Practical NO:- 9

Title:- Temperature Forecasting using RNN

Theory:-

RNN's are a class of neural networks designed to recognize patterns in sequences of data such as time series, speech, or text. Unlike traditional feedforwad neural networks, RNNs have loops that allow information to persist. This makes them suitable for tasks where context and order of the data are important.

In this experiment, a dataset containing historical temperature readings is used to train an RNN model. The model learns from past temperature values and attempts to predict future values. The long short term memory (LSTM) variant of RNN is often used due to its capability to overcome the vanishing gradient problem and to capture long-term dependencies.

Key corner concepts.

- Time-series Data - Data that is collected at successive, evenly spaced points in time.

- Recurrent Neural Network (RNN) - A neural network that processes sequences of inputs by maintaining an internal state (memory).

- LSTM (Long-short-term Memory) - A type of RNN architecture that effectively captures long-term dependencies.

- Normalization - Scaling data values to a smaller range to improve training efficiency.

- Loss Function - A function like Mean Squared Error (MSE) is used to measure the difference between actual & predicted values.

Metrics / Plot used:-

- Mean Squared Error (MSE) - Measures the average squared difference between predicated and actual values.

- Loss Curve - A plot of training and validation loss over epochs to evaluate the models learning process.

- Actual vs Predicted plot - shows how closely the predicted temperature values match the actual ones.

Conclusion:-

The RNN model effectively learned temporal patterns in the historical temperature data and predicted future values with reasonable accuracy. This demonstrates the suitability of RNN's for time-series forecasting tasks like temperature prediction.