NFT Coin Price Prediction (Non-Fungible Token) Using K-Nearest Neighbors Method

Adena Wahyu Gumelar
Informatics Department
Faculty of Science and Informatics
Universitas Jenderal Achmad Yani
Cimahi, Indonesia
adenawahyug18@if.unjani.ac.id

Tacbir Hendro Pudjiantoro
Informatics Department
Faculty of Science and Informatics
Universitas Jenderal Achmad Yani
Cimahi, Indonesia
thp@if.unjani.ac.id

Puspita Nurul Sabrina
Informatics Department
Faculty of Science and Informatics
Universitas Jenderal Achmad Yani
Cimahi, Indonesia
pns@if.unjani.ac.id

Abstract

NFT, or non-fungible tokens, are online certificates of ownership that can be traded based on data units stored in digital ledgers belonging to blockchain technology. This is non-fungible, meaning that it cannot be exchanged and is unique. NFT has been around since 2014. But now, it is increasingly being considered as a practical method for trading digital artwork or art. To buy NFT assets, you require special coins in the form of NFT coins, which consist of various types, such as mana coins, sand, axes, and other NFT coins. The NFT coins are used to process NFT purchase transactions. The movement of NFT coins over time is relatively erratic and uncertain. This NFT coin price prediction will be very useful for investors to know how the investment flow of each price works because the price of each NFT coin will change from time to time. through the literature study stage, interviews, and viewing daily NFT coin price data where the attributes used are date, open, high, low, close, and volume. The method used in this research is k-Nearest Neighbours. Dataset collection through the website www.coinmarketcap.com for the period January 1, 2019 to December 31, 2021. Then the data processing is carried out. An accurate NFT coin price prediction model can help investors in considering transaction decisions because NFT coin prices, which tend to be non-linear, will allow investors to make predictions. This study aims to obtain the predicted value of NFT coins using the k-Nearest Neighbours algorithm.

Keywords
Blockchain, NFT (non-fungible token), KNN (K-Nearest Neighbors).

1. Introduction
The trend of non-fungible tokens (NFT) has been increasing in recent times. This is because the public's interest in buying and selling digital assets and works of art through NFT is getting higher. One of the reasons for the growing popularity of NFT is the rapid development of digital technology. The increasing public interest in crypto assets

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sustains the popularity of NFT. As it is known that there are a large number or types of cryptocurrency coins. Likewise with NFT coins which consist of various types. Like mana coins, sand, axs and other NFT coins. The NFT coins are used to process NFT purchase transactions.

The disclosure of NFT coin price data on coinmarketcap.com gives investors the opportunity to make profits. The profit in question is in the form of Capital Gain which is the difference between the purchase price and the selling price. However, the right time to buy and sell NFT coins must be known by investors to make a profit. The price of the NFT coin on coinmarketcap.com always displays the price movement of the NFT coin which is always changing, increasing, and decreasing at an unknown time by investors, therefore, the low and high prices of the NFT coin can be seen by looking at the price of the NFT coin both from the price the highest, lowest, and closing prices, thus making it difficult for investors to decide whether to buy NFT coins, whether the price of NFT coins will go up or down the next day.

The use of the K-Nearest Neighbors (KNN) algorithm to produce a level of data accuracy has been proven in previous research, the research is K-Nearest Neighbors (KNN) which is used to predict the stock price of PT Bank Central Asia TBK, where the results show that the prediction accuracy reaches 61.67% so that the prediction achievement can help the public and investors to know the stock price in the future.

From the problems above, it is hoped that by conducting this research, the prediction of NFT coin prices using the K-Nearest Neighbors algorithm method is able to provide information according to the conditions expected by investors.

1.1 Objectives

The purpose of this study is to solve the problem that investors have difficulty making decisions in purchasing NFT coins, by predicting the price of NFT coins using the k-Nearest Neighbors algorithm method, so that when buying NFT coins at a certain price will minimize losses.

