

Assignment – 4

Title - Time series analysis.

Problem Statement - Recurrent neural network (RNN) Use the Google stock prices dataset and design a time series analysis and prediction system using RNN.

Objectives -

To build a RNN model to predict the stock price and time analysis.

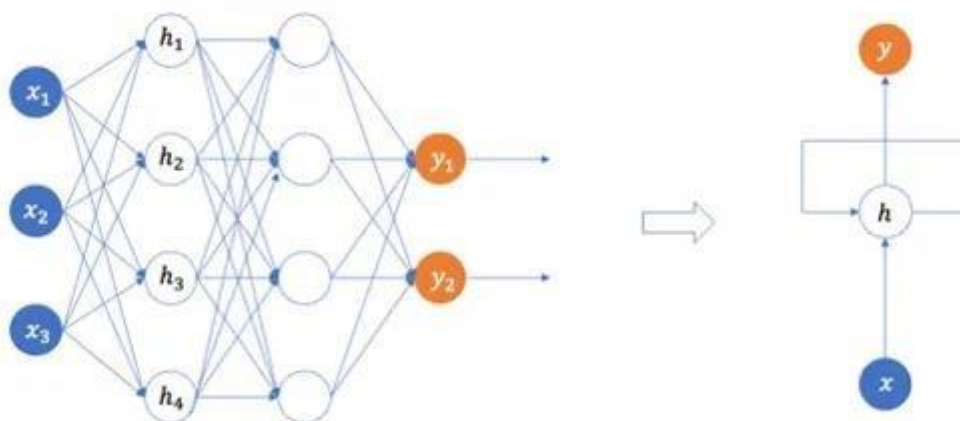
Outcome -

To understand the exploratory data analysis, split the training and testing data, Model Evaluation and Prediction by the RNN on the google stock price dataset.

Theory -

RNN:

Recursive Neural Network (RNN) should be specially designed. RNN translates the provided inputs to machine readable vectors. Then the system processes each of this sequence of vectors one by one, moving from very first vector to the next one in a sequential order. While processing, the system passes the information through the hidden state (memory) to the next step of the sequence. Once the hidden state has collected all the existing information in the system until time period t , it is ready to move towards the next step and in this newer step the hidden step is classified as the previous hidden state defined. The outputs of the previous periods should somewhat become the inputs of the current periods. And the hidden layers will recursively take the inputs of previous periods. The hidden layer receives the inputs from the input layer, and there is a line to connect a hidden layer back to itself to represent the recursive nature.



Training through RNN

1. A single time step of the input is provided to the network.
2. Then calculate its current state using set of current input and the previous state.
3. The current h_t becomes h_{t-1} for the next time step.
4. One can go as many time steps according to the problem and join the information from all the previous states.
5. Once all the time steps are completed the final current state is used to calculate the output.
6. The output is then compared to the actual output i.e the target output and the error is generated.
7. The error is then back-propagated to the network to update the weights and hence the network (RNN) is trained.

Advantages of Recurrent Neural Network

1. An RNN remembers each and every information through time. It is useful in time series prediction only because of the feature to remember previous inputs as well. This is called Long Short Term Memory.
2. Recurrent neural network are even used with convolutional layers to extend the effective pixel neighborhood.

Disadvantages of Recurrent Neural Network

1. Gradient vanishing and exploding problems.
2. Training an RNN is a very difficult task.
3. It cannot process very long sequences if using tanh or relu as an activation function.

Algorithm:

1. Import Libraries: Install the required libraries and setup for the environment for the assignment. importing SciKit-Learn, Pandas, Seaborn, Matplotlib ,Tensorflow and Numpy.
2. Importing Data and Checking out: As data is in the CSV file, we will read the CSV using pandas read_csv function and check the first 5 rows of the data frame using head().
3. Visualize the data using matplotlib.
4. Creating the Training data.
5. Building the Long Short Term Model
6. Compiling the model.
7. Training the model.
8. Creating the test data.
9. Evaluation and Visualizing the predicted values of Google stock prices.

Conclusion -

We have analyzed a Recursive Neural Network (RNN) Model on google stock prediction.