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BITCOIN PRICE PREDICTION USING LSTM

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ABSTRACT

Bitcoin is a kind of Cryptocurrency and now is one of type of investment on the stock market. Stock markets are influenced by many risks of factor. And bitcoin is one kind of cryptocurrency that keep rising in recent few years, and sometimes sudden fall without knowing influence behind it on the stock market. Because it's fluctuations, there's a need and automation tool to predict bitcoin on the stock market. This research study learns how to create model prediction bitcoin stock market prediction using LSTM, LSTM (Long Short Term Memory) is another type of module provided for RNN later developed and popularized by many researchers, like RNN, the LSTM also consists of modules with recurrent consistency. The contribution of this study is providing a new forecasting framework for bitcoin price prediction can overcome and improve the problem of input variables selection in LSTM without strict assumptions of data assumption. The results revealed its possible applicability in various cryptocurrencies prediction, industry instances such as medical data or financial timeseries data. The Method that we apply on this research, also technique and tools to predict Bitcoin on stock market yahoo finance can predict the result above $ 12600 USD for next days after prediction, in the last section we make conclusions and discuss future works. The proposed methodology is then applied to train a simple Long Short Term Memory (LSTM) model to predict the bitcoin price for the upcoming 5 days. When the LSTM model is trained with a suitable data chunk, thus identified, sustainable results are found for the prediction. In the end of this paper, the work culminates with future improvements.

Keywords: Bitcoin, Cryptocurrency, RNN, LSTM.

1. INTRODUCTION

Many works have been done to predict time series, as well as BTC value. However, any deep learning models have not been much used yet to predict the BTC price value. Knowing the deep learning models become stateof-the-art neural network architecture that improves prediction accuracy in various domains including time series, we consider applications of deep learning to predict the BTC price value .In coming sections, we will explore previous works done on BTC price prediction, discuss deep learning models to predict the time series, and focus on three main articles which will serves foundation of our work .Primarily, the main challenge of bitcoin exchange rate is its high rate of price fluctuation. High price volatility implies a certain measure should be taken to predict the price of bitcoin accurately. Knowing the forecasting activity is necessary to tell about the future price of bitcoin and build trust as well as acceptance throughout the world. Influenced by a variety of factors, such as political system, public relations, and market policy of a country, can determine economical role of bitcoin and international relation of countries on different market strategies. Lastly, doesn ' t have an official road map: few key challenges and developments coming up for bitcoin prediction.

2. METHODOLOGY

LSTM (Long Short Term Memory) is a type of **recurrent neural network (RNN)** that is capable of processing sequential data, such as timeseries data. It is particularly useful for predicting time-series data because it can remember past information and use it to make predictions . LSTM has been used in the Bitcoin field 9 to predict Bitcoin prices and conduct algorithmic trading. A study proposed a novel data decomposition-based hybrid bidirectional deep-learning model to forecast the daily price change in the Bitcoin market and conduct algorithmic trading on the market. The model outperformed other benchmark models, including econometric models, machine-learning models, and deep-learning models.

3. MODELING AND ANALYSIS

Long Short-Term Memory (LSTM) models are a type of deep learning algorithm that can be used to predict cryptocurrency prices 1. The proposed methodology of training a simple LSTM model to predict the Bitcoin price for the upcoming 30 days is a common approach in cryptocurrency price prediction 1. However, it's important to note that LSTM models can be prone to overfitting, especially when dealing with limited historical data 1. Overfitting occurs

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when a model is trained too well on the training data and starts to memorize it instead of learning the underlying patterns 1. This can lead to poor performance on new, unseen data, making the model unreliable for real-world predictions 1. To avoid overfitting, it's important to use techniques such as regularization and early stopping 1. Regularization involves adding a penalty term to the loss function that the model is trying to minimize, which discourages it from fitting the training data too closely 1. Early stopping involves monitoring the performance of the model on a validation set during training and stopping the training process when the performance stops improving 1. Another way to avoid overfitting is to use more data if possible. This can help the model learn more general patterns that are less likely to be specific to the training data 1. This may not always be possible, especially in cases where there is limited historical data available. Despite these limitations, LSTM models have been shown to be effective at predicting cryptocurrency prices over longer periods of time when the market is relatively stable 12. It's important to note that no model can predict the future with 100% accuracy, and there are many factors that can influence the price of a cryptocurrency Therefore, it's always a good idea to do your own research and consult with a financial advisor before making any investment decisions.

