APPLICATION OF DATA MINING TO PREDICATE STOCK PRICE USING LONG SHORT TERM MEMORY METHOD

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Abstract

Investing some of our wealth to invest in stocks is highly recommended considering the fluctuating nature of stock prices, meaning that stock prices can go up and down at any time depending on the conditions and phenomena that occur on the stock market. Stock investment includes having a high risk of loss but also by taking that risk it is also possible to get high profits (High Risk High Return). Shares are proof of ownership of company value or proof of equity interest. Shareholders are also entitled to receive dividends (profit sharing) according to the number of shares they own. This study aims to make it easier for everyone who wants to invest in Google and Tesla stocks and implement the long short term memory method for stock price prediction. This data mining research resulted in a Root Mean Square Error (RMSE) value of 1.80%, which means the prediction results are very accurate with real data and the average difference between real stock price data and predicted data is $3 -$15.

1.   INTRODUCTION

Investing some of our wealth to invest in stocks is highly recommended considering the fluctuating nature of stock prices, meaning that stock prices can go up and down at any time depending on the conditions and phenomena that occur on the stock market. Stock investment includes having a high risk of loss but also by taking that risk it is also possible to get high profits (High Risk High Return). Shares are proof of ownership of company value or proof of equity interest. Shareholders are also entitled to receive dividends (profit sharing) according to the number of shares they own. Equity, on the other hand is the investment method of choice for many investors as it can provide attractive returns such as dividends and capital gains.Before investing in stocks, we must make several considerations, such as determining the purpose of stock investments, checking financial conditions, seeking as much information as possible about the shares that we want to buy, choosing a securities platform that already has a license from the Financial Services Authority (OJK). unwanted mistakes when investing in stocks.

It is difficult to see a stock price chart that changes from time to time this is caused by several factors such as stock fundamentals, fluctuations in the rupiah exchange rate against foreign currencies, market manipulation factors, for the law of supply and demand. This condition creates selling pressure and stock prices will fall. In the panic selling phenomenon, investors are afraid the price will continue to fall and want to immediately sell shares at any price. This behavior is caused by emotions and fears, not by rational analysis.

In a previous study conducted by Wilda Yulia (2020), the prediction of Garuda Indonesia's stock price in the midst of the COVID-19 pandemic using the ARIMA method resulted that the ARIMA model (3,1,2) is the best ARIMA model where stock prices are influenced by a single trading day. then. While this study uses the long short term memory method and looks for the Root Mean Square Error (RMSE) value to measure the accuracy of the final stock price prediction results and

produces an RMSE value of 1.80% which means the prediction results are very accurate with real data.
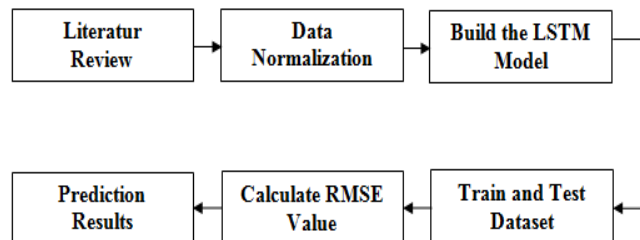
2. METHOD

Figure 1. Research Method Steps

2.1 Literatur Review

Literature studies can be obtained through research journals that have been carried out previously, theses, and books related to research.

2.2 Data Normalization

Literature studies can be obtained through research journals that have been carried out previously, theses, and books related to research.

2.3 Build the LSTM Model

Creating a model using the long short term memory method in python according to the research method used.

2.4 Train and Test the Data

This process is carried out using the long short term memory method which aims to produce an accurate final value in predicting tesla and google stock prices.

2.5 Calculate RMSE Value

Calculating the root mean square error (RMSE) value to estimate the accuracy of the long short term memory model. This is done by squaring the error value then dividing by the total number of datasets and taking the root. The smaller the RMSE value, the better.

3. RESULT AND DISCUSSION

To see or predict stock prices requires knowledge in technical and fundamental analysis. The stock prices is influenced by various factors such as import – export policies, phenomena that occur within a certain period. This study uses long short term memory as the method used in predicting stock prices with the variables data, close price, adjust close price, volume, open price.

	Date	Open	High	Low	Close	Adj Close	Volume
0	2013-01-02	357.385559	361.151062	355.959839	359.288177	359.288177	5115500
1	2013-01-03	360.122742	363.600128	358.031342	359.496826	359.496826	4666500
2	2013-01-04	362.313507	368.339294	361.488861	366.600616	366.600616	5562800
3	2013-01-07	365.348755	367.301056	362.929504	365.001007	365.001007	3332900
4	2013-01-08	365.393463	365.771027	359.874359	364.280701	364.280701	3373900
5	2013-01-09	363.769043	366.789398	361.945892	366.675140	366.675140	4075700
...	...	...	...	...	...	...	...
1255	2017-12-26	1058.069946	1060.119995	1050.199951	1056.739990	1056.739990	760600
1256	2017-12-27	1057.390015	1058.369995	1048.050049	1049.369995	1049.369995	1271900
1257	2017-12-28	1051.599976	1054.750000	1044.770020	1048.140015	1048.140015	837100
1258	2017-12-29	1046.719971	1049.699951	1044.900024	1046.400024	1046.400024	887500

Figure 2. Stock Price Dataset

When you want to start investing in stocks, there are several problems that are often faced, such as only fixating on one type of stock, not knowing the fundamentals, wanting to make a quick profit. A good investor will always pay attention to internal and external factors and first analyze the

performance of the company whose shares will be purchased. This is intended so that there is no loss and does not experience a continuous decline in the value of the stock price.

