

Final Project 2025 – Semester B

Deep Learning Course - Reichman University

Finally, it's time for the final project!

In this final assignment, you will put into practice what you've learned throughout the course.

Project Definition

There are two options for completing the project:

Option 1: Work on a project based on your own idea.

Option 2: Choose a guided project we've prepared for you (see details below).

Regardless of your choice, the primary deliverable is a written report & code that summarizes your project idea, background, motivation, methodology, results, and conclusions.

Projects are to be completed in pairs.

We expect both students in each pair to be actively involved in the work. A key part of our evaluation will be based on your thought process and contribution, not just final results. We encourage you to bring original thinking and a degree of innovation to your project, whether through the dataset, methodology, experiments, or insights.

Option 1: Your Own Idea

You will work on a project based on your own idea.

Whether it's a novel dataset, an interesting task, or a unique application of a known architecture — you're encouraged to think independently and apply the tools you've acquired in the course.

Once you have an idea for the project, please send a short project proposal by email to moshe.butman@post.runi.ac.il. kfir.bar@runi.ac.il

Your proposal should include:

A clear description of the task and what you plan to do

The specific dataset(s) you intend to use

Please make sure to consider resource constraints — you won't be able to train a new version of ChatGPT :)

We will provide initial feedback and inform you whether your proposal is approved or needs adjustment.

Once your project is approved, you may begin working on it and submit it by the final deadline.

The expected structure of the final report is described in the submission section below.

If you choose Option 1, please submit your project proposal by July 16, 2025.

Option 2: Guided Project – Pneumonia Classification from Chest X-Rays

If you prefer a more structured assignment, you may choose the following project.

Task:

Classify chest X-ray images as either normal or pneumonia using the publicly available dataset: <https://www.kaggle.com/datasets/paultimothymooney/chest-xray-pneumonia>

The dataset is already split into train, validation, and test folders.

You must leave the test set untouched and report your final model performance only on this set.

You may adjust the split between training and validation as you wish.

What you need to do:

1. Implement a CNN-based model to solve the classification task.
2. Implement a Vision Transformer (ViT) based on the architecture & idea (you can select different parameters such as patch size etc.) from the following paper: <https://arxiv.org/pdf/2010.11929>
3. Compare and analyze the performance of the two models.

Your analysis should include:

Quantitative metrics: accuracy, precision, recall, F1-score

Training curves, convergence behavior, and generalization

Discussion of model complexity (e.g., training time, number of parameters)

Observations about overfitting/underfitting

Strengths and weaknesses of each model in the context of the task

You can of course apply different approaches such as data augmentation, transfer learning, or other training techniques and evaluate their impact.

Reference to relevant literature that compares ViT & CNN with improvement “trick” — for example:

"WHEN VISION TRANSFORMERS OUTPERFORM RESNETS WITHOUT PRE-TRAINING OR STRONG DATA AUGMENTATIONS"

<https://arxiv.org/pdf/2106.01548>

Submission

Please submit a zip folder with the following components:

1. Report - Please use the following template to write your report:

<https://www.overleaf.com/read/ysyygwggbmr#392432>

The maximum number of pages is 8, but shorter reports are welcome.

2. Your Code - a link to your code repository. This can be either a Github repository or a colab notebook (clearly documented and easy to follow). You may use Keras, PyTorch, or TensorFlow.

Important dates

July 16, 2025 - Deadline for submitting your project proposals
(Only applies if you choose to work on your own idea)

July 22, 2025 - Deadline for approving your project proposals
(Only applies if you choose to work on your own idea)

August 17, 2025 – Final deadline for submitting your completed project

If you have any questions or need assistance, don't hesitate to contact us. Good luck, and we look forward to seeing your innovative work!

****Good luck****