



Assignment - 4

Title

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

Objective

To implement different deep learning model.

Theory

RNN for a dataset having continuous data such as Google stock prices & how to effectively measure the accuracy of the model using R2 value.

We use RNN for modeling sequence / series data where we have to analyze a series of data when predicting something. In other words, in series data, a sequence of historical data points must be considered when making predictions & cannot just draw conclusion just by overlooking the data.

Therefore, unlike other models such as Multi-layer perceptron & other simple ML models used for prediction, when using RNN, first should define the sequence of data to be considered when training one data point into the model.



Conclusion

In this story we applied the concepts of Recurrent Neural Network (RNN) on the Google stock prices dataset.

FAQ's

1) What's the difference between CNN and RNN and in which cases would use each one?

= 1) Architecture :

CNN - Designed for processing grid-like data such as images. They use convolutional layers to extract spatial hierarchies of features efficiently.

RNN - Designed for sequential data such as text or time series. They use recurrent connection to capture temporal dependencies.

2) Applications :

CNN - Ideal for tasks like image recognition, object detection and computer vision tasks where spatial relationships are crucial.

RNN - Suitable for tasks like natural language processing, speech recognition and time series prediction where sequence of data and present and context matters.

3) Use =

CNN = Grid like data with spatial relationship.

RNN = Tasks involving sequential data with temporal.



2) How many dimensions must the input of an RNN layer have? What does each dimension represent? What about its output?

= The inputs of an RNN are typically have three dimensions. Each dimension represents batch size, sequence length, and feature dimensionally respectively. Outputs have three dimensions where units represent the hidden state dimensionality of the RNN cells.

3) What are the main difficulties when training RNNs?

= The main difficulties in training RNNs include vanishing and exploding gradients, making it challenging to capture long-term dependencies. Additionally RNNs suffer from difficulties in retaining memory over long sequences.

4) What are the uses of RNN in NLP?

= RNNs are widely used in NLP for tasks like language modeling, sentiment analysis, machine translation & named entity recognition. Their ability to model sequential data allows them to capture contextual information efficiently, making them suitable for tasks where understanding the context is crucial for accurate predictions in text data.

5) What's the difference between Traditional Feedforward Networks & Recurrent Neural Networks?