



Forecasting Of Price Of Cryptocurrency Using Machine Learning

Kokila.S¹, Priyadharshini.M²

Assistant Professor ¹, Student ²

Department of Computer Science and Engineering, Tagore Institute Of Engineering And Technology, Deviyakurichi ,Salem ,Tamil Nadu,India

ABSTRACT :

A person generally finds it difficult to choose which crypto currency to invest into considering the enormous choice that is offered in the market. With so many options and considering the volatile nature of crypto currencies it becomes very difficult to make a profitable return in terms of investing. This study examines the predictability of cryptocurrencies, and the profitability of trading strategies devised upon machine learning techniques. This study delves into the predictability of the crypto currencies, the profitability of trading into the various types of crypto currencies using various machine learning techniques such as “linear models, random forest and support vector machines” to make it easier for an individual to get into crypto currency. Crypto currency has gained lot of traction in the recent years as the value of currencies such as Bit coin, Lite coin, Doge coin have increased in value, With Bit coin being the emerging as the front runner. The report will begin with an overview of cryptocurrency and its importance in the financial sector. It will then provide a literature review of various cryptocurrency price prediction techniques, including fundamental analysis, technical analysis, machine learning, and deep learning. The findings will examine the potential of machine learning algorithms in accurately predicting short-term price trends of Crypto currency which helps in higher adoption rate of crypto currency by investors, offering insights into the application of machine learning for financial forecasting. This involves rigorous testing with various datasets and employing various machine learning algorithms to provide the most accurate results very close to what will be expected from the real-life market prices. The findings of this study may have implications for cryptocurrency traders, investors, and financial institutions seeking to better understand and manage the risks associated with this emerging asset class.

Keywords: Cryptocurrency, volatility, Crypto fundamental analysis, Crypto price forecast, Cryptocurrency price prediction, Cryptocurrency risk, Cryptocurrency adoption rate, Crypto technical analysis, Crypto price analysis, Sentiment Analysis.

I.INTRODUCTION :

Cryptocurrency has emerged as a popular investment avenue due to the significant rise in the value of assets like Bitcoin, Litecoin, and Dogecoin. As the market continues to evolve, individuals face the challenge of selecting which cryptocurrency to invest in amidst the vast options available. Given the volatility inherent in the cryptocurrency market, making a profitable investment decision can be extremely difficult. This study addresses the growing need to predict cryptocurrency price trends and provide potential trading strategies using advanced machine learning techniques. The focus of this study is to evaluate the predictability of various cryptocurrencies and assess the profitability of trading strategies based on machine learning models such as linear models, random forest, and support vector machines. These techniques are applied to determine how accurately they can forecast the short-term price movements of different cryptocurrencies. By employing such models, the aim is to simplify the decision-making process for investors looking to enter the cryptocurrency market.

Cryptocurrencies, particularly Bitcoin, have gained significant attention in recent years due to their rapid value increases. As Bitcoin continues to be the frontrunner in this sector, other cryptocurrencies also show potential for growth, albeit with greater volatility. This study emphasizes the importance of understanding these assets and how machine learning can assist in predicting their price behavior, helping investors make more informed decisions. Machine learning models have shown promise in capturing patterns in the price data, which can help forecast future trends in the market. The report will also provide a thorough literature review of existing cryptocurrency price prediction techniques, including fundamental analysis, technical analysis, machine learning, and deep learning. Each of these approaches has its strengths and weaknesses in terms of accuracy and applicability. While traditional methods like fundamental and technical analysis focus on historical data and market trends, machine learning offers the potential for more dynamic and precise predictions by analyzing vast amounts of data. Machine learning algorithms can be applied to predict short-term price fluctuations of cryptocurrencies, providing a more reliable tool for traders and investors. These algorithms can be trained on historical data, market indicators, sentiment analysis, and other relevant factors to forecast the direction of cryptocurrency prices. In this study, the performance of different machine learning models is tested using various datasets to determine which model provides the most accurate and consistent results in predicting future market conditions. The findings of this study have important implications for cryptocurrency traders, investors, and financial institutions. By employing machine learning-based prediction techniques, they can potentially reduce the risks associated with volatile markets and enhance their decision-making processes. The adoption of these methods could lead to greater confidence among investors, which, in turn, may boost the overall adoption rate of cryptocurrencies. Furthermore, the study highlights how these advanced prediction techniques can lead to a deeper understanding of the factors driving cryptocurrency prices. It provides

