

Predict the Trend of Indonesian People's Interest in Bitcoin Facing the 2024 Bitcoin Halving Using a Forecasting Algorithm

Mohammad Nasta'in¹, Akhlis Munazilin, M. T.², Adi Susanto, M. Kom.^{3*}

¹Sistem Informasi, Fakultas Sains & Teknologi Universitas Ibrahimy, Indonesia

²Ilmu Komputer, Fakultas Sains & Teknologi Universitas Ibrahimy, Indonesia

³Teknologi Informasi, Fakultas Sains & Teknologi Universitas Ibrahimy, Indonesia

*Corresponding author: nastainmohammad08@gmail.com

ABSTRACT

Cryptocurrency Bitcoin is one of the largest investment crypto assets throughout the world with a total market capitalization of 1.35 trillion US Dollars. Bitcoin was created by Satoshi Nakamoto in 2009 with a decentralized blockchain system. Indonesia is still ranked 7th in the world in cryptocurrency adoption, which means Indonesia is still behind other countries. The inhibiting factors are poor government regulations and a lack of public education platforms regarding this new cryptocurrency technology. This research aims to analyze and predict trends in Indonesian people's interest in bitcoin in the context of the 2024 bitcoin halving, taking Google Trends data and then predicting it using a double exponential forecasting algorithm. Related data was collected to analyze community interest patterns using the KDD (Knowledge Discovery in Database) method. Searches with the keyword "bitcoin" reached the day of the 2024 bitcoin halving on April 19, 2024. From the dataset obtained from the 2014-2024 period with a total of 121 records, using the double exponential 29 forecasting algorithm produces test and train RMSE values of 7,184 and 14,907. Meanwhile, the train and test MAPE values are 0.313 and 0.861. The model that has been created is then implemented using the Python Streamlit library so that web-based analysis can be carried out. The predicted peak point value in 09-2024 is 48.5 and the lowest point in 08-2025 is 17.9. It is hoped that this trend analysis can help develop the adoption of crypto assets, especially bitcoin, to educate the public about the importance of bitcoin as a future investment asset, and the government needs to play a role in making crypto adoption easier in Indonesia.

Keywords:

Bitcoin Halving; Bitcoin; Google trends; Trend of Interest; Forecasting

INTRODUCTION

It is hoped that technological developments can help make work easier and more efficient in human life today. The world is always developing as new problems emerge that previous generations never expected. Therefore, humans must always adapt and innovate to survive. In 2008 there was a severe economic crisis regarding low quality housing loans or what could be called subprime mortgages in America, namely Bear Stern and Lehman Brothers. (Argawal, n.d.) Before 2008 this crisis had occurred in the previous year, until finally it broke out due to the effects that it happened very badly. This incident caused a loss of public trust in the Bank. As a result, other large institutions were also affected, such as JP Morgan Bank, America's Bank and AIG in the insurance industry. (Ausop et al., n.d.)

The impact of this economic crisis has resulted in people starting to distrust the state-controlled financial system, so they try to look for a new system that is better than the fiat money system. (Nuraliati, Ayke, 2019) People think that the system is centralized and controlled by state authorities. very fragile and dangerous when used during an economic crisis that will occur in the future. The solution to the world's public anxiety emerged in 2009, namely the digital currency (cryptocurrency) Bitcoin which was created by an anonymous person named Satoshi Nakamoto. (Rejeb, A., Rejeb, K., & Keogh, 2021) Bitcoin was created to compete with other currencies. fiat used by all countries in the world. Bitcoin is very different from current currencies which can be printed without a maximum number and circulated to the public which ultimately creates inflation. Bitcoin is only created in 21 million coins, so when Bitcoin reaches its limit, no coins will be created. again. (No, 2009) To overcome the conventional system which

is only supported by trust, bitcoin can be used as a cryptographic proof-based payment without requiring a third party in each transaction. (Nakamoto, n.d.)

