

Crypto Currency Price Prediction Using Machine Learning

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ABSTRACT

In this project, we attempt to predict the Cryptocurrency price accurately taking into consideration various parameters that affect the Bitcoin value. For the first phase of our survey, we aim to understand and identify daily trends in the Bitcoin market while gaining insight into optimal features surrounding Bitcoin price. For the second phase of our survey, using the available information, we will predict the sign of the daily price change with highest possible accuracy. Bitcoin is a crypto currency which is used worldwide for digital payment or simply for investment purposes. Bitcoin is decentralized i.e. it is not owned by anyone. Transactions made by Bitcoin exchanges". These allow people to sell/buy Bitcoins using different currencies. The largest Bitcoin exchange is Mt Gox. Bitcoins are stored in a digital wallet which is basically like a virtual bank account. The record of all the transactions, the timestamp data is stored in a place called Blockchain. Each record in a blockchain is called a block. Each block contains a pointer to a previous block of data. The data on blockchain is encrypted. During transactions the user's Sample paragraph, The entire document should be in name is not revealed, but only their wallet ID is made public. At present, the prices of these cryptocurrencies do not have a significant amount of studies and research as compared to traditional trading markets. However, the number of studies is steadily increasing as the popularity of Bitcoin is surging.

KEYWORDS: Bitcoin, Prediction, Transaction, Blockchain.

1.Introduction

Cryptocurrency is one of the most popular and valuable Digital currency in the current financial market, attracting traders for investment and thereby opening new research opportunities for researchers. Countless research works have been performed on Cryptocurrency price prediction with different machine learning prediction algorithms. For the research: relevant features are taken from the dataset having strong correlation with Bitcoin prices and random data chunks are then selected to train and test the model. The random data which has been selected for model training, may cause unfitting outcomes thus reducing the price prediction accuracy. Here, a proper method to train a prediction model is being scrutinised. The proposed methodology is then applied to train a simple Long Short Term Memory (LSTM) model to predict the bitcoin price for the upcoming 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. Instead of any direct human investments, generating profit with the help of algorithms is a common practice in the stock market. Many case studies have been performed to reach the conclusion that mathematical models warrant better results than humans. Bitcoins are an eye catching initiative in the fields of cryptography, economics, and computer sciences, as such currencies have a special character which is gained when integrating currency units with cryptographic technology. Due to the fact that cryptocurrency has a minute history, when compared to the stock market, new and unexplored territories are thus being scouted. Structurally, both the stock market and the cryptocurrency price data are having characteristics such as time series data, but high volatility is routinely present in the latter, with heavy wavering in the prices. A cryptocurrency market differs from a traditional stock market in the respect that the former has a lot of new features. It is required to apply new techniques for prediction suitable for the cryptocurrency market. Fewer studies have been conducted on cryptocurrency price prediction when compared to the stock market. In this paper, we are predicting the Bitcoin price trend using a Long Short-Term Memory (LSTM) model. Our model is aimed to predict the next five day's price of Bitcoin.

2.Existing System

The existing system fails when there are rare outcomes or predictors, as the algorithm is based on bootstrap sampling. The previous results indicate that the stock price is unpredictable when the traditional classifier is used. The existence system reported highly predictive values, by selecting an appropriate time period for their experiment to obtain highly predictive scores. The existing system does not perform well when there is a change in the operating environment. It doesn't focus on external events in the environment, like news events or social media. It exploits only one data source, thus highly biased. The existing system needs some form of input interpretation, thus need of scaling. It doesn't exploit data pre-processing techniques to remove inconsistency and incompleteness of the data. Have obtained highly accurate results on implementing their prediction Gated Recurrent Unit (GRU) model. However, their prototype has a large time complexity. Thus, complicating the expected results in this ever-changing environment. Additionally, the selected features aren't enough to predict the Bitcoin prices; as various factors like social media, policies, and laws that each country announces to deal with digital currency, can all play.

