Deep Learning Project II

Blaine Swieder

21 May 2025

1 Project Description

1.1 Objective

Implement a Convolutional Neural Network (CNN) with 1D convolutional layers and a Recurrent Neural Network (LSTM, GRU allowed) for sentiment analysis on the IMDB dataset.

1.2 Tasks

Please complete the following tasks for this project.

- Implement and train your Convolutional Neural Network (CNN) and a Recurrent Neural Network (RNN) models on the IMDB dataset.
- Present your best results in a table that includes:
  - Mini-Batch Size
  - Number of Hidden Layers
  - Listing of the number of channels and size of kernels or hidden units
  - Total Number of parameters excluding the embedding layer.
  - Optimization Methods used.
  - Initializer
  - Regularization (if used)
  - Number of training epochs
  - Final training accuracy
  - Final testing accuracy
  - Ratio of the test accuracy to the 10^{th} root of the total number of parameters.
- Plot the convergence curve of the loss function, the training accuracy, and the testing accuracy against the training epochs.
- Discuss your results, including observations on modality, skewness, and any gaps in the histogram.

1.3 The IMDB Dataset

The IMDB dataset consists of movie reviews, each labeled as either positive or negative. The dataset has 25,000 reviews for training and another 25,000 for testing. Use word embedding to represent words in a dense vector representation.