In April 2024, Bitcoin is expected to experience a halving. Halving is an event when the results or wages of bitcoin miners are cut in half or 50 percent. This event occurs every 210,000 blocks or approximately four years. This is done to limit supply and slow the speed at which new bitcoins enter the market, so that bitcoins do not experience inflation. 52 So supply and demand. In the 2021 cycle, BTC experienced an ATH of 50,000 US dollars per coin or the equivalent of 600 million. Before the Halving occurred, Bitcoin had reached ATH at a value of 70,000 US Dollars per coin or had reached a value of 1 billion. Reporting from Pintu.co.id, Bitcoin's market capitalization in 2024 will reach 1.35 trillion US Dollars, making Bitcoin the seventh largest asset in the world. (Zela, 2024)

With this Super Mega Cycle event, which is marked by the Bitcoin Halving, researchers hope that the Indonesian people can also invest and understand the function of Bitcoin as a digital asset Store of Value. Researchers analyze and predict Indonesian people's patterns towards Bitcoin using *opensource* data from Google Trends to understand more deeply the Indonesian people's interest in Bitcoin Digital Currency (Cryptocurrency) trends. Google Trends is a platform provided by Google that aims to provide significant insight into internet users' interest and search patterns on certain topics. Google user search history data is classified into many categories that have been used in Google Trends. (Kurniawan & Falentina, n.d.) Google Trends is open source and can be accessed via the link <https://trends.google.co.id>. Data collected over a period of 10 years, from the period 2014-2024 in Indonesia.

In order to anticipate and improve interest in crypto, especially bitcoin, related parties must be able to predict or predict trends in Indonesian society so that they are better prepared for the 2024 cycle. Data obtained from Google Trends can be predicted using a forecasting algorithm. Forecasting is the process of guessing or estimating a situation in the future based on past traces in the hope of finding patterns that will occur, so that appropriate action can be taken. Researchers can make decisions by understanding changes in people's interests and related preferences. To analyze trends in public interest in Bitcoin, in the context of facing the 2024 Bitcoin Halving, Google Trends is a suitable reference for searches related to Bitcoin. It is hoped that the analysis made will be able to determine the pattern of interest of the Indonesian people regarding the Bitcoin cryptocurrency. It is hoped that this research will provide results as insight for the public to make decisions for both researchers and practitioners in the world of cryptocurrency.

RESEARCH METHODS

This research uses the Knowledge Discovery in Database method or what is known as (KDD). A systematic approach in extracting important, implied and unknown information from some data (Society et al., 2023). The research steps are as shown in the diagram below

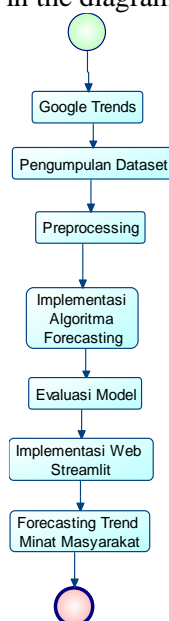


Figure 1. Research Method Flow

Data collection

Data collection in this research was obtained from the Google Trend platform which provides data related to time, volume and public interest in keywords. The amount of data taken from the 2014-2024 period with the keyword chosen is "bitcoin: (Indonesia)". In facing the 2024 Bitcoin Halving, relevant keywords related to the interests of the Indonesian people are the keywords in the research.

Preprocessing

Data preprocessing is an important process in data mining, this is because it is necessary to sort and improve data to produce good performance. To maximize the results from the trained data, researchers correct bad data with null values or numbers >1 .

Forecasting Algorithms

Forecasting is an activity in predicting an event in the future. (Study et al., 2023) by using a forecasting algorithm it is hoped to obtain a forecast or prediction in the future based on the error value in the forecast (forecast error) by calculating the MSE (Mean Squared Error) value. and MAPE (Mean Absolute Percentage Error). This algorithm is usually used to predict the weather, future sales, estimate production quantities and many others. (No Title, n.d.)

Application Development with Streamlit

The model that has been created can be developed with a simple and interactive interface using the Streamlit framework. (Syafarina, 2023) This framework is designed to be able to build data mining applications that use machine learning and data science systems. Forecasting models that have been integrated can be used on a web basis, by determining the number of months in the selected period.

RESULTS AND DISCUSSION

Dataset Preparation & Preprocessing

The data obtained and collected for this research is open source data which can be taken from the trends.google.co.id link. Data was taken for 10 years in the 2014-2024 period, 121 data records were obtained in the form of monthly data from the key "bitcoin" for the Indonesian region. This data will be used to predict trends in Indonesian people's interest in bitcoin crypto.

