

**The final project of:**

Neural Networks

**Implementing an application in neural networks**

Faculty of Computer Science and Telecommunications

Cracow University of Technology

Fall 2025

Code upload is due Tuesday, January 7, 2026.

The final report is due Tuesday, January 13, 2026.

Presentation: will be announced later.

**Type of the project:**

*A) Application of neural networks:*

For this type of project, please select an application you are interested in and use deep learning to solve it. Some ideas of possible project types with much attention in recent years are as follows:

1. Music Genre Classification: Build a neural network model to classify music into different genres.
2. Fake News Detection: Build a neural network to classify news articles as real or fake based on their content.

3. Disease Diagnosis from Medical Images: Implement a CNN to diagnose diseases from medical images, such as X-rays or MRIs.
4. Plant Disease Detection in Agriculture: Implement a model to identify plant diseases from images of leaves. Dataset: [PlantDoc](#).
5. Sentiment Analysis on Social Media Data. Dataset: [IMDb Reviews](#).

More advanced topics:

1. Image Captioning: develop a neural network model to generate accurate and meaningful image captions. Dataset: dataset : [Flickr Image dataset](#).
2. Time Series Analysis: Apply deep learning techniques to analyse and predict patterns in temporal data, such as stock market prices or weather forecasts.
3. Generative Models: Design a deep learning model capable of generating realistic images, video, or music.
4. Object Detection: Build a model to identify and localise objects within images or video streams.
5. Natural Language Processing: Create a model to understand and generate human-like text or assist in language-related tasks such as sentiment analysis or machine translation.
6. Neural Machine Translations: Improving Neural Machine Translation using Attention Mechanisms.
7. Self-Driving Cars: Object Detection and Tracking for Autonomous Vehicles using Deep Learning.
8. Reinforcement Learning: Develop an agent to learn optimal decision-making strategies through interactions with an environment.

This type of project consists of the following parts:

- 1) Your source codes and execution.
- 2) Explain the dataset you have used.
- 3) Explain in detail the approach you used.
- 4) Hyper-parameter tuning and showing their effect on the performance of your approach.

- 5) Apply the methods you learned in class.
- 6) Provide a short report (up to 5 pages) highlighting different parts of your tasks, clearly describing what you did, and discussing your results.

You get credit according to factors such as importance, the correctness of the code, choosing the right algorithm according to the dataset, having promising results, your report, and your presentation.

### *B) Theoretical project*

You can also do a theoretical project, a new algorithm you propose or prove something in an existing one. For example, the conditions in which the algorithm converges or why gradient descent often works despite non-convexity.

This project can be accomplished in groups of two, and both students are responsible for the project and of course, the presentation. However, you can divide the subtasks between yourselves.

In rare cases, three group members are also acceptable if the project is big or complicated.