Recurrent Neural Networks

Assignment 1: Basic Level - Session Type Prediction with Simple RNN

Objective: Build a simple RNN model to predict the type of AI problem based on session characteristics from the One Hour AI Solution platform.

Dataset Context: The dataset contains information about AI sessions conducted on the One Hour AI Solution platform, including features like session duration, number of interactions, and client domain.

Tasks:

1. Load and preprocess the provided session data CSV file
2. Implement a Simple RNN to predict the problem category based on sequence of interactions
3. Train the model using the provided dataset and evaluate its performance
4. Compare your results with those from a standard non-recurrent neural network
5. Discuss the advantages of using RNN for this sequential prediction task

Dataset: ai_sessions_basic.csv

Assignment 2: Intermediate Level - LSTM for Session Duration Prediction

Objective: Develop an LSTM model to predict session durations for the One Hour AI Solution platform to help with scheduling and resource allocation.

Dataset Context: The dataset contains sequences of AI engineer-client interactions from previous sessions, including the type of questions asked, problem complexity, and resulting session duration.

Tasks:

1. Load and preprocess the session interaction data from the provided CSV
2. Build an LSTM model to predict the total session duration based on early interactions
3. Implement techniques to address the vanishing gradient problem if observed
4. Compare your LSTM model with a Simple RNN implementation on the same task
5. Analyze which interaction patterns tend to lead to longer or shorter sessions

Dataset: ai_interactions_intermediate.csv

Assignment 3: Low-Advanced Level - GRU for Solution Success Prediction

Objective: Build a GRU-based model that analyzes sequences of problem-solving approaches to predict whether an AI solution will be successful.

Dataset Context: The dataset contains timestamped sequences of actions taken by AI engineers during One Hour AI Solution sessions, with labels indicating whether the solution was successful.

Tasks:

1. Load and process the sequential action data from the provided CSV
2. Implement a GRU model to predict solution success based on the action sequences
3. Compare the performance of your GRU model with both Simple RNN and LSTM models
4. Analyze how the different gating mechanisms affect model performance on this task
5. Identify patterns in successful solution approaches that could be used for engineer training

Dataset: ai_solutions_advanced.csv