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Stock market prediction using LSTM Module

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Abstract: ***In this entire study the use of stock market prediction for the financial growth of a company have been highlighted. The application of LSTM, limitation and further recommendation has also been mentioned here. The study also showed its future improvement in stock market prediction and the reasons behind its popularity have also been discussed here in details. Wrong prediction in stock market analysis can damage a company financially therefore, its importance for the growth of a business has discussed in details. Sometimes, it may be difficult to store previously collected data for the neural node, thus, the use of LSTM has become vital. The most vital issue with RNN is the Vanishing Gradient problem hence; this particular technology has solved this problem and is capable of storing a huge amount of important data constantly.***

Keywords: LSTM, stock market prediction, Vanishing Gradient problem, RNN, Financial growth.

1. INTRODUCTION

An exchange between customer and retailer takes place in a stock market, it is an important element of the regular market economy. Therefore, regular analysis of this market helps the investors to make a proper decision regarding investing in a particular company. Stock market prediction refers to the process; through this an organization tries to decide the future value of company stock. For this reason, a positive forecast is essential that helps the agency to earn more profits, based on the current situation of price change. In the present situation, LSTMs are used as an effective way of predicting, and their application, limitations, and future recommendations will be discussed thoroughly in this study. These recommendations will highlight its future scopes for further improvements and it can be expected that it will be more effective in the future.

2. RELATED WORK

2.1 Stock market prediction in the current scenario

These days, the stock market forecast has become an essential part of a business and LSTM is the most effective way to perfect predicting. It is the improved version of Recurrent-Neural-Networks (RNN) as it stores prior essential data and does not store irrelevant information. Mainly it has three ways, the input gate, the forget gate, and the output gate, in the case of the input gate, the model stores data for future use. In the case of the forgetting gate, the model deletes the data that is not needed for analysis, and finally, the output gate displays the information [4]. The main reason for using this model is that it requires a huge amount of information and it is based on the history of a particular market. It can detect extremely minute mistakes by utilizing the gates, for this reason, this technique has become popular for stock market prediction in present situations.

This model expands the memory of Recurrent-Neural-Networks and that allows them to show the information that is needed to be applied [5].

2.2 Application of LSTM

In the current situation of stock market prediction, the implementation of LSTM has become an essential factor. The main reason for applying this strategy is its accuracy; it is much faultless as fifty-sixty percent accuracy can provide a company with solid results. This is much more effective, as it uses three gates and within the input gate, there are also many vital elements such as current input, hidden state of information, and present cell input. The last element is the most effective as it is used for the future forecast [2]. This particular model is specifically used in the forecast as it equalizes the data collected previously to enhance the execution of RNN indirectly. It is easy to apply, as it has different cells for storing, processing, and analyzing data, therefore, the accuracy of this exact model is much more efficient. Different units of this model can be shown in the below figure

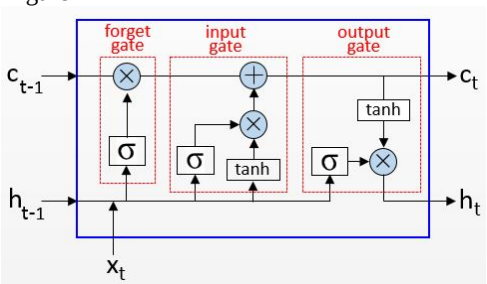

Figure 1: Different parts of LSTM[2]

This model is also used by new investors for a better understanding of the present marketing strategies and helps them to decide whether, to invest further or not. The remembering skill of this device makes it different and

useful from other models. The previous models and theories of stock market analysis were not much helpful as their calculation method was only concerned with the identification of patterns in stock price variation. Another drawback of past theories is that they were using only numerical data and that was not always accurate. Therefore, stock market predictions in past years were difficult and could not solve all the problems [1]. For this reason, LSTM has become an essential way as it has a specialized memory cell that can store data for a long time. The major advantage of LSTM is its capacity to grasp condition-specific secular dependence, therefore, every part remembers data independently and these parts do not hamper other functions.

Another benefit of applying LSTM is that its networks are perfect for searching the effect of stock price variation on the costs of numerous other stocks. They can determine the time of past trends of particular stock price movements and whether it is needed to be preserved or not [8]. Thus, they can analyze the future trends of the stock market and for these reasons; this model is applied by companies and investors for perfect prediction.

2.3 Limitations of using LSTM

Nowadays, LSTM is largely used by organizations across the world though there are numerous limitations of this model that are needed to be improved in the future. The first disadvantage is it has insufficient memory for train, as it stores a large amount of data it cannot receive proper training. Another important drawback of LSTM is its speed, it is slower than other models, and this is majorly due to the sequential computation program. This design requires a series of inputs for calculation and for this huge amount of data is also much important [6]. To process this huge amount of data time becomes an important factor as it requires a huge amount of time; this automatically slows down the speed of LSTM. It can be said that these are the major disadvantages of this design though; it is more advanced than other techniques.

