Stock Price Prediction

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***Abstract*—In the domain of Financial Management, Stock Market has its own importance and a role to play. Prediction of Stock Market has proven to be a difficult task due to its changing computational nature and complexity but now a few models have been developed to predict stock prices with the help of artificial intelligence and Random Forest Techniques. In this work we present a vigorous and precise model of stock price prediction using Machine Learning methods. We have taken dataset of WIPRO and try to predict its stock value, the next day. We have used LSTM (long short-term memory) and RNN architecture to build forecasting framework for stock prices. With these memory cells, networks can effectively associate memories and input remote in time. The financial data: Open, High, low and Close prices of stock are used for creating new variables which are used as input to the model. We have imported Keras libraries and used packages like Sequential, Dense, LSTM and Dropout. Extensive results have been presented on the performance of these models.**

Keywords—Stock Price Prediction, LSTM, neural networks, RNN, financial forecasting, Time series analysis

I. Introduction and Motivation

Machine Learning has become one of the most reliable tool in financial market. It is used to manage investment efficiently. Machine learning has been used widely in financial sector to provide better decisions in predicting stock market prices.

Neural network is very powerful machine learning model. With respect to artificial intelligence NNs are known as connectionist models, since they comprise of basic connected units, artificial neural networks that can learn representations. Machine learning models and NNs have been successfully applied in finance, both for forecasting and hedging purposes. In this paper work, we tried to predict the stock prices. Different and efficient approaches like RNNs architectures and LSTM have been applied.

A RNN technique is often built on learning from sequences, where the sequence is nothing more than a list of pairs (x_t, y _t), where x_t, resp. y_t, denotes an input, resp. the associated output, at a particular time step t. We can have a consistent output value y_t=t throughout the entire sequence for different types of problems, or we can choose from a list of desired outcomes for each x_t. To represent a sequence, we consider some hidden state at each time step. The RNN can grasp the current state of a sequence, remember the context, and process it forward to future values using the latter. A new hidden state, let us call it h_t, is added to every new input x_t, according to h_(t-1). The RNN is basically a feed-forward neural network with one hidden layer with an input x_t and an output y_t at every time step in the context of so-called regular fully-connected neural networks. The backpropagation through time (BPTT) algorithm is commonly used to illustrate the training procedure for RNNs. The latter is created in the same way as the basic backpropagation one. We need all the partial derivatives of the error metric with respect to the weights since the weight update operation is often conducted by an iterative numerical optimization algorithm that utilises n-th order partial derivative, e.g. first order in the case of stochastic gradient descent.

Basic RNNs are especially good at modelling short sequences. Nonetheless, they reveal a sizable number of issues. This is the case with vanishing gradients, where the gradient signal becomes so weak that learning for long-term relationships in the data becomes extremely slow. On the other hand, if the weight matrix values get too large, the gradient signal may become too strong, causing the learning scheme to diverge. Exploding gradients is a term used to describe the latter. When compared to RNNs, the single time step cell of an LSTM has a more complicated structure than merely a hidden state, input, and output. The input gate, forget gate, and output gate are three adaptive and multiplicative gating units found inside these cells, which are also known as memory blocks. Both input and output gates, with appropriate weights, serve the same purpose as the input and output gates in RNNs. The forget gate, a new instance, is responsible for learning how to recall or forget its prior state. This latter aspect enables more complicated temporal patterns to be captured.

All NNs were trained using Keras, which a NNs library written in Python for deep learning. Keras, a deep learning NNs library built in Python, was used to train all of the NNs. We employed the Adam technique as an optimization algorithm. Adam combines the advantages of two existing optimizers: ADAgrad and RMSprop. Another crucial part of training the model is to ensure that the weights do not become excessively enormous, resulting in overfitness. We've decided to employ Tikhonov regularisation for this project.

We compared daily training outcomes for WIPRO stock prices, demonstrating that the LSTMs strategy can deliver high enough accuracy. This indicates that it can be used successfully in practise. We also show that RNNs must be trained over a large number of epochs to avoid overfitting to the dataset, with final weights carefully chosen and early termination. Our work is based on Wipro stock prices prediction. Wipro is third largest Indian IT Company and fast-growing company. Wipro has been operating since 1945 and ultimately engrossed many Indian businesses for its excellent services, which is highly based on vegetable and advanced oil products.

Therefore, predicting its stock prices has been of great interest.

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