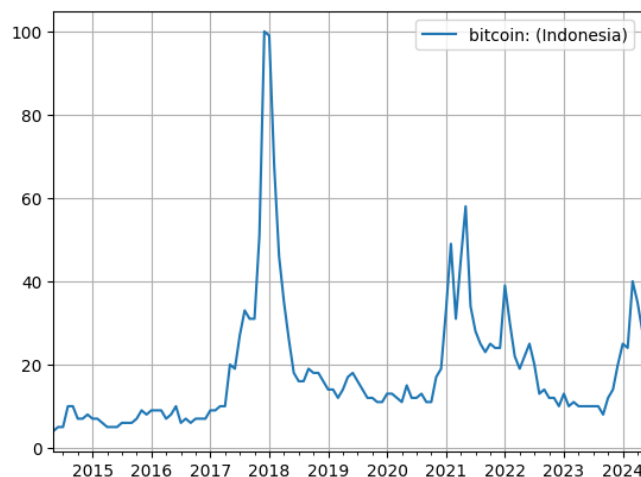


Figure 2. Bitcoin Trend Graph: (Indonesia)

The data that has been collected is cross checked to correct data that is null and data that has unclear variables so that errors do not occur in the forecasting process.

Forecasting Algorithm on Public Interest in Bitcoin

The data was collected and preprocessed so that there were no missed values in the data. The forecasting process was carried out using the Python programming language in a Jupyter notebook. The seasonal_decompose plot value of bitcoin in Indonesia is as follows.

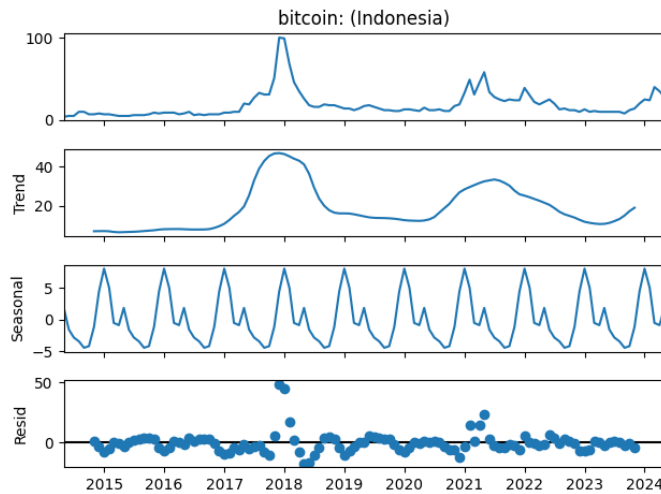


Figure 3. Seasonal decompose Chart

Non-stationary time series data can be differentiated transformed by calculating changes in the data value at time $t - 1$. One test can use Augmented-Dickey Fuller (ADF). The results of the Dickey-Fuller Testing results in this study are as follows Training data is locked from 04-2024 and testing data is locked from 01-2022.

Table 1. Sample Distribution

Case	Value
Test Statistic	-3.338765
p-value	0.013232
Lags Used	3.000000
Number of Observations Used	117.000000
Critical Value (1%)	-3.487517
Critical Value (5%)	-2.886578
Critical Value (10%)	-2.580124
dtype	float64

In model training using double exponential forecasting, the training data value uses "fitted values", while the testing value is 29. The RMSE (Root Mean Squared Error) and MAPE (Mean Absolute Percentage Error) values are as shown in the following table.

Table 2. Train & Test Forecasting

Case	Value
Train RMSE	7.184105255013968
Test RMSE	14.907117292333934
Train MAPE	0.31318801459899853
Test MAPE	0.861708666124293

The evaluation results show that the model has quite good accuracy in predicting trends in Indonesian people's interest in bitcoin. The data trained uses double exponential forecasting to create a prediction model of trends in Indonesian people's interest in bitcoin. The model that has been trained can work well as can be seen from the data, the prediction results have graphs that are almost the same as the training data and testing data.

