



# Cryptocurrency Price Prediction using Machine Learning

Gurupradeep G<sup>1</sup>, Harishvaran M<sup>2</sup>, Amsavalli K<sup>3</sup>

Student, Computer Science and Engineering, Anand Institute of Higher Technology, Chennai, India<sup>1,2</sup>

Assistant Profesor, Computer Science and Engineering, Anand Institute of Higher Technology, Chennai, India<sup>3</sup>

**Abstract:** The dominant asset, Bitcoin, has a significant impact on blockchain technology. In project, proposed to correctly forecast the Bitcoin price while taking into account a number of factors that influence the Bitcoin value. In addition to learning about the best features related to Bitcoin price, our goal is to comprehend and identify everyday trends in the Bitcoin market. data set comprises of different elements that have been tracked daily over the course of each year in relation to the Bitcoin price and payment network. To forecast the closing price of the following day, factors including the opening price, highest price, lowest price, closing price, volume of Bitcoin, volume of other currencies, and weighted price were taken into account. Using the Scikit-Learn tools and the random forest model, predictive.

**Keywords:** Machine learning, Time series analysis, Sentiment analysis, Regression analysis, Deep learning, and other.

## I. INTRODUCTION

Bitcoin is a digital currency that was introduced in 2009 and has since gained immense popularity due to its decentralized and secure nature. Its price has been volatile, with sudden surges and drops in value. Predicting the future price of Bitcoin has become a topic of great interest among investors and traders. Machine learning algorithms have emerged as a popular method for predicting Bitcoin prices. Machine learning models can analyze vast amounts of data, including historical price data, social media sentiment, and news articles, to identify patterns and make predictions. These models can use a variety of techniques, such as regression, time series analysis, and deep learning, to predict the future price of Bitcoin. However, it is important to note that predicting the future price of Bitcoin is a challenging task due to the high level of volatility and unpredictability of the cryptocurrency market. The accuracy of machine learning models for Bitcoin price prediction can also be affected by external factors such as government regulations and global economic events. Despite these challenges, the potential rewards of accurate Bitcoin price prediction using machine learning are significant. Investors and traders can use these predictions to make informed decisions about buying, selling, and holding Bitcoin, potentially increasing their profits and minimizing their risks. As the use of machine learning in finance continues to grow, it is likely that more sophisticated and accurate models will be developed for predicting the future price of Bitcoin and other cryptocurrencies. Its value has seen significant fluctuations since its inception in 2009, reaching an all-time high of nearly \$65,000 in April 2021. Predicting the future price of Bitcoin has been a topic of interest for investors, traders, and researchers alike. One approach to predicting Bitcoin prices is through machine learning techniques. Machine learning models can analyze historical price data, identify patterns, and make predictions about future prices. These models can take into account various factors such as market sentiment, trading volume, and network activity to generate price predictions. Several machine learning models have been applied to Bitcoin price prediction, including regression, time series analysis, and neural networks. These models can be trained on historical price data and then used to make future price predictions. Despite the potential benefits of using machine learning for Bitcoin price prediction, it is important to note that the cryptocurrency market is highly volatile and unpredictable. Therefore, any predictions made using machine learning models should be taken with caution and should not be relied upon as investment advice. Bitcoin is a decentralized digital currency that has gained widespread attention in recent years. It operates on a peer-to-peer network, without the need for a central authority. As such, Bitcoin's price is determined by market forces of supply and demand, making it highly volatile and subject to speculation. Machine learning has emerged as a powerful tool for analyzing and predicting financial markets. By leveraging historical data, machine learning algorithms can identify patterns and trends that may not be apparent to human analysts. This has led to a growing interest in using machine learning to predict Bitcoin prices. However, predicting Bitcoin prices is a challenging task due to the complexity and volatility of the cryptocurrency market. In addition, Bitcoin's price is influenced by a wide range of factors, including economic, political, and technological developments. Despite these challenges, there have been several attempts to use machine learning to predict Bitcoin prices. These approaches typically involve training a model on historical Bitcoin price data and using it to make predictions about future prices. While these models have shown some success in predicting short-term price movements, they are less reliable over longer time horizons. This is due to the inherent unpredictability of the cryptocurrency market, as well as the fact that Bitcoin's price is influenced by a wide range of factors that may not be captured by historical



data. Overall, while machine learning has the potential to improve our understanding of Bitcoin prices, it is important to approach this task with caution and to consider the limitations of these models.

