

Deep Learning Final Project Instructions

Objective

The objective of this final project is to provide students with hands-on experience in implementing and experimenting with deep learning architectures by re-implementing a chosen architecture from a list of research papers. Students will gain practical knowledge in understanding, implementing, and experimenting with state-of-the-art deep learning models.

Task Description

Paper Selection: Each group of students (**pairs**) will select one paper from a list of provided research papers. The selected paper should describe a deep learning architecture along with its application in a specific task (e.g., image classification, natural language processing, etc.).

Architecture Presentation: Students are required to thoroughly understand the chosen architecture and its application. They will prepare a presentation explaining the architecture, its components, and the task it aims to solve. The presentation should cover the key aspects of the chosen architecture, the implementation process, experimental results, and insights gained.

The presentation will be presented at the last lecture of the semester, each group will have 10 mins to present and 2 mins to answer questions. The presentation should cover:

- Overview of the architecture.
- Key components and modules.
- Training methodology.
- Application domain and task.
- Results and performance metrics reported in the paper.

Implementation: Students will re-implement the chosen architecture using PyTorch. The implementation should closely follow the details provided in the paper. Students should write clean, well-documented code to facilitate understanding and reproducibility.

Experimentation: After successfully implementing the architecture, students will conduct experiments to explore various aspects of the model. This includes:

- Baseline Evaluation: Evaluate the performance of the implemented architecture on a relevant dataset following the evaluation protocol described in the paper.

- Variations and Improvements: Experiment with different variations of the architecture (e.g., changing hyperparameters, modifying layers/modules, adding regularization techniques) and analyze their impact on performance.
- Comparative Analysis: Compare the performance of the original architecture with the variations and improvements proposed. Students should provide insights into which modifications led to performance improvements or deteriorations.

Documentation and Report: Students are required to document their work comprehensively. This includes:

- Detailed explanation of the implementation, including code comments.
- Experimental setup, including datasets used, hyperparameters, and evaluation metrics.
- Results and analysis of experiments conducted.
- Discussion on insights gained, challenges faced, and lessons learned.
- Suggestions for further improvements or research directions based on their findings.

Evaluation Criteria:

- Understanding: Clarity in understanding the chosen architecture and its components.
- Implementation Quality: Accuracy and completeness of the implementation.
- Experimental Design: Thoughtfulness in designing and conducting experiments.
- Analysis and Interpretation: Depth of analysis and interpretation of experimental results.
- Documentation and Presentation: Quality of documentation, report, and presentation delivery.

Important Dates

- Architecture Presentation: [10.3.2024]
- Experimentation and Report Submission: [26.3.2024]

Additional Notes

- Students are encouraged to seek guidance from the instructor or teaching assistant throughout the project.
- Projects are submitted in pairs.

- Plagiarism will not be tolerated, and any instances will be dealt with according to the course's academic integrity policy. The use of LLMs for consultation is allowed, but all uses must be documented and submitted in the final report.
- Any deviations from the provided guidelines should be discussed with the instructor beforehand.
- Students in Miluim do not have a deadline for submitting the reports, though they are encouraged to present in class on the architecture presentation date.