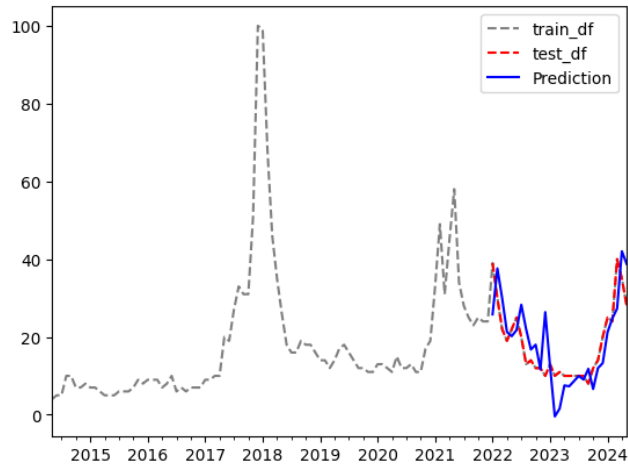


Figure 4. Forecasting training and testing graphs

Model Implementation Using Streamlit

The results of the analysis of the model created are then imported pickle so that it can run on a website basis using the Streamlit framework. Application users only enter predicted values for several months as desired and then the prediction results can be found.

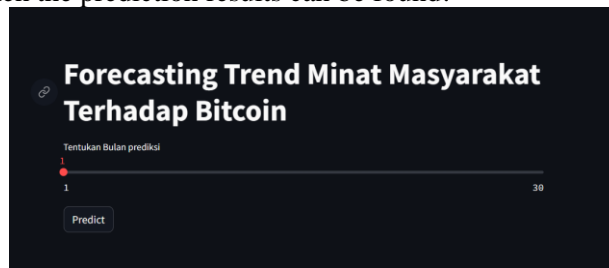


Figure 5. Website display

According to the prediction results, the trend of Indonesian people's interest in bitcoin will experience an increasing trend in the next few months. The peak point of public interest will be in the month 09-2024 at a value of 48.5 and will fall back to the normal point in the month 08-2025 at a value of 17.9.

bitcoin: (Indonesia)	
2024-06-01 00:00:00	32.0188
2024-07-01 00:00:00	31.6875
2024-08-01 00:00:00	46.0688
2024-09-01 00:00:00	48.5625
2024-10-01 00:00:00	35.1313
2024-11-01 00:00:00	26.7
2024-12-01 00:00:00	23.2375
2025-01-01 00:00:00	20.5563
2025-02-01 00:00:00	19.2063
2025-03-01 00:00:00	19.1938
2025-04-01 00:00:00	18.2375
2025-05-01 00:00:00	20.05
2025-06-01 00:00:00	18.6688
2025-07-01 00:00:00	18.65
2025-08-01 00:00:00	17.9313
2025-09-01 00:00:00	19.1313
2025-10-01 00:00:00	18.8938
2025-11-01 00:00:00	22.1875
2025-12-01 00:00:00	24.2375

Figure 6. Predicted Value

Conclusion

In researching trends in Indonesian people's interest in bitcoin, a double exponential forecasting algorithm was used using the Python programming language in Jupyter notebook for data processing and creating forecasting models. Data taken from Google Trends in the 2014-2024 period with 121 data records, which contain community interest values. The use of the double exponential forecasting algorithm for train "fitted values" and test at a value of 29, has quite good results, producing RMSE test and train values of 7,184 and 14,907. Meanwhile, the MAPE train and test values are 0.313 and 0.861. The model that has been created is imported pickle so that it can be run on a web basis using the Streamlite framework. As for the predictions from this application, the highest interest trend value in the month 09-2024 is 48.5 and the lowest interest trend value in the month 08-2025 is 17.9.

Suggestion

Future research can use algorithms other than forecasting to predict trends in public interest. The data used can be added to maximize trend forecasting. From these results, it is hoped that the government will increase ease of access for both crypto sellers, regulations and education. For the public to learn the fundamentals of crypto, especially bitcoin, so they can understand how it works and use bitcoin for long-term investment as a store of value, not just because of fomo.

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BIOGRAPHIES OF AUTHORS



Mohammad Nasta'in, a 23-year-old youth from Dusun Jurang Jero, Kalirejo Village, Banyuwangi. Since his time as a student, his interest in technology was evident when he served as the Head of the Infokom Department of the Rayon, developing students' talents in video editing. Later, as the Editor-in-Chief of the Science and Technology Media at his university, he documented student activities and published their works. Skilled in video editing using software such as Adobe Premiere, Capcut, and After Effects. Possessing good communication skills and enjoying teamwork. His hobby is mountain climbing during academic breaks to relieve stress and maintain health. Ambitious to develop himself in the field of technology and multimedia, while enjoying the adventure of the great outdoors.