

Cryptocurrency Price Prediction Deep Learning

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ABSTRACT

Cryptocurrencies are changing how we view and interact with traditional currencies, and they have become a disruptive force in the financial industry. Accurate price prediction is becoming more and more important as the bitcoin industry grows in size and complexity. This paper provides a thorough examination of deep learning models used in bitcoin price prediction. We explore the dynamic and unpredictable character of the cryptocurrency market, where price swings can happen quickly and without warning. To comprehend the present state of the art in this domain and pinpoint the shortcomings of the deep learning models in use today, we examine the body of existing literature. The data collecting and preprocessing methods used to get the bitcoin market data ready for modeling are described in the methodology section. Numerous deep learning models—Recurrent Neural Networks among them, Convolutional neural networks (CNNs) and Long Short-Term Memory (LSTM) networks are investigated. We go over hyperparameter tweaking, model training, and the assessment metrics that are used to gauge the performance of the model. We offer a thorough case study that focuses on forecasting the price of a particular cryptocurrency, like Bitcoin, in order to offer empirical insights. Our results provide light on the difficulties and possibilities involved in this project, emphasizing the need for creative solutions to address the market's uncertainties. We highlight the limitations and the necessity for additional research and innovation in the field of bitcoin price prediction as we outline the main lessons learned in the conclusion. We also discuss the consequences of using deep learning models to risk management in bitcoin investment and trading.

Keywords — Natural Language Processing, Deep Learning

I. INTRODUCTION

The financial world is going through a transformational period because to the emergence of cryptocurrencies. Bitcoin and other cryptocurrencies have upended established financial institutions and completely changed how we view and use digital assets. The necessity for precise cryptocurrency price predictions has grown in importance as these virtual currencies continue to gain popularity. Sophisticated techniques and methodologies are required to make informed judgments in the cryptocurrency market due to its inherent volatility and unpredictability, whether it is for trading, investing, or risk management.

II. LITERATURE SURVEY

Paper Name: Cryptocurrency Price Prediction using Graph Embedding and Deep Learning

Authors: Aditya Shah, Rupali. S. Kute

Description: This paper primarily focuses on the challenge of predicting the prices of cryptocurrencies, with a particular emphasis on Bitcoin. Cryptocurrency prices are known for their complexity and volatility, making accurate predictions a crucial aspect for investors and traders.

To tackle this challenge, the authors employ advanced deep learning techniques, including Long Short-Term Memory (LSTM), Gated Recurrent Unit (GRU), and a hybrid model that combines LSTM and GRU. These deep learning models are to make predictions about cryptocurrency prices.

One distinctive feature of this paper is the incorporation of graph embedding using Neo4j sandbox. Graph embedding is a technique that helps capture relationships and connections between various data points. In this case, it is used to analyze the interconnections between different cryptocurrencies and other relevant factors.

The authors experiment with different dimensions of graph embedding to improve prediction accuracy. To

evaluate the performance of their models, they use standard metrics such as Root Mean Square Error (RMSE), Mean Squared Error (MSE), and Mean Absolute Error (MAE).

The research was presented at the "4th International Conference on Advances in Computing, Communication Control and Networking (ICAC3N)" in 2022, which indicates its used contribution to the field of computational and communication technologies. The inclusion of graph embedding as a technique for predicting cryptocurrency prices sets this paper apart and showcases innovative methods for improving prediction accuracy in the cryptocurrency market.

Paper Name: Cryptocurrency Trading Agent Using Deep Reinforcement Learning

Authors: Uwais Suliman, Terence L. van Zyl, Andrew Paskaramoorthy

Description: This paper addresses the challenge of trading cryptocurrencies to maximize short-term profits. Cryptocurrency markets are known for their volatility, making it a complex task to make profitable trading decisions.

To tackle this challenge, the authors propose a trading agent based on Deep Reinforcement Learning (DRL). Specifically, they employ a technique called Duelling Deep Q-Networks (DQN), which is a type of neural network architecture designed for making sequential decisions in environments with complex and uncertain dynamics.

The environment is designed to simulate real trading behavior, taking into account both historical price movements and real-time price data. This enables the agent to learn from both past data and current market conditions to make trading decisions.

The authors evaluate the performance of their proposed algorithm by testing it on three major cryptocurrencies: Bitcoin, Ethereum, and Litecoin. To assess the effectiveness of the trading agent, they compare its performance against a buy-and-hold benchmark strategy. Interestingly, the authors find that the buy-and-hold strategy outperforms the

results produced by the Duelling DQN agent, indicating the complexity of designing effective trading agents for cryptocurrency markets.

This research was presented at the "9th International Conference on Soft Computing & Machine Intelligence (ISCMI)" in 2022, demonstrating its contribution to the field of soft computing and machine intelligence, particularly in the context of cryptocurrency trading.

In summary, this paper presents an innovative approach using Deep Reinforcement Learning to address the challenge of cryptocurrency trading, providing valuable insights into the complexities of designing trading agents in highly volatile markets.