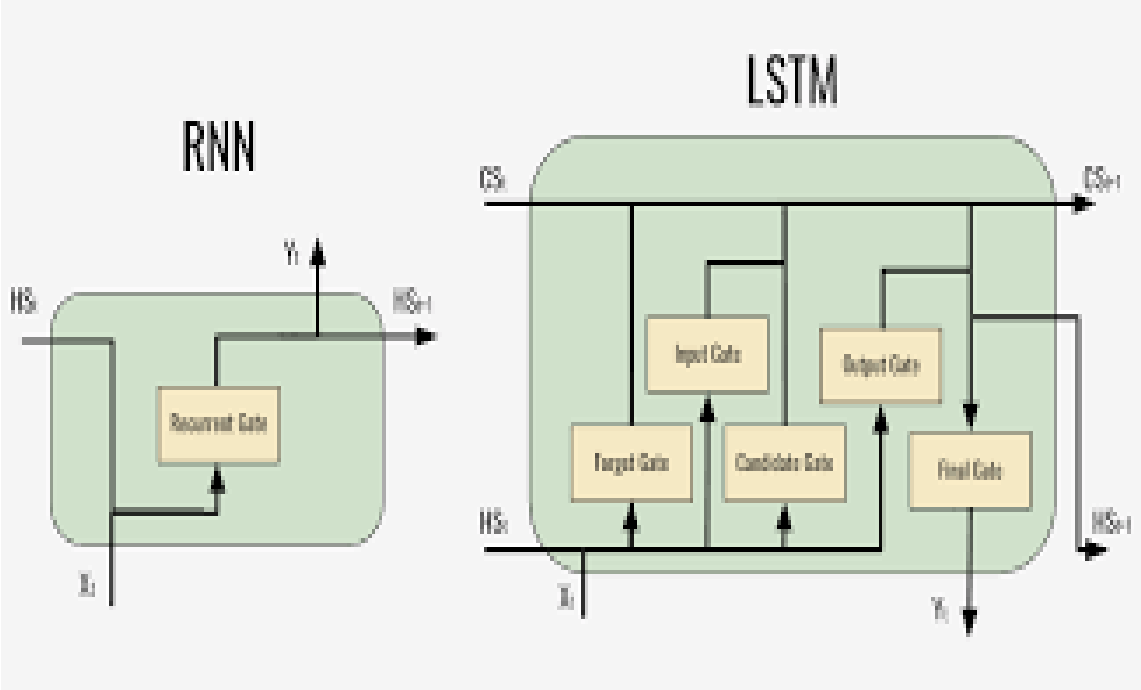

Fig 3.1 RNN AMD LSTM

4. MODEL BUILDING

An LSTM model is built using various layers such as Embedding, LSTM, Dropout, and Dense2. The number of layers and their parameters can vary based on the specific requirements of the problem at hand.Yes, building an LSTM (Long Short-Term Memory) model involves several steps and the use of various layers. LSTM model on a separate set of data that it hasn't seen during training, often referred to as the test data.This evaluation provides an unbiased estimate of how well your model has learned from the training data and its ability to generalize to new, unseen data. Common metrics used for evaluation include accuracy, precision, recall, F1 score, and area under the ROC curve (AUC-ROC) for classification problems, and mean absolute error (MAE), mean squared error (MSE), and root mean squared error (RMSE) for regression problems.Remember, a model that performs well on the training data but poorly on the test data is likely overfitting, meaning it's memorized the training data too closely and is unable to generalize well to new data. Techniques like regularization, dropout, and early stopping can help mitigate overfitting. Prediction,Once satisfactory performance is achieved on the testing data to LSTM model can be used to make predictions on new data Absolutely! Once the LSTM model has been trained and evaluated, and you're satisfied with its performance on the testing data, it can indeed be used to make predictions on new, unseen data.This is often the ultimate goal of building a machine learning model: to make accurate predictions or decisions based on data it hasn't seen before. The trained model can be saved and deployed in a variety of environments, depending on the specific use case.For example, it could be used in a production system where it receives real-time data, makes predictions, and outputs results that inform decisionmaking processes. Alternatively, it could be used in an offline setting to generate insights from a batch of collected data. The trained model can be saved and deployed in a variety of environments, depending on the specific use case. For example, it could be used in a production system where it receives real-time

data, makes predictions, and outputs results that inform decision-making processes. Alternatively, it could be used in an offline setting to generate insights from a batch of collected data. However, it's important to remember that while LSTM models can be effective, they are not 100% accurate and should not be the sole decision-making tool for investment decisions. Always consider other factors and consult with a financial advisor when making investment decisions. Also, keep in mind that the effectiveness of LSTM models can depend on the quality and quantity of the data, the specific architecture of the model, and how well the model is trained.

5. CONCLUSION

In summary, this study discusses the feasibility of the price prediction for bitcoin based on LSTM neural network scenarios. Using the variablecontrolling method to investigate the impact on price forecast accuracy of different parameters of the LSTM model. the accuracy of Bitcoin price prediction drop as larger batch sizes are given at minor epochs. The accuracy of the forecast is relevant to the number of neurons. To be specific, when changing the percentage of data for training from 70% to90%, the accuracy goes up regardless of the years of Bitcoin trading. According to the analysis, when a single time sequence input is only 7 closing prices, the prediction error increases more compared to the length of 14, 30, and 60. According to the results, when the dates for Bitcoin trading is 2 y in LSTM model training. the accuracy of the forecast is higher than the dates of 1 year, 3 years or 5 years. In this case, when establishing an LSTM model for Bitcoin price prediction now, the accuracy is higher when using closing prices from the past 2 years than from the past 1 year, 3 years, or 5 years. Nevertheless, the parameters experimented on are still limited. In the future, more parameters could be investigated, which might help find more influence on the accuracy of Bitcoin price prediction. All the findings make suggestions for the adjustment of different kinds of parameters in the establishment of the LSTM model for Bitcoin price prediction.

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