3.1   Google Stock Price Prediction

The technology sector is currently the largest market segment and has the potential to grow even more in the future. Today's technology pervades every aspect of life and every sector of the economy. Therefore, the growth potential of technology companies is getting bigger. Technology companies are also considered to be a very fast-moving and volatile sector. This means it is very possible to make money from the stock of a technology company like Google stock
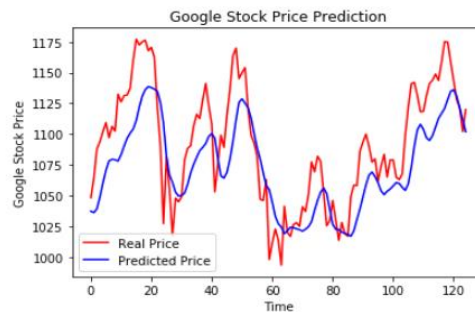

Figure 3. Google Stock Price Prediction

From the graph that has been presented through Figure 3.3, it can be seen that there are 2 colors on the graph. The red color represents the real google stock price for the current period. The blue color is Google's stock price obtained through prediction results using the long short term memory method. At this time the stock price is in the price range of $ 1050 but the resulting prediction data is $ 1048. On the 60th day, the stock price experienced a sharp decline to reach the $1000 mark and the predicted price of $1020 was not much different from the comparison between the real price and the price from the prediction that had been made. Through the predictions that have been produced, the movement of stock prices is quite significant up and down for the next few days this can happen due to fundamental factors, internal and external factors and based on current phenomena.

3.2   Tesla Stock Price Prediction

Tesla was founded in 2003, since its inception Tesla has always innovated to create something environmentally friendly such as electric cars, converting vehicle fuel from gasoline to electricity. In realizing its innovation, investors are very interested in providing an injection of funds to Tesla because the fundamental factors are very clear. This is certainly very able to maintain the stability of Tesla's stock price for a very long period of time.
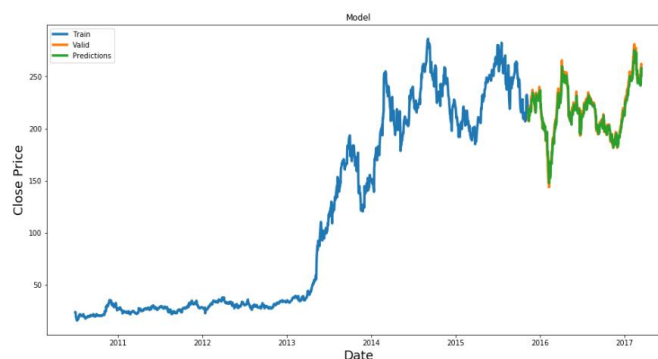

Figure 4. Tesla Stock Price Prediction Result

In Figure 4. there are 3 color graphics, namely blue, yellow and green. The blue graph is the training data used in this study as much as 80% (2011 - 2014) and testing data as much as 20% (2015

- 2017). The yellow graph is valid data for Tesla prices. The green chart is the result of the Tesla stock prediction. From the results above, it shows that, in 2015 Tesla stock prices tended to be low compared to 2016 and 2017. The resulting prediction prices are not much different from Tesla's real stock prices. If averaged, the difference is only around $3 - $15. This can be a reference or consideration for investors who want to invest some of their funds to buy Tesla shares. This study resulted in a Root Mean Square Error (RMSE) value of 1.80%, which means the prediction results are very accurate with real data.

4.   CONCLUSION

In this study, the prediction results regarding the stock prices of Google and Tesla resulted in a root mean square error of 1.80%, which means that the value is very accurate. and it is hoped that further research can be developed using other methods such as the c4.5 algorithm, KNN, support vector machine in order to produce a better level of accuracy. Long Short Term Memory (LSTM) can be used to predict stock prices for Google, Tesla and other stocks by generating a Root Mean Square Error (RMSE) value of 1.80%, which means that the prediction results are very accurate with real data and the average difference. The resulting data between real stock prices and predicted data is $3 -$15. To invest in Google and Tesla stocks, it is expected that you need to pay attention to various aspects such as the company's fundamental conditions, the amount of daily transaction volume, technical analysis that needs to be done so as not to make decisions quickly that result in mistakes in investing and causing losses.

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