

CSE440: Natural Language Processing II

Lab Project: Token-Level Multi-Class Classification

Task:

You will be assigned one of the following datasets: NER 1, NER 2, POS 1, or POS 2. You must use only your assigned dataset throughout the project.

Data Access Link: [📁 Project Datasets](#)

Begin by loading and exploring your assigned dataset. The dataset is already split into training and testing sets in an 80-20 ratio, provided as separate CSV files. Use the training set for model training and validation, and the testing set strictly for final evaluation. Perform basic exploratory data analysis (EDA) and necessary text preprocessing.

Design and implement four types of models: a simple Recurrent Neural Network (RNN), a Long Short-Term Memory network (LSTM), a Gated Recurrent Unit network (GRU), and a Bidirectional LSTM (BiLSTM). To build your models, you may use any deep learning framework, such as TensorFlow/Keras or PyTorch.

Tune the hyperparameters of each model by experimenting with learning rates, batch sizes, number of epochs, and other settings. Use validation performance to guide your decisions during tuning.

Evaluate the performance of each model using relevant metrics. You must calculate and report accuracy, F1-score (macro and/or weighted), the confusion matrix, and the classification report. Include both visual and tabular representations to compare the models.

Deliverables:

You must submit a report of no more than 4 pages in PDF format. The report should include the following sections:

- Abstract: A brief summary of your approach and findings.
- Introduction: Background of the task and motivation behind your work.
- Methodology: Details of your exploratory data analysis, preprocessing steps, and model architectures.
- Results: A comparative analysis of your models based on evaluation metrics.
- Conclusion: Key takeaways, limitations, and possible improvements.
- References: Cite any research papers, libraries, or tools you have used throughout your project. Use IEEE citation style.

You must also submit the complete code used in the project.

You will attend a short viva session where you will explain your approach, model design choices, and the results you obtained. Each team member will be asked questions during the viva, so be prepared to answer questions on any aspect of the project.

Submission Instructions:

You must submit a compressed ZIP file containing the following:

- Your report (GroupNo_ID1_ID2_ID3.pdf)
- All code files or notebooks (GroupNo_ID1_ID2_ID3.ipnyb/py)

Mark Distribution

The final grading will be based on the following components:

- Report: 5 marks
- Code: 3 marks
- Viva: 3 marks