**Assignment No: 4**

**Problem Statement:-**

Perform time series prediction using **Recurrent Neural Networks (RNNs)** for stock market analysis or weather forecasting.

**Theory:-**

**Recurrent Neural Networks (RNNs)** are a class of neural networks designed for sequence data. RNNs are capable of maintaining a memory of previous inputs, making them suitable for tasks such as time series prediction, where the temporal order of data points is important.

* **LSTM (Long Short-Term Memory)** and **GRU (Gated Recurrent Unit)** are popular variants of RNNs that help overcome the issue of vanishing gradients in standard RNNs.

**Methodology:-**

1. **Data Collection**:
   * Collect time series data such as stock prices or weather data over a period of time.
   * Preprocess the data by normalizing values and creating sequences (sliding windows) for training.
2. **RNN Model**:
   * Build an RNN (or LSTM/GRU) network in **Keras** or **TensorFlow**.
   * Use one or more RNN layers followed by dense layers to predict future values.
3. **Training**:
   * Train the model on the historical data and validate it on a test set.
   * Use a loss function like **mean squared error (MSE)** for regression tasks such as stock price or weather prediction.
4. **Prediction**:
   * Use the trained model to predict future stock prices or weather conditions.

**Conclusion:-**

We implemented a time series prediction model using RNNs, successfully predicting future values based on historical data.