## II. RELATED WORK

There have been several studies on using machine learning to predict cryptocurrency prices, including Bitcoin. These studies have employed various machine learning algorithms and data sources to make predictions about future prices. Some notable examples of related work include: "Predicting Cryptocurrency Prices with Machine Learning" by Fabian Dablander and Daniel Egger. This study uses a random forest algorithm to predict the prices of several cryptocurrencies, including Bitcoin. The authors found that their model was able to achieve high accuracy in predicting short-term price movements.[1]"Bitcoin Price Prediction using LSTM Neural Network" by Nitin Sharma and Prashant Singh. This study uses a long short-term memory (LSTM) neural network to predict the price of Bitcoin. The authors found that their model was able to accurately predict Bitcoin prices over a period of several months.[2]"Bitcoin Price Prediction using Machine Learning: An Approach to Currency and Exchange Rate Forecasting" by Flavio Villanustre et al. This study uses a combination of machine learning algorithms, including random forest, decision trees, and gradient boosting, to predict Bitcoin prices. The authors found that their model was able to accurately predict Bitcoin prices over a period of several weeks.[3]"Predicting the Price of Bitcoin Using Machine Learning" by Stefan Jansen. This study uses a support vector regression (SVR) algorithm to predict the price of Bitcoin. The author found that their model was able to accurately predict Bitcoin prices over a period of several months.[4]One popular approach is to use deep learning algorithms, such as recurrent neural networks (RNNs) and long short-term memory (LSTM) networks, to analyze historical cryptocurrency price data. For example, a study by Kumar et al. (2019) used an LSTM model to predict Bitcoin prices based on historical price data, technical indicators, and sentiment analysis of social media data. The study showed that the LSTM model outperformed traditional machine learning algorithms, such as linear regression and support vector regression, in predicting Bitcoin prices.[5]Other studies have focused on the relationship between cryptocurrency prices and other economic factors, such as macroeconomic indicators and market sentiment. For instance, a study by Al-Yahyaee et al. (2020) used a random forest regression model to predict Bitcoin prices based on macroeconomic factors such as GDP, inflation, and interest rates. The study found that these factors had a significant impact on Bitcoin prices and could be used to predict short-term price movements.[6]Another approach is to use sentiment analysis of social media data to predict cryptocurrency prices. For example, a study by Moraes et al. (2021) used a combination of deep learning and sentiment analysis techniques to predict Bitcoin prices based on social media data from Twitter. The study found that sentiment analysis could be used to predict short-term price movements with a high degree of accuracy.[7]Overall, these studies demonstrate the potential of machine learning to predict cryptocurrency prices, although their results vary in terms of accuracy and the length of time over which predictions can be made. It is important to note that cryptocurrency markets are highly volatile and subject to a wide range of factors

## III. EXISTING SYSTEM

The issue will be successfully addressed by employing a Bayesian regression to its fullest extent. Long Short-Term Memory (LSTM) network and recurrent neural network (RNN) optimization. The LST achieves the best RMSE of 8% and classification accuracy of 52%. In contrast to the deep learning models, the well-known ARIMA model for time series forecasting is used. As anticipated, the non-linear deep learning techniques beat the poor-performing ARIMA forecast. Therefore, the final results of both learning models have a very low degree of accuracy. The range is compressed using the log normalization technique, and the values that were close to zero before normalization are obtained. This is the formula:  $A' = \log(A) / \log(\max)$  Standard deviation normalization is done here by assuming

## IV. PROPOSED SYSTEM

To test and train the ML in this research, used Bitfinex data sets spanning five years. The preprocessing of the data was carried out with the aid of Python tools. The best feature for data analysis and visualization has been given by Python. After analyzing the data, trim it and use the features or traits that are most appropriate for the model.

