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 methods from neural networks; however, it may used methods from neural networks not covered during class. The implementation may be completed using any programming language you choose with whatever libraries you choose.

Note that it is recommended to do a project that has some novel aspect. Implementing a well-known neural network on a well-known dataset 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).

Components

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

Proposal

The proposal is a maximum two-page document that outlines the topic of your project. The proposal should contain the following elements:

1. Front matter (title of project, course code, names/student numbers of all group members)
2. Introduction/background on the problem.
3. Proposed method(s) using neural networks.
4. Dataset to be used.
5. Proposed validation/analysis strategy.
6. Weekly schedule indicating project milestones to be completed each week.
7. Your availability for the project demonstration during the last two weeks of class (provide at least five one-hour time slots on at least two different days and preference for in-person or online).
8. 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).

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.

Demonstration

The project will be demonstrated to the instructor or teaching assistants during a live (in-person or online) 15-minute demonstration session. The demonstration allows students to showcase their implementation and allows instructor or teaching assistants to ask questions about the project. Students must be prepared to show 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.

Report

The project report will be a maximum ten-page report that describes your project in detail. The report should contain the following sections:

1. Title page (including title of project, course code, names/student numbers of all group members)
2. Statement of contributions (if applicable)
3. Introduction (including motivation for the problem, related work, problem statement)
4. Methods (including neural networks used, dataset, validation experiments)
5. Results (qualitative and quantitative results or outcomes achieved, including both positive and negative results)
6. Discussion (including implications of the work, limitations of the work, directions for future work)
7. References (including primarily peer-reviewed sources)

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 of your project. Source code should not be included with the project report.

If the project was completed in a small group of students, the report must include a statement of contributions. This statement should identify: (1) whether each group member made significant contribution, (2) whether each group member made an approximately equal contribution, and (3) exactly which aspects of the project each group member contributed to.

Logistics

Proposal

Proposal due date: February 28, 2023

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.

Demonstration

Demonstration date: During the final two weeks of class (to be arranged individually)

Time limit for demonstrations: 15 minutes (including questions)

Demonstrations will be conducted during a live in-person or online meeting with the instructor or a teaching assistant. Specific timeslots will be assigned by the course instructor with consideration to availability/preferences indicated in the project proposal. Timeslot preferences will be handled on a first-come first-served basis.

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.

Report

Report due date: April 12, 2023

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.