contain the following sections:

1. Front matter
 - Title of project
 - Course code
 - Names and student numbers of all group members
2. Statement of contributions (if project completed in a group)
 - Whether each group member made a significant contribution
 - Whether each group member made an approximately equal contribution
 - To which aspects of the project each group member contributed
3. Introduction
 - Background and motivation for the project
 - Related prior work
 - Statement of objectives
4. Methods
 - Methods from neural networks
 - Dataset (if applicable)
 - Validation strategy or experiments

5. Results
 - Qualitative results
 - Quantitative results
6. Discussion
 - Limitations of the work and directions for future work
 - Implications of the work
7. References

Page limit for reports: 10 pages

Please use a standard page format (i.e. page size 8.5" x 11", minimum ½" margins, minimum font size 10, no condensed fonts or spacing). The page limit includes all figures, tables, appendices, and references. Please submit the report as a PDF file.

Reports are to be submitted electronically through Brightspace. It is your responsibility to ensure that your report is submitted properly.

The report is worth 60% of the project grade.