3.Proposed System

It is also important to be able to predict Bitcoin price changes. Stock market prediction has grown over decades using daily data and accessible high frequency data. However, research on how to predict Bitcoin price is still lacking. Previous studies have predicted Bitcoin price in two ways: empirical analysis and analysis of robust machine learning algorithms. Machine learning algorithms have been widely applied to make accurate predictions in many areas, including product manufacturing and finance such algorithms can be replicate for the Bitcoin market, even in the world of crypto currency. Though more methods about feature selection and measurements are leveraged, previous related works have depended on the researchers' domain knowledge and lack a comprehensive consideration of feature dimensions. The bitcoin network is a peer-to-peer payment network that operates on a cryptographic protocol. Users send and receive bitcoins, the units of currency, by broadcasting digitally signed messages to the network using bitcoin crypto currency wallet software. Transactions are recorded into a distributed, replicated public database known as the blockchain, with consensus achieved by a proof-of-work system called mining. The network requires minimal



structure to share transactions. An ad hoc decentralized network of volunteers is sufficient. Messages are broadcast on a best effort rejoin the network.

4.LITERATURE REVIEW

Cryptocurrency price prediction using machine learning (ML) is a rapidly growing area of research, driven by the need to predict the volatile behavior of digital assets like Bitcoin, Ethereum, and other altcoins. The literature on this subject encompasses various methodologies, including supervised learning, unsupervised learning, and deep learning approaches. Early studies primarily focused on time-series models, such as Autoregressive Integrated Moving Average (ARIMA) and Moving Average Convergence Divergence (MACD), which relied heavily on historical price data. However, these models were limited in capturing non-linear relationships in cryptocurrency price movements. With the advancement of machine learning, more sophisticated techniques like Support Vector Machines (SVM), Random Forests, and Artificial Neural Networks (ANNs) have been explored to model and predict cryptocurrency prices. Research has shown that ANNs, especially Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) networks, can capture temporal dependencies and better predict price trends. The incorporation of alternative data sources, such as social media sentiment analysis, news sentiment, and on-chain data (transaction volume, wallet activity), has further enhanced prediction accuracy by providing valuable external factors that influence price fluctuations. Additionally, ensemble methods and hybrid models have emerged as promising approaches, combining the strengths of various algorithms to improve prediction outcomes. Researchers have also explored the role of feature engineering, where carefully selected technical indicators and market signals are used to boost the performance of machine learning models. Despite the promising results, challenges remain, including overfitting, data scarcity, and the inherent unpredictability of cryptocurrency markets. However, the continuous evolution of machine learning techniques, coupled with the growing availability of data, offers significant potential for improving cryptocurrency price prediction models.

5.METHODOLOGY

5.1. Data Collection

- **Historical Data**: Collect data from reliable sources (like exchanges or financial APIs such as Binance, CoinMarketCap, or Yahoo Finance). This data includes Bitcoin's historical price data (open, close, high, low prices), volume, market capitalization, etc.
- Additional Data: Social media sentiment, news sentiment, macroeconomic data, and on-chain metrics (like hash rate, miner activity, wallet balances, etc.) may also be included as external features.

5.2. Preprocessing and Feature Engineering

- **Data Cleaning**: Remove outliers, handle missing values, and normalize the data (e.g., using MinMaxScaler or StandardScaler).
- **Time Series Decomposition**: Decompose the time series into its trend, seasonality, and residual components to improve prediction accuracy.
- Feature Engineering: Create technical indicators (e.g., moving averages, Bollinger Bands, RSI) that are commonly used in trading, or other features like sentiment scores from news/social media.



5.3. Model Selection

Several deep learning models can be used for Bitcoin price prediction:

• Long Short-Term Memory (LSTM): is specifically designed to capture long-term dependencies and is widely used in time series prediction tasks.

5.4. Model Training

- **Splitting Data**: Divide the dataset into training, validation, and test sets. A typical split might be 70% for training, 15% for validation, and 15% for testing.
- **Model Training**: Train the selected model on the training dataset. You can use backpropagation and gradient descent algorithms for this purpose.
- **Hyperparameter Tuning**: Tune model parameters like learning rate, number of layers, number of neurons, batch size, etc., using methods like grid search, random search, or Bayesian optimization.