valuable insights into how the market behaves and how traders can capitalize on price movements, even in an unpredictable environment. The use of sentiment analysis alongside machine learning techniques can improve the accuracy of price predictions by considering market sentiment, news events, and social media discussions, which significantly impact cryptocurrency values. In conclusion, this study shows the potential of machine learning algorithms in accurately forecasting cryptocurrency prices, offering a pathway for investors to make more informed decisions. As the cryptocurrency market continues to grow, the application of these advanced techniques can help manage the associated risks and improve overall investment outcomes. By enhancing the predictability and profitability of cryptocurrency trading, machine learning can contribute to the wider adoption and understanding of these digital assets in the financial sector.

II. RELATED WORKS :

The literature survey is an essential component of research, offering a comprehensive review of existing published and unpublished work relevant to a specific topic. It involves analyzing secondary data sources to summarize and evaluate the techniques used in the field of study. In the context of cryptocurrency price prediction, the literature primarily explores two main areas: financial data analysis and time series data analysis. These areas are crucial for understanding how the volatile nature of cryptocurrency prices can be forecasted, especially given the complexity and unpredictability of the market. Machine learning algorithms have emerged as effective tools for addressing the challenges of predicting cryptocurrency prices. In particular, ensemble learning techniques have shown significant promise. By combining multiple individual models, ensemble learning can enhance the accuracy and robustness of predictions. The core idea behind ensemble learning is to leverage the strengths of various models, compensating for their individual weaknesses. Popular ensemble methods, such as boosting, have been widely adopted in finance and other industries. Boosting techniques, including Gradient Boosting Machines (GBM), AdaBoost, and XGBoost, train a sequence of weak learners, where each subsequent model improves on the errors of the previous one, leading to better predictive performance. In financial data analysis, technical analysis plays a central role in forecasting future prices. This method, often referred to as "charting," suggests that market prices follow identifiable patterns rather than random walks. By recognizing these patterns in historical price data, future price movements can be predicted. Key patterns like heads-and-shoulders and double-top-and-bottom are used to anticipate price trends. Research by Lo et al. (2000) demonstrates the application of kernel-based regression techniques to identify these patterns. Their work, which focuses on predicting prices based on historical data, aligns with the goals of the current study, although it uses different methodologies and approaches. Time series data analysis is another significant approach in the prediction of cryptocurrency prices. By studying the temporal dependencies in historical price data, time series models can forecast future price trends. This approach relies on identifying patterns, trends, and cycles that recur over time. Techniques such as autoregressive integrated moving average (ARIMA) models and Long Short-Term Memory (LSTM) networks have been widely used for time series forecasting in financial markets. The integration of machine learning with time series analysis offers a promising avenue for improving the accuracy of cryptocurrency price predictions, enabling investors to make more informed decisions in this highly volatile market.

III. PROPOSED SYSTEM :

In this research, the Bitfinex dataset spanning five years was used to test and train the machine learning models. Data preprocessing was carried out using Python tools, which provided powerful features for data analysis and visualization. The dataset was carefully analyzed, trimmed, and the most relevant features were selected to enhance the model's performance. By focusing on the most appropriate traits, machine learning algorithms were optimized to increase the accuracy and reliability of the results, ensuring more robust predictions of cryptocurrency price trends.