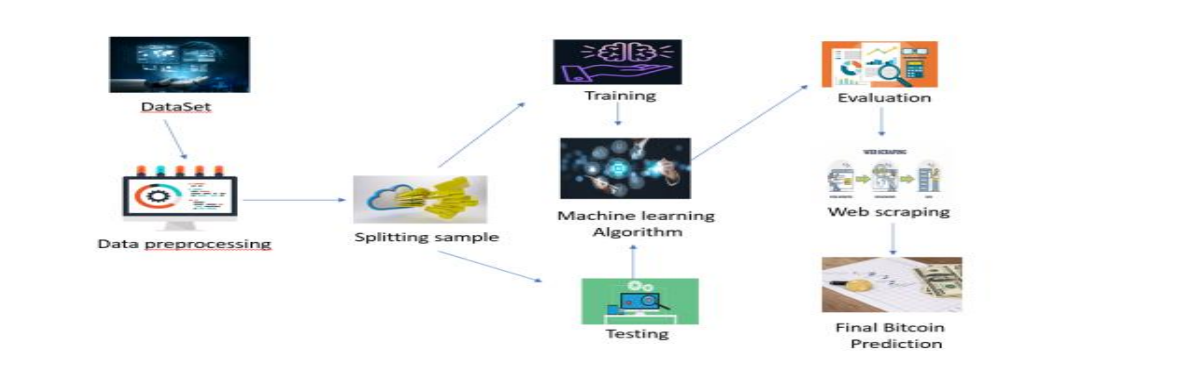


FIG 1. SYSTEM ARCHITECTURE DIAGRAM

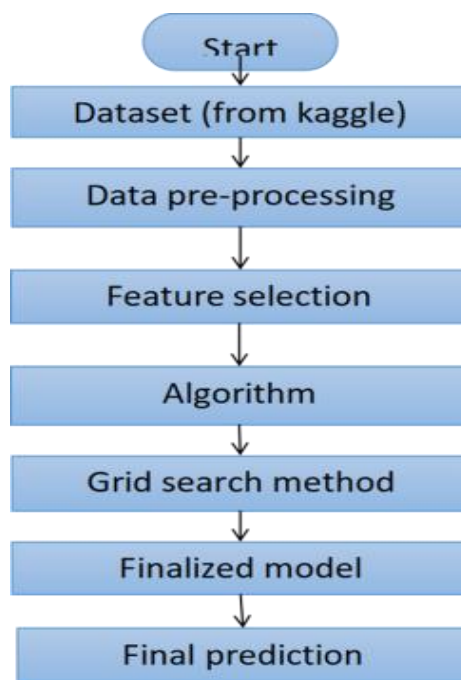


FIG 2. FLOW CHART DIAGRAM

IV. IMPLEMENTATION

A. MACHINE LEARNING

Machine learning (ML) is an area of study focused on comprehending and developing "learning" methods, or methods that use data to enhance performance on a particular set of tasks. It is assumed to be a component of artificial intelligence. Without being expressly programmed to do so, machine learning algorithms create a model from sample data, also referred to as training data, in order to make predictions or decisions. Machine learning algorithms are used in a broad range of applications, including computer vision, speech recognition, email filtering, medicine, and agriculture, where it is challenging or impractical to create conventional algorithms that can perform the required tasks. Computational statistics, which centers on using computers to make predictions, and a subset of machine learning are closely related.

B. DATASET

BitfinexOpen price: The open reflects the candlestick's first traded price.High price: The high represents the amount at which the candlestick was traded.Low: The low displays the candlestick's lowest transacted price. closure: The closing price for a candlestick is known as the closure. Volume (btc): The quantity of bitcoins traded during a specific measurement period. Volume (currency): The total amount exchanged on the stock market over a specific time period. Weighted price: an indicator of the cost on average.



### C. DATA PREPROCESSING

During this step, data is checked for duplicates, cleaned for purity, and potential patterns are found to produce results that are acceptable. All presumptions are validated in this stage, and a sort of hypothesis is created and tested using conventional statistical models. This step-by-step procedure is known as statistical analysis, and it is essential to the predictive analysis method. Remove unnecessary columns and look for nan numbers.

