**Assignment No: 4**

**Problem Statement:**

Implement time series prediction using Recurrent Neural Networks (RNNs) for tasks such as stock market analysis or weather forecasting.

**Theory:**

Recurrent Neural Networks (RNNs) are designed to handle sequential data by maintaining a memory of previous inputs. This makes them well-suited for tasks like time series prediction, where the order of data points over time is critical.

* LSTM (Long Short-Term Memory) and GRU (Gated Recurrent Unit) are advanced variants of RNNs that address the vanishing gradient problem, which is common in standard RNNs.

**Methodology:**

1. Data Collection:
   * Gather time series data such as stock prices or weather data over a specified period.
   * Preprocess the data by normalizing values and creating sequences (e.g., using sliding windows) for training.
2. RNN Model:
   * Build an RNN model (or an LSTM/GRU-based model) using Keras or TensorFlow.
   * Use one or more RNN layers, followed by fully connected (dense) layers to predict future values.
3. Training:
   * Train the model on historical time series data and validate it on a test set.
   * Use a loss function such as mean squared error (MSE) for regression tasks, such as stock price or weather forecasting.
4. Prediction:
   * Utilize the trained model to forecast future stock prices or weather conditions based on past data.

**Conclusion:**

We successfully developed a time series prediction model using RNNs, accurately forecasting future values based on historical data.