5.5. Model Evaluation

- Evaluation Metrics: Common metrics include Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), and Mean Squared Error (MSE).
- Validation: Use the validation dataset to fine-tune hyperparameters and avoid overfitting.
- **Testing**: Finally, evaluate the model's performance on the test dataset to ensure generalizability.

5.6. Prediction

- Forecasting: Once the model is trained and evaluated, use it to predict future Bitcoin prices.
- **Multistep Forecasting**: If predicting for multiple future time steps, models like LSTM and GRU can be used to predict multiple days or weeks ahead.

5.7. Post-Processing

- **Inverse Transformation**: If data was scaled during preprocessing, use inverse scaling to return the predicted values to their original scale.
- Trend Adjustment: Consider adjustments based on market trends or additional external data sources if needed.



6. SYSTEM ARCHITECTURE DIAGRAM



7.Result



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8.CONCLUSION

Predicting the future will always be on the top of the list of uses for machine learning algorithms. Here in this project we have attempted to predict the prices of Bitcoins using two deep learning methodologies. This work focuses on the development of project based learning in the field of computer science engineering, by taking into account the problem definition, progression, student assessment and use of hands on activities based on use of learning algorithm to develop application. The LSTM model, implemented here, is a basic model that takes into consideration only a few features that affect the Bitcoin price. Our model is fairly accurate when predicting the future prices. However, to increase the efficiency of the model, more Bitcoin price features need to be taken into consideration. We recommend using Kaggle as the source of datasets, since information present in this website holds a high degree of authenticity. Crypto is decentralized method of virtual money. It assumes a crucial part in unrestricted economy. One of the major advantages of crypto currency is that it eradicates third party intermediary among the users. The main purpose behind this work is to predict prices of various crypto currencies present in the market, efficiently. There has been numerous research on different methods for crypto price prediction. There are many factors such as social, economic, geographical, political which effects crypto prices and makes it volatile in nature. Due to high volatility of the time series data, accuracy of crypto prediction is not good. Through the study of various research paper, it is seen that RNN based model provides best accuracy amidst the volatility and all fluctuations. To get accurate results, deep learning models are used which helps in minimizing the risk and makes predictions more stable.



9.FUTURE SCOPE

Our future work would include in-depth scrutinisation on the topic of LSTM, and deep learning at large. Such factfindings would be beneficial for forecasting the prices of cryptocurrencies with the help of LSTMs, in the future. The future scope of the proposed work is to enhance the accuracy of predictions by considering more parameters like public relations, political activity, market policy, etc. into account. Incorporation of Fuzzification is also one of the major future scopes. Future scope of this project will involve adding more parameters and factors like the financial ratios, multiple instances, etc. The more the parameters are taken into account more will be the accuracy. The system can also be applied for analyzing the contents of public comments and thus determine patterns/relationships between the customer and the corporate employee. The use of traditional algorithms and data mining techniques can also help predict the corporation's performance structure as a whole. The use of machine learning and artificial intelligence techniques to predict the prices of the stock is an increasing trend. More and more researchers invest their time every day in coming up with ways to arrive at techniques that can further improve the accuracy of the stock prediction model. Due to the vast number of options available, there can be n number of ways on how to predict the price of the stock, but all methods don't work the same way. The output varies for each technique even if the same data set is being applied. In the cited paper the stock price prediction has been carried out by using the random forest algorithm is being used to predict the price of the stock using financial ratios form the previous quarter. This is just one way of looking at the problem by approaching it using a predictive model, using the random forest to predict the future price of the stock from historical data. However, there are always other factors that influence the price of the stock, such as sentiments of the investor, public opinion about the company, news from various outlets, and even events that cause the entire stock market to fluctuate. By using the financial ratio along with a model that can effectively analyze sentiments the accuracy of the stock price prediction model can be increased.

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