DS5007 Deep Learning Assignment 3: RNN, LSTM, GRU

Deadline Date: Feb 21, 2025
Timing: 11:50 am
Graded Lab (10 Marks)

Instructions

1. Provide well-commented, indented code with meaningful variable names.
2. Write questions in separate text blocks before the code blocks containing answers.
3. Read the questions carefully before answering. Follow any specified approaches, libraries, or data structures.
4. All plots should have appropriate axis labels, titles, and legends.
5. If the provided dataset is too large, work on a smaller chunk to avoid memory issues.
6. For longer training runs requiring a GPU, consider using Kaggle for better computational resources.

Tasks (5 Marks each)

Task 1: Machine Translation using RNN, GRU, and LSTM

Objective: Implement a neural machine translation (NMT) model using RNN, GRU, and LSTM for translating English sentences into French.

Dataset: Use the **English-French dataset** from: https://www.manythings.org/anki/

Instructions:

1. Load and preprocess the dataset (tokenization, padding, vocabulary creation).
2. Implement three different models using:
   - RNN
   - GRU
   - LSTM
3. Train each model and evaluate their performance using BLEU score.
4. Compare the performance of the models and provide a discussion on which architecture performed the best and why.

Task 2: Stock Market Forecasting using RNN, GRU, and LSTM

Objective: Implement and compare the performance of RNN, GRU, and LSTM for stock price prediction.

Dataset: Use the **Yahoo Finance Stock Market** Dataset from: https://finance.yahoo.com/

Instructions:

1. Select a stock (e.g., Apple - AAPL, Tesla - TSLA, or any other of your choice).
2. Load and preprocess the dataset (normalize, create time series sequences).
3. Implement three models using:
   - RNN
   - GRU
   - LSTM
4. Train the models and evaluate them using RMSE (Root Mean Squared Error) and visualize predicted vs. actual stock prices.
5. Compare and analyze the performance of the models.

Files to be Submitted

- A `.ipynb` file containing the code, named as `YourNameYourRollNoAssignmentNo.ipynb`.