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Cryptocurrency Prediction

THE review paper of analysis of Bitcoin Price Prediction

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Abstract:

Cryptocurrency is the digital form currency that can be the future currency in the digitalized world. Our research seeks the efficient time series algorithms that can predict the crypto price however it is difficult to achieve tremendous results because of its fluctuated price volatility. We have used two deep learning time series approaches to attain the high accuracy results that can predict the cryptocurrency. We have taken the Bitcoin for this purpose and used LSTM and GRU algorithms for training our prediction model. The date from January 01, 2018 to May 3, 2025 has been taken from the famous Crypto exchange named 'Bitsmap'.

Introduction:

Crypto currency has gained the most influence in 2025 when Donald Trump launched his coin just before the US election and got more than 6 billion dollars the amount he couldn't get his entire life but in just one day he wiped out billions from the market. He went on further to regularize the cryptocurrency after he had won the elections. The world may face a paperless era of currency in the digitalized world but surely it will take some years.

That was the core reason why I chose this topic for my research and model training through machine learning techniques. Another reason could be the final year project of ours that we have taken.

Let's define what it is. Basically it is the decentralized currency means no Central bank of any county has a control on it. The transactions are made possible without any third party involvement and the transactions are protected by the Blockchain in which all the digital amount is saved.

The researcher has explored the two research papers for this aim. Both authors have given the point of view regarding which machine learning algorithm works best for predicting the price of cryptocurrency: they have tried several algorithms and after comparing the evaluation of all algorithms, they suggested which one has the tremendous accuracy for prediction. Let's discuss both research papers.

Related Work:

The research has read two reseach paper for this purpose. The is being shared with the readers.

The first paper 'Machine Learning Models Comparison for Bitcoin Price Prediction
' was published in 2018 by two authors: 'Thearasak Phaladisailoed' and 'Thanisa Numnonda' both are from the King Mongkut's Institute of Technology Ladkrabang, Thailand. They both chose to apply machine learning as well as the deep learning algorithms. They have used four algorithms, two of them were machine learning and the rest of them belonged to the deep learning. The have shown the significance of cryptocurrency and its prediction also they have made sure that the prediction also depends on the regional factors like international relations, policy making etc.

Now discuss their technical work. They applied two regression models and two deep learning models on their data which is taken from kaggle with the help of bitsmap: a website for cryptocurrency. They have fully focused on Bitcoin currency for the reason because it is so popular among all the cryptocurrencies. They argued on it that in 2017 Bitcoin account 72% of the total market of cryptocurrency and the transections were 286,419.

They have taken the datasets from 2012 to 2018 and train with 70 percent test and 30 percent train split. The regression algorithms they have used are: "Theil-Sen Regression" and "Huber Regression" similarly, deep learning algorithms are: "Long Short Term Memory (LSTM)" and "Gated Recurrent Unit(GRU)". After using all these techniques they have come to the conclusion that the deep learning algorithms are more efficient to predict the price of Bitcoin through their accuracy and time compilation. For that purpose they have used the Mean Square Error (MSE) and R-Square Error for the evaluation metrics for the evaluation and among all four algorithms, GRU has the great accuracy with MSE=0.00002 and R-squar=99.2 percent.

As far as the second paper is concerned, it has been published in 2020 named: 'Bitcoin Price Prediction and Analysis

