CS 577 — Deep Learning — Course Project

Fall 2024

Course Project: In the project, you will turn in a single pdf file that "annotates" a deep learning model from your choice of a published paper in one of the venues in the "Venues for Paper Selection" section.

- If you are using python notebook file (`.ipynb`), you must convert it into a PDF file for the submission.
- You are encouraged to use the modified NeurIPS template provided. But this is not required.

Course Project:

The goal is to create a detailed and well-annotated explanation of the model, similar in style to "The Annotated Transformer" blog post (https://nlp.seas.harvard.edu/annotated-transformer/).

- The project will be due at 11:59pm Central Time on Nov 15.
- You must work in groups of size 2, 3 or 4 students.
- You must finalize your group roster by Oct 9
- You must finalize your paper selection by Oct 16

Course Project — requirements: Your project must include each of the 6 parts below:

1. Background:
   - Explain clearly the motivation: the problem does the paper seek to address
   - Explain the key breakthrough of the paper: which innovations enabled the paper to resolve the problem
2. Model architecture:
   - Analysis: Use diagrams/visualizations of the model together with code to explain the model, part-by-part
   - Synthesis: Use a diagram/visualization of the model together with code to explain how the parts come together
3. Model training, explain the training loop and its sub-parts. For instances, in "The Annotated Transformer", the authors of the blog discussed "Optimizer" and "Regularization", among several other items. There is no standard set of parts to a training loop. But be as thorough as possible in explaining all the training techniques that are used.
4. Minimal CPU-ready working example (MWE-CPU).
   - Create a small synthetic dataset OR find a small real world dataset suitable for the model
   - Create a miniaturized version of the model that trains on a laptop. You can achieve this by reducing the number of parameters/layers/width/floating point precision/or all of the above. "Everything should be made as simple as possible, but no simpler."
   - Train the miniaturized model on the small dataset and discuss the training process and outcome. Note: our grading criteria is not with respect to the model's performance. Instead, we are looking for maximizing our understanding.

5. Discussion: Weaknesses/limitations/future directions.

6. Group member contribution: Detail the contributions of each group member.

Course Project — Peer Grading: Every member of the class is required to review 4 projects. The reviewer-to-project assignment will be done randomly and released on Nov 16 by noon. For the review, you will be asked to read each assigned project carefully and assign scores based on several criteria that will be provided later. In addition to the scores, you will be asked to turn in a plain text file justifying your reason for each score. The review will be double blind (either the reviewers nor the authors will know the identity of each other).

If the project receives peer review scores that has a reasonable level of variance, the overall project grade will be the average review score. In case that a project receives unusually high variance in the scores, the instructors will examine the project and reviewers justifications closely and intervene if necessary.

Note on academic integrity and peer review: It is possible that the reviewer may learn the identity of the authors unintentionally (e.g., via conversations prior to Nov 16 the reviewer-to-project assignment released). This is allowed and NOT considered a breach of academic integrity.

However, after Nov 16, reviewers must refrain from learning the identity of the authors. Purposely circumventing anonymity to gain advantage *is* considered academic dishonesty. See section on "Academic Integrity" below.

Course Project — Venues for Paper Selection:

AAAI - Association for the Advancement of Artificial Intelligence Conference, ACL - Annual Meeting of the Association for Computational Linguistics, CVPR - Conference on Computer Vision and Pattern Recognition, ECCV - European Conference on Computer Vision, EMNLP - Conference on Empirical Methods in Natural Language Processing, ICCV - International Conference on Computer Vision, ICLR - International Conference on Learning Representations, ICML - International Conference on Machine Learning, IJCAI - International Joint Conference on Artificial Intelligence, KDD - Conference on Knowledge Discovery and Data Mining, NAACL - North American Chapter of the Association for Computational Linguistics Conference, NeurIPS - Conference on Neural Information Processing Systems, SIGIR - SIGIR Conference on Research and Development in Information Retrieval, WWW - International World Wide Web Conference.