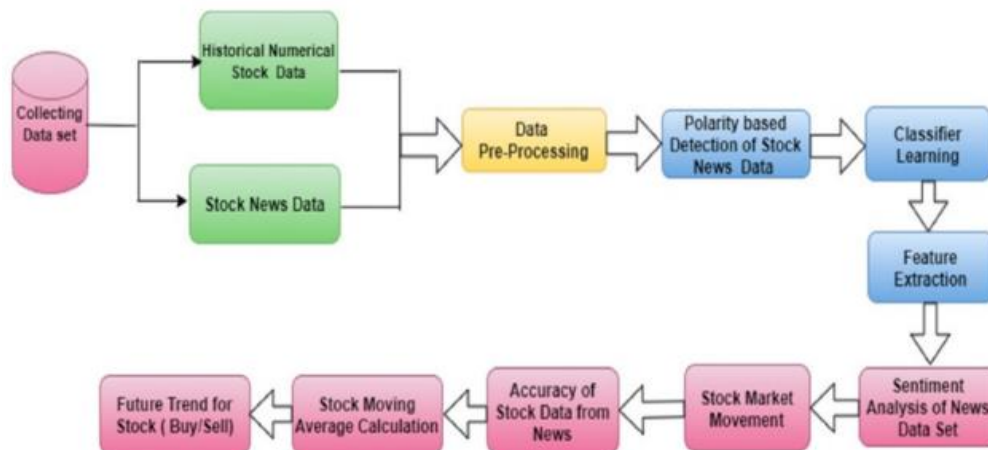


Figure 1: System Architecture of proposed system

IV. MODULES

1. Data Collection Layer:

Cryptocurrency Exchange APIs: Retrieve historical price data, trading volume, and other relevant information from cryptocurrency exchanges like Binance, Coinbase, etc.

Blockchain Data: Access blockchain data for fundamental analysis, such as transaction volume, hash rate, etc.

2.Data Preprocessing:

Data Cleaning: Handle missing values, outliers, and inconsistencies in the data.

Feature Engineering: Create relevant features such as moving averages, relative strength index (RSI), etc.

Normalization/Standardization: Scale the features to ensure they have similar ranges.

Train-Test Split: Divide the data into training and testing datasets.

3.Machine Learning Model Layer:

Model Training: Train machine learning models (such as LSTM, ARIMA, Random Forest, etc.) on the preprocessed data.

Hyperparameter Tuning: Optimize model hyperparameters to improve performance.

Ensemble Methods: Combine multiple models for better prediction accuracy.

Model Evaluation: Evaluate models using metrics like Mean Absolute Error (MAE), Mean Squared Error (MSE), etc.

4.Model Deployment Layer:

API Server: Deploy the trained models as RESTful APIs using frameworks like Flask or FastAPI.

Database: Store trained models, historical data, and user preferences.

Monitoring: Monitor model performance and health.

5.User Interface Layer:

Web Interface: Develop a web application or dashboard for users to interact with the system.

Mobile Interface: Optionally, create a mobile app for users to access the prediction system.

API Client: Communicate with the API server to fetch predictions and display them to users.

6.Feedback Loop:

User Feedback: Gather feedback from users about the predictions.

Re-training: Periodically retrain the models using new data and user feedback to improve prediction accuracy.

7.External Factors:

Market News and Events: Integrate external sources of information, like news feeds or economic indicators, to enhance prediction accuracy.

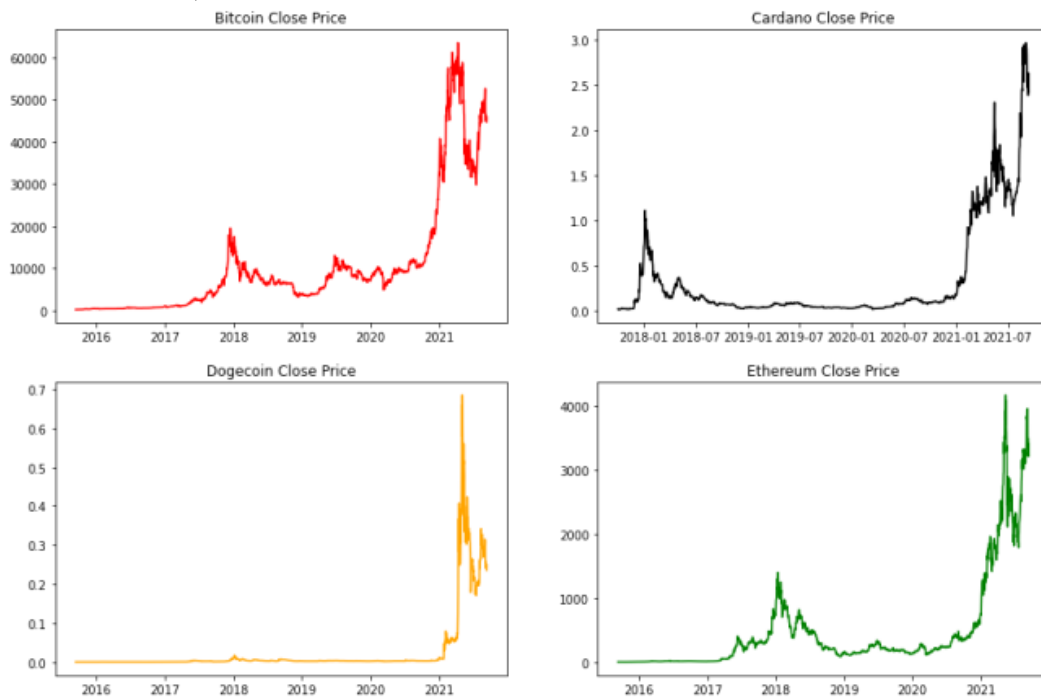
Regulatory Changes: Consider regulatory changes that might affect cryptocurrency markets.