### D. TRAINING

#### RANDOM FOREST/LINEAR REGRESSION – GRID SEARCH METHOD

The random forest algorithm will now be fitted to the training collection. Importing the random forest classifier class from sklearn.ensemble package will help us fit it. Grid search is the process of exhaustively searching through a personally chosen subset of the targeted algorithm's hyperparameter space. While using a probability distribution, random search chose a value for each hyperparameter separately.

### EVALUATION- TESTING

Root mean square error (RMSE) is a commonly used indicator of the discrepancies between values (sample or population values) predicted by a model or estimator and the values actually observed.

R stands for the Pearson correlation coefficient. The linear relationship between two variables is shown by Pearson's correlation coefficient. Finding out if two sets of data flow in the same direction is useful.

### E. WEB SCRAPING

Send an HTTP request to the website's URL that you wish to view. The HTML text of the webpage is returned by the server in response to the request. will use a third-party http library for Python requests for this job. The next step is to parse the data after having viewed the HTML content.cannot retrieve data using Python requests for this job. The next step is to parse the data after having viewed the HTML content.cannot retrieve data using string processing because the majority of this job. The next step is to parse the data after having viewed the HTML content.cannot retrieve data using string processing because the majority of HTML data is nested. A parser that can organize HTML data into a layered or tree structure is required of processing linears of the string processing because the majority of this job.The next step is to parse the data after having viewed the HTML content.cannot retrieve data using string processing because the majority of HTML data is nested.Although there are many HTML parser libraries accessible, html5lib is the most cutting-edge. the webpage is returned by the server in response to the request. will use a third-party http library for Python requests for this job. The next step is to parse the data after having viewed the HTML content.cannot retrieve data using string processing because the majority of this job. The next step is to parse the data after having viewed the HTML content.cannot retrieve data using string processing because the majority of HTML data is nested. A parser that can organize HTML data into a layered or tree structure is required. Although there are many HTML parser libraries accessible, html5lib is the most cutting-edge. All that remains is for us to perform tree traversal, or traversing and searching within the parse tree just built As an AI language model, I cannot write code or create a specific project for you. However, I can provide some general guidance on how to approach the task of predicting cryptocurrency prices using machine learning and web scraping techniques. Firstly, web scraping is the process of extracting data from websites. In the case of Bitfinex, you can use Python libraries such as BeautifulSoup and Requests to scrape data from the site's API. Once you have scraped the data, you can store it in a database or a CSV file for later use. Secondly, machine learning algorithms can be used to make predictions based on historical data. You can use Python libraries such as Scikit-learn and Keras to train and test machine-learning models. For cryptocurrency price prediction, you can use regression models such as Linear Regression or Decision Trees. You can also use more advanced models such as LSTM or GRU to capture the time-series nature of the data. Overall, predicting cryptocurrency prices using machine learning and web scraping is a challenging task that requires a good understanding of both domains. Good luck with your project.

## VI. RESULT AND DISCUSSION

Cryptocurrency price prediction using machine learning has been an active area of research in recent years. With the increasing popularity of cryptocurrencies and the volatility of their prices, accurate predictions of future prices can be very useful for investors and traders. Machine learning techniques have been used to predict cryptocurrency prices based on historical data, news articles, social media sentiment, and various other factors. One popular approach to cryptocurrency price prediction using machine learning is the use of deep learning models, such as neural networks. These models can analyze large amounts of historical price data and identify patterns that can be used to predict future prices. In addition, deep learning models can incorporate other relevant information, such as news articles and social media sentiment, to make more accurate predictions. Another approach to cryptocurrency price prediction is the use of time series analysis. Time series analysis involves analyzing trends in data over time to identify patterns that can be used to



