Deep Learning Project

CSE403: Deep Learning
Fall Semester, 2025, UNIST

Sept. 18, 2025

1   Introduction

This project is designed to provide you with hands-on experience in solving a real-world problem using deep learning. The primary objective is for you to go through the complete pipeline of problem formulation, dataset selection, model design, experimentation, and critical analysis of results. By the end of the semester, you should be able to demonstrate not only technical implementation skills but also an ability to reason about why certain approaches succeed or fail.

- Projects may be completed **individually** or in **teams of up to two students**. There will be no difference in grading between individual and team projects.

- The evaluation will consist of two stages: a **Project Proposal Presentation** and a **Final Presentation**.

- For questions, please contact:

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2   Project Workflow

The project is structured into five steps. Each step should be clearly documented in your final presentation.

2.1   Step 1: Problem Definition

In the first step, you are expected to clearly articulate the problem you want to solve. This includes formulating a specific research question or describing a concrete application scenario. You should also explain the relevance of the problem—why it matters and why deep learning provides a meaningful approach.

- Clearly define the problem statement.

- State the research question or application context.

- Explain the importance and potential impact of solving this problem.

2.2   Step 2: Datasets Used

The success of any deep learning project depends heavily on the data. In this step, you will identify and prepare the dataset you plan to use. Public datasets are recommended, but you may also create a synthetic dataset if necessary. A brief analysis of the dataset (size, features, labels, and source) should be included.

- Identify a suitable public dataset or justify the creation of a synthetic one.

- Provide a short description of the dataset structure.

- Discuss why this dataset is appropriate for your chosen problem.

2.3 Step 3: Appropriate Deep Learning Algorithms

Once the problem and data are chosen, the next step is to select suitable algorithms. Your choice of model should be motivated by the nature of the problem and dataset. Examples include CNNs for image data, RNNs for sequential data, or Transformers for text and multimodal tasks.

- Select one or more deep learning algorithms relevant to your task.
- Justify why the chosen method(s) are appropriate.
- Reference prior work or tutorials if helpful.

2.4 Step 4: Experiments and Results

This step focuses on implementation and evaluation. You will set up your experimental environment, train models, and measure their performance. It is strongly recommended that you compare different approaches or include a baseline method. Your evaluation should include both quantitative results (metrics) and qualitative analysis (visualizations, case studies, or error analysis).

- Set up the training environment (frameworks, libraries, hardware).
- Train and evaluate your models systematically.
- Compare results across multiple approaches.
- Report both numerical metrics and illustrative examples.

2.5 Step 5: Conclusions

In the final step, you summarize the findings of your project. This includes lessons learned, limitations you encountered, and possible directions for future work. A thoughtful conclusion is important, as it demonstrates that you not only ran experiments but also reflected on their outcomes.

- Summarize the insights from your experiments.
- Discuss limitations and challenges.
- Propose potential improvements or future extensions.

3 Evaluation

Project evaluation is divided into two stages: the Project Proposal Presentation and the Final Presentation. The purpose of evaluation in this course is not to rank students in fine detail, but to encourage the sincere completion of the assigned tasks. The focus will be on effort, clarity, and depth of understanding rather than minor differences in performance metrics or the use of advanced deep learning models.

3.1 Stage 1: Project Proposal Presentation (15 points)

The proposal stage ensures that you have identified a meaningful problem and feasible dataset before moving into model implementation. This is your chance to receive feedback early and refine your plan.

- **Content**: Problem definition (Step 1) + Dataset description (Step 2)
- **Format**: Online submission
- **Submission Date**: October 24, 2025 (Friday)
  - Upload both the proposal slides (PDF) and recorded presentation video (up to 5 minutes in length) to Blackboard.

3.2 Stage 2: Final Presentation (30 points)

The final presentation is where you demonstrate the complete project pipeline, including model implementation and critical analysis.

- **Content**: Full project covering Steps 1–5

- **Format**

  - In-class oral presentation (up to 5 minutes per student/team), focusing on a concise summary of your project. The exact time may be adjusted depending on the number of teams.
  - A recorded presentation video (up to 15 minutes per student/team) must also be submitted, providing the full version of your presentation.

- **Submission Deadline**: December 5, 2025 (Friday)

  - Upload both the presentation slides (PDF) and recorded presentation video to Blackboard.
  - Source code should also be included.

- **Presentation Schedule**

  - December 9, 2025 (Tuesday)
  - December 11, 2025 (Thursday)

- **Evaluation Criteria** (tentative breakdown):

  - Problem Definition & Dataset: 8 points
  - Model Design & Experiments: 10 points
  - Results & Discussion: 7 points
  - Presentation Quality: 5 points

4 Deliverables

Your deliverables will include both presentation materials and source code. These should be submitted electronically via Blackboard.

(1) Proposal Presentation Slides (PDF) – uploaded by **Oct 24**

(2) Proposal Presentation Video (up to 5 minutes) – uploaded by **Oct 24**

(3) Final Presentation Slides (PDF) – uploaded by **Dec 5**

(4) Final Presentation Video (up to 15 minutes) – uploaded by **Dec 5**

(5) Source Code – uploaded by **Dec 5**

5 Submission Guidelines

To maintain consistency, all submissions must follow the guidelines below.

- All submissions must be in **English**.

- File naming convention: use your own student ID if individual, or concatenate all team members' IDs if a team (e.g., Final_20251234_20253456.zip).

  - Proposal_[studentID(s)].zip (must include: proposal slides, proposal video)
  - Final_[studentID(s)].zip (must include: final slides, presentation video, source code, optional results/models)

Note: Late submissions will not be accepted under any circumstances.