3. METHODOLOGY

These days, the stock market forecast has become a complicated issue as there are many elements that influence the prediction. This is more effective, as it uses three gates and within the input gate, there are also many vital elements such as current input, hidden state of information, and present cell input. The last element is the most effective as it is used for the future forecast [2]. The proper collection of data is the key factor for this study, after the collection of data the study can precede further [11]. The data collected during surveys can be divided into two categories; first major amount of data must be stored for sampling, and the minimum quantity of data for examination. For proper sampling mean squared errors used to understand the value of this model, this is not the only process, there are also several other techniques for sampling data. This method can be shown in the below figure

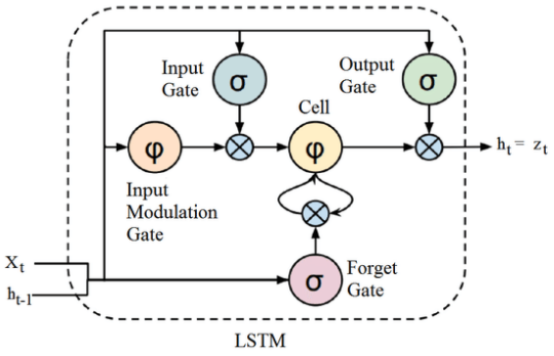

Figure 2: The LSTM model

After the processing of information, some features are needed to be chosen for perfect analysis, such as date, time, and capacity. In the next phase, the information is fed to the neural network and is prepared for training to predict by considering random biases and weights The LSTM design is made up of a sequential input layer and a dense output layer is important and the final step is result display [7]. In this stage, the result is shown by the output layer of RNN to compare this value with the desired value. Therefore, the difference between the achieved result and desired result can be measured by applying the backpropagation algorithm and the mistakes can be minimized by adjusting weights and the biases of the network. This is the entire process of analyzing LSTM and those are the fundamental steps for a complete study.

4. EXPERIMENT RESULT

After proper analysis of the data, it is much more important to discuss the result thoroughly. According to the calculation, it has been observed that there is a difference between the mathematical value and the desired value as shown in fig-1. Therefore, it can be said the dissimilarity in the length of data highly affected the result, and alternation in the dataset will change the result. Moreover, it has been seen that the first dataset in this study was less unstable and had lower values, as the examination proceeds it has become visible that the examination dataset was becoming more unstable than the previous [3]. It is major to avoid these kinds of changes for making a better prediction in the stock market and it will automatically reduce the difference between the statistical value and the ideal value. It has also been observed that different data sets regarding sampling and evaluating data will improve the outcome and will make more accurate forecasts. Therefore, it can be said that LSTM is the best method for this type of prediction as this design has the capacity to use several datasets within a period [10]. This technique also makes minute errors and human mistakes are negligible in this case, for these reasons this model is gaining popularity among the financial experts of different companies as it has the highest accuracy in predicting the stock market. It can also be said that this model always gives positive outcomes as it is efficient enough, therefore, the difference between two values is always negligible. This minute difference can also

be improved by slight changes in variables and produce fruitful results.

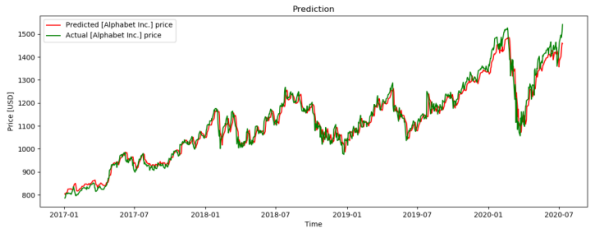

figure 1:Result of LSTM implementation

5. RECOMMENDATIONS AND CONCLUSION

In stock market prediction LSTM has become an essential method though having numerous advantages; it also has some limitations that can be improved in the future. The betterment strategies include increasing the number of cells, more cells will improve their functional ability as they will remember more data and it will also increase LSTM's speed. Another recommendation can be done by mass initialization; in this case, it is essential to add more mass initialization programs according to the function [9]. This will upgrade LSTM's mode of learning and remembering information. Another improvement strategy is to increase the number of layers, which will indirectly help this design to function more accurately and will allow this model to take action fast.

It can be concluded that the popularity of stock market prediction is growing day by day as customer demands are changing. Therefore, it is important for the companies as well as the investors to make a proper decision regarding investments. This is motivating economists to search for new methods and tactics for better forecast and for this LSTM has become much more popular. In this study, the role of the Long Short-Term Memory unit in RNN has been highlighted and the reasons for application have also been discussed in detail. Therefore, it can be said that the LSTM tactics are not error-free still; it is the most advanced method for prediction. It can be expected that it will be improved in the future by applying these strategies.

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