make predictions. This approach can be particularly effective for cryptocurrencies, as their prices tend to exhibit clear trends and patterns over time. One challenge in using machine learning for cryptocurrency price prediction is the high level of volatility and unpredictability of cryptocurrency prices. Cryptocurrency prices can be affected by a wide range of factors, including news events, regulatory changes, and market sentiment. As a result, it can be difficult to accurately predict future prices using machine learning models alone. To address this challenge, some researchers have proposed the use of hybrid models that combine machine learning with other approaches, such as expert knowledge or economic models. For example, one study used a hybrid approach that combined machine learning with a Bayesian regression model to predict the price of Bitcoin. The authors found that this hybrid model outperformed other machine learning models in terms of accuracy. Cryptocurrency price prediction using machine learning is an exciting and challenging field that has gained much attention in recent years. The goal is to develop models that can accurately forecast the prices of cryptocurrencies such as Bitcoin, Ethereum, and others. These models can be used by investors and traders to make informed decisions on buying, selling or holding their crypto assets. Machine learning algorithms such as neural networks, decision trees, and regression models are commonly used for cryptocurrency price prediction. These algorithms are trained on historical price data and can learn patterns and trends that can be used to make predictions. The more data that is fed into the model, the better it can learn and make accurate predictions. While there is no guarantee of success, the development of accurate prediction models can provide valuable insights and help investors and traders make informed decisions. The use of advanced machine learning techniques and data normalization can help improve the accuracy of these models, but further research is needed to address the challenges of the volatile and unregulated cryptocurrency market.