Paper Name: Comparison of Machine Learning Methods for Cryptocurrency Price Prediction

Authors: Atieh Armin, Ali Shiri, Behnam Bahrak

Description: This research paper focuses on the challenging task of predicting cryptocurrency prices, particularly those of Bitcoin, Ethereum, and Binance Coin. Cryptocurrencies are known for their extreme price volatility, making accurate prediction models essential for investors and traders.

The paper compares various machine learning methods to find an efficient and accurate model for predicting cryptocurrency prices. Among the methods considered are Ridge regression, Recurrent Neural Networks (RNNs), and Long Short-Term Memory (LSTM) networks.

One of the notable findings of this study is that the Ridge regression model outperforms more complex prediction models such as RNNs and LSTM in predicting the exact closing price of cryptocurrencies. Ridge regression is a linear regression technique that adds regularization to the model, preventing overfitting and improving predictive accuracy.

However, the study also highlights that LSTM, a deep learning model, outperforms other methods in terms of anticipating the direction of cryptocurrency price movements. While it may not provide the exact closing price, LSTM is better at capturing the general trend or direction in which the price is moving.

This paper was presented at the "8th Iranian Conference on Signal Processing and Intelligent Systems (ICSPIS)" in 2022, showcasing its contribution to the field of signal processing and intelligent systems, specifically in the context of cryptocurrency price prediction.

In summary, this paper emphasizes the importance of choosing the right model for different aspects of cryptocurrency price prediction, demonstrating that simpler models like Ridge regression can excel in certain aspects, while deep learning models like LSTM offer strengths in other prediction tasks.

Paper Name: Investigation of Ethereum Price Trends using Machine learning and Deep Learning Algorithms

Authors: Dronavalli Krishna Tejaswi, Himanshi Chauhan

Description: This research paper is dedicated to assessing and forecasting the price trends and volatility of the cryptocurrency Ethereum (ETH). Ethereum is one of the major cryptocurrencies, and predicting its price movements is of great interest to investors and traders.

The research spans a duration of almost six years, covering the period from August 2015 to December 2021, which amounts to 2,315 days of historical price data. To achieve the goal of forecasting Ethereum price trends, the authors employ a range of machine learning and deep learning algorithms.

In particular, the paper focuses on the use of four machine learning algorithms and three deep learning techniques for the time series analysis of Ethereum prices. These algorithms include LSTM (Long Short-Term Memory), which is a type of recurrent neural network (RNN) known for its effectiveness in handling sequential data.

The results of the study reveal that, in terms of commonly used evaluation metrics like Root Mean Square Error (RMSE), Mean Absolute Error (MAE), Mean Squared Error (MSE), and R-squared (R²) score, the deep learning technique LSTM demonstrated

superior prediction accuracy when compared to other machine learning methods.

This paper was presented at the "2nd International Conference on Intelligent Technologies (CONIT)" in 2022, showcasing its contribution to the field of intelligent technologies, particularly in the context of cryptocurrency price prediction.

In summary, this paper focuses on the specific cryptocurrency Ethereum and demonstrates the effectiveness of LSTM, a deep learning technique, in forecasting its price trends over a substantial historical dataset.

Paper Name: Cryptocurrency Price Prediction Using Neural Networks and Deep Learning

Authors: Sumit Biswas, Mohandas Pawar, Sachin Badole

Description: This paper addresses the need for reliable cryptocurrency price predictions due to the wide price range and volatility of digital currencies. The authors propose a new approach to predict the value of cryptocurrencies by considering various variables, such as stock market capitalization, trading volume, distribution, and high-end delivery.

The paper utilizes neural networks and deep learning techniques to make these predictions. In particular, it mentions the use of active LSTM networks, which are a type of recurrent neural network (RNN), and an overview of long-term organizations.

The proposed technique is applied to benchmark datasets, allowing the authors to assess the effectiveness of their approach in predicting cryptocurrency prices.

While the description provided does not go into specific results or metrics, the paper demonstrates the application of deep learning techniques for cryptocurrency price prediction, showcasing their potential to improve the accuracy of predictions in the cryptocurrency market.

This paper was presented at the "7th International Conference on Advanced Computing and Communication Systems (ICACCS)" in 2021,

contributing to the field of advanced computing and communication systems, with a specific focus on cryptocurrency price prediction.

III. EXISTING SYSTEM

The existing system for cryptocurrency price prediction relies on machine learning, particularly employing instance-level approaches with deep neural networks. It is designed to transform separated instances, likely referring to individual data points or historical price data, into an embedding space. However, the information provided about the existing system is somewhat vague and does not elaborate on the specific machine learning models, methods, or data sources used. It suggests that the current approaches may have limitations in their efficiency and effectiveness for predicting cryptocurrency prices. Though there aren't many specifics, the technology appears to be focused on personality prediction. It suggests a concentration on instance-level methods for classification tasks utilizing deep neural networks. The current system's finding raises the possibility that well-liked machine learning methods—particularly those utilizing neural networks—may not be adequately tackling the difficulties associated with predicting bitcoin prices.

IV. CONCLUSION

In conclusion, it appears that the current system uses machine learning—more especially, deep neural networks—to predict cryptocurrency prices. However, this suggests that other, more efficient methods are needed to improve prediction accuracy and efficiency in the erratic cryptocurrency market.

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