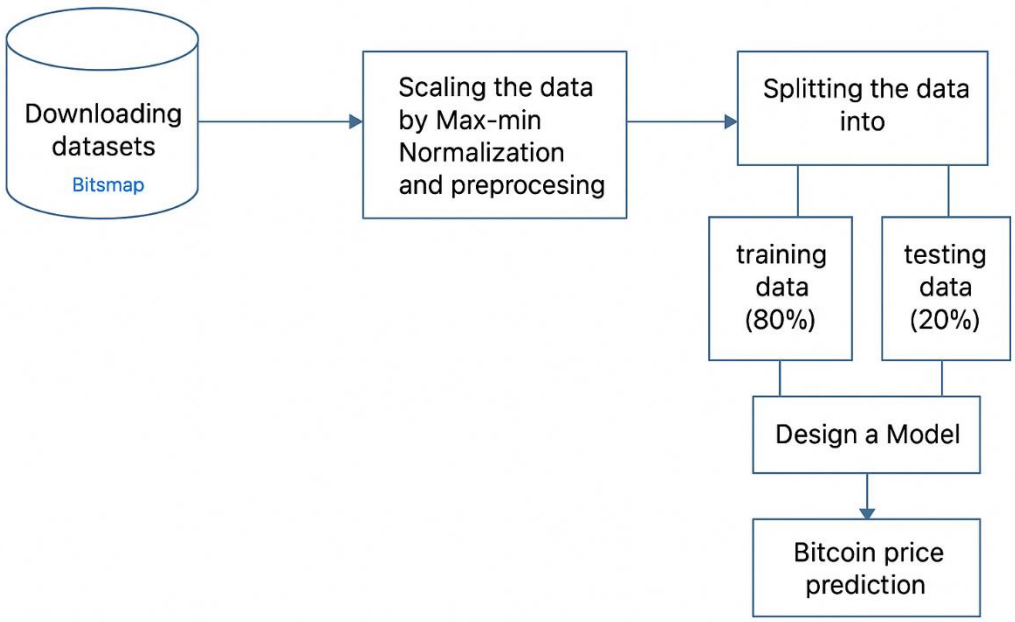
Using Deep Learning Models' written by 'Muniye Temesgen Awoke Muniye' from KIIT university, India. This research has also discussed the significance value of cryptocurrency especially for Bitcoin. He argued that in 2019, Bitcoin had the worth of 90 billion US dollar and in 2015, 100,000 technology and business companies had gone for the Bitcoin market. In 2017, 71 Billion US dollars are publicly traded through Bitcoin.

The researcher has only applied the deep learning algorithms in order to predict the prices which were LSTM and GRU as both algorithms have also used by the previous researchers. Also collected the data from kaggle from 2014 to 2018 with 80/20 ration of train test split. For the accuracy metrics, he chose Root Mean Square Error(RMSE) and Mean Absolute Percentage Error(MAPE). And at the end the researcher has shown that the GRU has the tremendous accuracy rate and less compilation time as compared to the LSTM.

Methodology:

1-Data Preprocessing

The data from 2018 to 2025 has been taken from the bitsmap: a cryptocurrency exchange platform for training the model. The min-max scaling is used to scale the data during the preprocessing and outliers have been removed using the z-score method.



Two RNN approaches have been used for the time series: LSTM and GRU

2-Long Short-Term Memory:

LSTM is a type of Recurrent Neural Network (RNN) designed to remember important information for long periods. It solves the problem of forgetting earlier data in sequences, which is common in traditional RNNs. LSTMs use special units called **gates** (input, forget, and output) to control what information should be remembered or forgotten over time. This makes them very effective for tasks like time series prediction, language modeling, and speech recognition.

3-Gated Recurrent Unit:

GRU is a simpler and faster version of LSTM. It also solves the problem of remembering long-term information in sequences but uses only two gates — **update** and **reset**. GRUs have fewer parameters than LSTMs, which often makes them more efficient to train while still providing similar performance, especially on smaller datasets.

Results:

After having the performance of both models, we sought out the GRU had the more accurate result than the LSTM. This shows the authenticity of the authors that I have read both noticed the same thing that GRU is the great for time series when you are making the model that is going to predict the price of cryptocurrency.

Comparison:

Model	Metric	Author 1	Author 2	Our Results
LSTM	MSE	0.000431		
LSTM	RMSE		0.092	0.0457
LSTM	MAPE		0.068	
LSTM	R^2 Score	0.992		0.9313
GRU	MSE	0.00002		
GRU	RMSE		0.075	0.0278
GRU	MAPE		0.065	
GRU	R^2 Score	0.992		0.9747

Chart of Our Models:

Conclusion:

Crypto is a decentralized currency that is gaining popularity day by day or it may cross to the paper currency. No third party for example Central bank or any bank has the control on the transactions. All the transactions are kept safe under the umbrella of the blockchain. Both researchers have said that the prediction of cryptocurrency is not only depends the parameters of data collection but regional factors like International Politics, International relations, current trends in social media and the policy of any country toward the cryptocurrency also influenced the prediction so make sure you keep updated all these trends while collecting and training data.

References:

1. https://www.researchgate.net/publication/345262720_Bitcoin_Price_Prediction_and_Analysis_Using_Deep_Learning_Models

2. https://www.researchgate.net/publication/328989226_Machine_Learning_Models_Comparison_for_Bitcoin_Price_Prediction