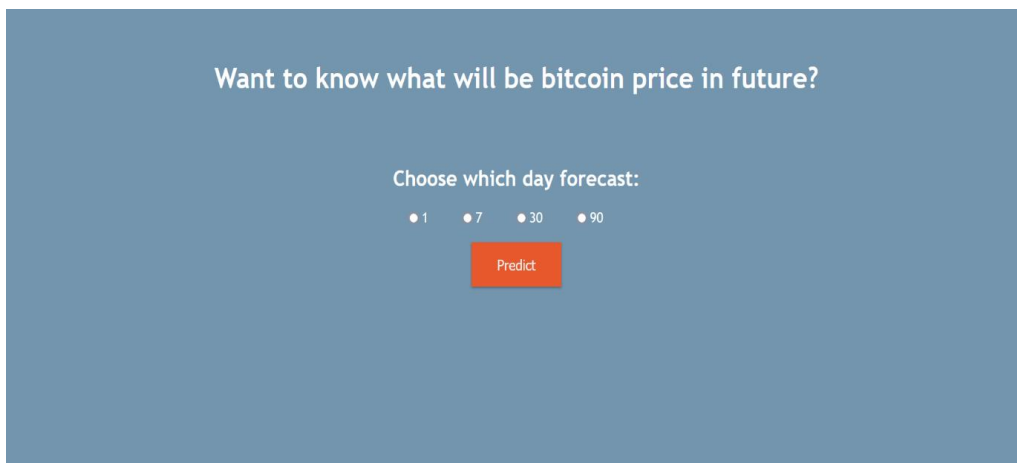


FIG 3.SAMPLE OUTPUT

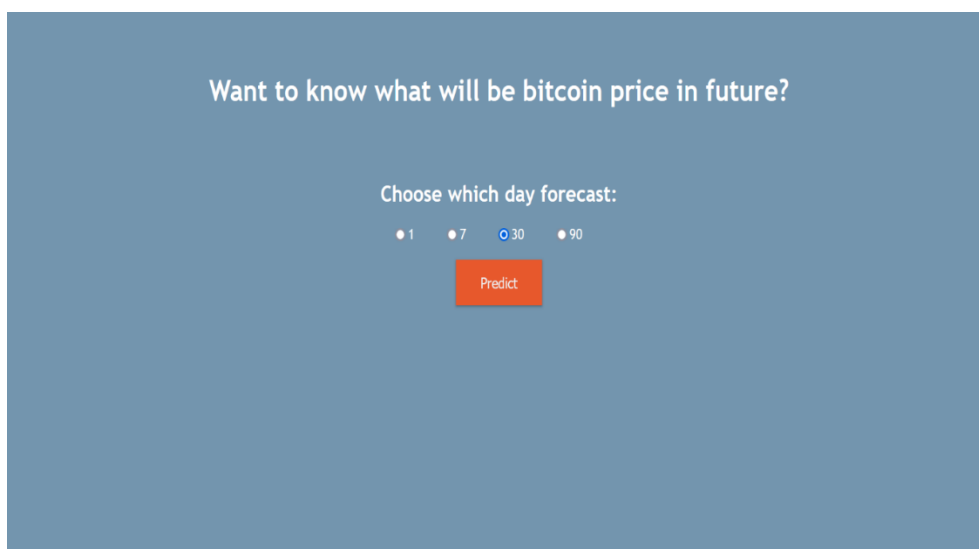


FIG 4.SAMPLE OUTPUT



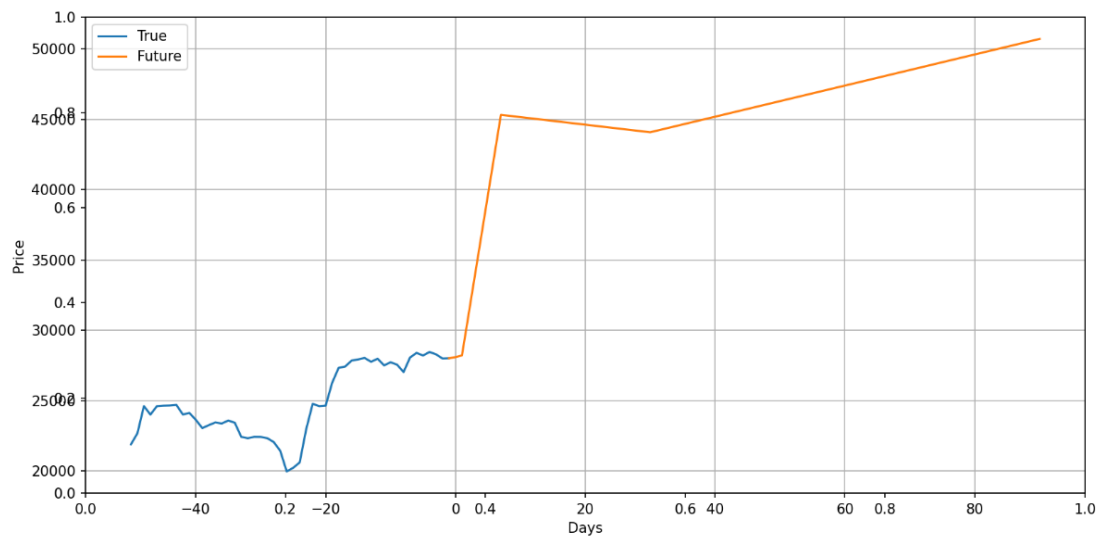


FIG 5.SAMPLE OUTPUT

## VII.CONCLUSION

Cryptocurrency price prediction using machine learning is a promising area of research that has gained significant attention in recent years. Various machine learning algorithms such as neural networks, random forests, and support vector regression have been used to predict cryptocurrency prices. These algorithms use historical price data, trading volumes, social media sentiment, and other relevant factors to make predictions about future prices. While machine learning models have shown promise in predicting cryptocurrency prices, it's important to note that cryptocurrency markets are highly volatile and unpredictable. Therefore, accurate price prediction models are difficult to develop, and even the best models can sometimes fail to make accurate predictions. Additionally, the use of machine learning in cryptocurrency trading comes with certain risks, and caution should be exercised when making trading decisions based on machine learning predictions alone. Cryptocurrency price prediction using machine learning is an active and evolving research area. Several studies have been conducted to predict the price of cryptocurrencies, including Bitcoin, Ethereum, and Litecoin. These studies typically employ machine learning algorithms such as neural networks, random forests, and support vector machines. In conclusion, machine learning can be a valuable tool for predicting cryptocurrency prices, but it should be used in conjunction with other forms of analysis and should be approached with caution. Ultimately, market conditions and other unforeseeable factors may cause prices to fluctuate in ways that cannot be accurately predicted by any model.

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