**MCA572– Neural Networks and Deep Learning V MCA**

**5-11-2024**

**Regular lab Question – 6**

**Lab Assignment: Time-Series Prediction with RNN**

**Objective:**

In this exercise, you will learn to implement a basic RNN model using Python and TensorFlow/Keras to predict future stock prices based on historical data.

**Dataset:**

Download the dataset: Stock Price Dataset - AAPL (Apple Inc.).

https://www.kaggle.com/datasets/tarunpaparaju/apple-aapl-historical-stock-data

This dataset contains daily stock prices (open, high, low, close, volume) for Apple Inc. from 2005 to 2017.

**Exercise Steps:**

**1. Data Preprocessing:**

o Load the dataset and focus on the 'Close' price column, as this will be your target variable for prediction.

o Normalize the data (e.g., using Min-Max scaling to keep values between 0 and 1).

o Split the dataset into a training set (80%) and a testing set (20%). **2. Create Training Sequences:**

o Convert the 'Close' prices into a series of sequences for training.

o Define a sequence length (e.g., 60 days), where each sequence will be used to predict the stock price for the next day.

**3. Build the RNN Model:**

o Define an RNN model with the following architecture:

▪ An RNN layer with 50 units

▪ A Dense layer with 1 unit (for regression output)

o Use the mean squared error (MSE) loss function and the Adam optimizer. **4. Train the Model:**

o Train the model on the training set for 50 epochs with a batch size of 32.

o Use validation data to check for overfitting.

**5. Make Predictions:**

o Predict the stock prices on the test set and transform the results back to the original scale if normalization was applied.

o Plot the predicted vs. actual stock prices to visualize the model’s performance.

**6. Evaluation:**

o Calculate the mean absolute error (MAE) and root mean squared error (RMSE) on the test set.

o Discuss how well the model performed based on these metrics. **Deliverables:**

• **Submit your Python code, a plot of predicted vs. actual stock prices, and a brief report (300-500 words) discussing the results and any observed limitations.**

**Program Evaluation Rubrics**

| **Evaluation Criteria** | |
| --- | --- |
|  | **5 marks C1-Implementation, Correctness and Complexity** |
|  | **2 marks C2-Documentation and Visualization** |
|  | **3 marks C3-Concept Clarity and Explanation** |

**General Instructions**

1. The file you have to save with your name, last 3 digits of register number and program number “Aaron\_201\_Lab1”.

2. The implemented code you have to upload in Github and in the Google Classroom in the given scheduled time.

3. Failure to upload within the allotted time will result in the loss of all marks for the corresponding lab exercise.