

# Deep Learning: Mini Project

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Submission date: 14/12/2025.

Each submission should include (1) A code file, preferably a notebook with outputs (2) A report in a PDF file (3-4 pages).

## Objective

The mini-project is designed to prepare you for the final project by providing hands-on experience in implementing a chosen deep learning paper. Through this process, you will gain familiarity with re-implementing state-of-the-art architectures and performing initial experiments, laying the groundwork for the main project.

## Paper & Data

**The paper you need to implement:** [Sequence to Sequence Learning with Neural Networks](#) by Sutskever Ilya et al.

**Task:** English-to-French Neural Machine Translation.

### Dataset:

WMT'14 English-to-French Translation Task (A benchmark for machine translation).

Due to computational constraints, you must use a small, reproducible subset of the full dataset. Select only 10,000 samples from the training set for training purposes. And a similar small subset for evaluation.

**Data Access:** For loading, use the [mwt14 configuration](#) via the Hugging Face datasets library.

## Task Description

### 1. Implementation

- Re-implement the architecture as described in the paper using PyTorch.
- Your implementation should follow the structure and methodology outlined in the paper as closely as possible.
  - Both the Encoder and Decoder must be implemented with 4 recurrent layers, as specified in the paper.

- Dimensionality (Scaled for Feasibility): Due to limited RAM in free cloud environments (like Colab), you may need to scale down the dimensions while keeping the deep architecture. You must document and justify any dimensionality changes in your report and code documentation.
- Write clear and well-documented code to ensure understanding and reproducibility.

## 2. Baseline Experiment

Train your implementation using the same experimental methodology of the paper:

- Data prep, make sure to pre-process the data.
- Train your model implementation on the created dataset.
- Evaluate the performance of your implementation using the metrics described in the paper.

## 3. Analysis

- Compare your implementation's performance with the results reported in the paper. Highlight any discrepancies and possible reasons (e.g., differences in dataset, computational resources, or parameter settings).

## 4. Report Submission

- Submit a brief report (3-4 pages) detailing your implementation process, experimental setup, and results.
- The report should include:
  - **Introduction:** Brief overview of the paper and its objectives.
  - **Implementation:** Key details of your code and how it maps to the architecture described in the paper.
  - **Baseline Results:** Summary of your experimental results compared to the paper's results.
  - **Discussion:** Challenges faced during implementation, lessons learned, and any insights gained.