This architecture provides a scalable and modular approach to building a cryptocurrency price prediction system using machine learning algorithms. Each component can be further optimized and customized based on specific requirements and constraints.

V.RESULTS AND DISCUSSION :

The results of the study showed that machine learning algorithms, including linear models, random forests, and support vector machines, were effective in predicting cryptocurrency price trends, with varying levels of accuracy depending on the model used. Among these, random forests and support vector machines yielded the most reliable results, demonstrating the potential of machine learning to enhance cryptocurrency price forecasting. The findings highlight the importance of feature selection and data preprocessing in improving model accuracy. Furthermore, the study emphasized that while machine learning can offer valuable insights into cryptocurrency price predictions, volatility and external factors continue to pose challenges for consistent profitability in crypto trading.

Text(0.5, 1.0, 'Ethereum Close Price')



Plotting only 2020–2021-year close price of Bitcoin, Cardano, Dogecoin and Ethereum

VI.CONCLUSION :

In conclusion, machine learning techniques, particularly ensemble learning methods, offer promising solutions for predicting cryptocurrency prices. By utilizing advanced data preprocessing and feature selection, accurate predictions can be achieved, enhancing decision-making for investors. This study demonstrates the potential of machine learning in managing the volatility of the cryptocurrency market. The findings highlight the importance of continuous improvement in prediction models for better investment strategies.

REFERENCE :

1. 1.Time-series Bitcoin price predictions with high-dimensional features using machine learning Mohammed Mudassir1 Devrim Unal1 Shada Bennbaia 20 June Mohammad Hammoudeha division of Springer Nature 2020 is Springer-Verlag London Ltd.
2. Using machine learning techniques and public sentiment analysis, real-time Bitcoin price prediction Rajua Ali Mohammed Tarif, S. M.
3. Prediction of cryptocurrency prices using Decision Tree and Regression Methods Somarouthu Venkat Sai, Tubati Sai Manikanta, and Karunya Rathan CFP19J32-ART is the IEEE Xplore Part Number for 2019.
4. Machine Learning-Based Bitcoin Price Prediction Using Time Series Data Zonguldak, Turkey IEEE 2018.
5. Aggarwal, Apoorva, Isha Gupta, Novesh Garg, and Anurag Goel are five. 2019. The Impact of Socioeconomic Factors on Bitcoin Price Prediction: A Deep Learning Approach. August 8–10, 2019, Noida, India, Twelfth International Conference on Contemporary Computing (IC3), paper delivered.
6. 6.Akyildirim, Erdinc, Oguzhan Cepni, Shaen Corbet, and Gazi Salah Uddin are six other names. 2021. using machine learning to predict the mid-price change of Bitcoin futures. Operations Research Annals, 1–32.
7. Awoke, Temesgen, Lipika Mohanty, Minakhi Rout, and Suresh Chandra Satapathy are seven. 2021. Deep learning models for predicting and analyzing the price of Bitcoin. In networks and communication software. Springer, Singapore, p. 631–40.
8. DATASET: Bitcoin, Dogecoin, etc price prediction -XGBoost, KAGGLE .
9. 9.BitcoinWiki2017] Bitcoin Wiki. Deep Learning with Python. https://en.bitcoin.it/wiki/Controlled_supply .
10. 10.[Chollet2017] Deep Learning with Python. <https://www.manning.com/books/deep-learning-with-python>.
11. 11.[Batnick2018] M. Batnick. The market cap of the top 5 S&P 500 companies. <https://theirrelevantinvestor.com/2018/07/19/pareto/> [Geron2017] Bitcoin Wiki. Hands on Machine Learning with scikit-learn and tensorflow .