2. Literature Review

The use of the K-Nearest Neighbors (KNN) algorithm to produce a level of data accuracy has been proven in previous studies, the research is K-Nearest Neighbors (KNN) which is used to predict the stock price of PT Bank Central Asia TBK, where the results show that accuracy prediction reached 61.67%. Through the confusion matrix, it is shown that the value given for precision or the level of accuracy of information expected for classified data has increased is 62.03% and data that has decreased in price is 60.76%, while the recall value or success rate of information found for classified data increases the price is 87.35% and the data classified as experiencing a price decline is 26.82%.

In addition, there is a K-Nearest Neighbors (KNN) study which is used to predict cryptocurrency prices, where the results of the research conducted are the KNN (K Nearest Neighbors) method experiments on 3 datasets using the K value parameter and the Nearest Neighbor Search Algorithm, concluded the KNN model which has the best accuracy is KNN with a value of K=3 and Nearest Neighbor Search Algorithm: Linear NN Search. The greater the value of K, the greater the value of the Mean Absolute Error and the value of the Root Mean Squared Error. And the more dataset/data history of Cryptocurrency prices used, the smaller the Mean Absolute Error value and the Root Mean Squared Error value.

3. Methods

The research method contains the steps to be taken in predicting the price of NFT coins using the K-Nearest Neighbors method starting with data collection, pre-processing, then implementing K-Nearest Neighbors.

1.Data Collection

The methods used in data collection are:
Literature study to collect information from previous research related to the K-Nearest Neighbors algorithm.

Internet Searching is a technique of collecting data through the help of technology in the form of tools / search engines on the internet, where all information from various eras is available in it. Data collection that will be used is taken from www.coinmarketcap.com.

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1. Pre-Processing

At this stage, the data is separated into training data and testing data. The results of this stage are in the form of training data and the selected variables in the feature selection as input for KNN. At this stage there are problems that arise from the data processing process, so pre-processing is needed.

2. Implementation of the K-Nearest Neighbors

At the implementation stage of the k-Nearest Neighbors algorithm, namely the process of implementing KNN on the NFT coin price prediction system which can produce NFT coin price prediction information. The K-Nearest Neighbors algorithm is a method for classifying objects based on the closest distance. K-Nearest Neighbors has a simple principle, works based on the shortest distance from the test sample to the training sample.

In this study the author only uses the Euclidean distance, the formula for calculating the distance with Euclidean is as below:

$$\sqrt{\sum_{i=1}^{K}(\mathrm{X}i - \mathrm{Y}i)^2}$$

The Xi value is the value in the training data, while the Yi value is the value in the testing data. The value of K is an attribute dimension.

According to the K-Nearest Neighbors Algorithm, there are stages:

a. Determine the parameter K (Sum of the number of nearest neighbors);
b. Calculate the distance between the test data sample and the entire training data sample;
c. Sort the distance;
d. Take the nearest neighbor;
e. Collect/Determine the nearest neighbor category; f. Use a simple majority category/Determine the most frequently occurring category (majority) as the predictive value of the new data.

4. Data Collection

This research was conducted using a dataset which is the most popular NFT coin, namely the historical daily dataset of the NFT MANA coin price for the period January 2019 to December 2021 which was taken from www.coinmarketcap.com. The dataset consists of the Date, Open, High, Low, Close, Volume, and Market cap attributes. Date is the date of the transaction, Open is the opening price/starting price at a certain time, High is the highest price of the opening price, Low is the lowest price of the opening price, Close is the closing price/final price of NFT coins from a certain time, Volume is the number of active trades that occurs from a particular coin, and market cap is a metric that becomes a reference for measuring the value of an asset on the market.

5. Results and Discussion

The implementation of the interface displays all the views contained in the NFT coin price prediction system. The interface implementation in Figure 1 is the display of the NFT coin price prediction software.

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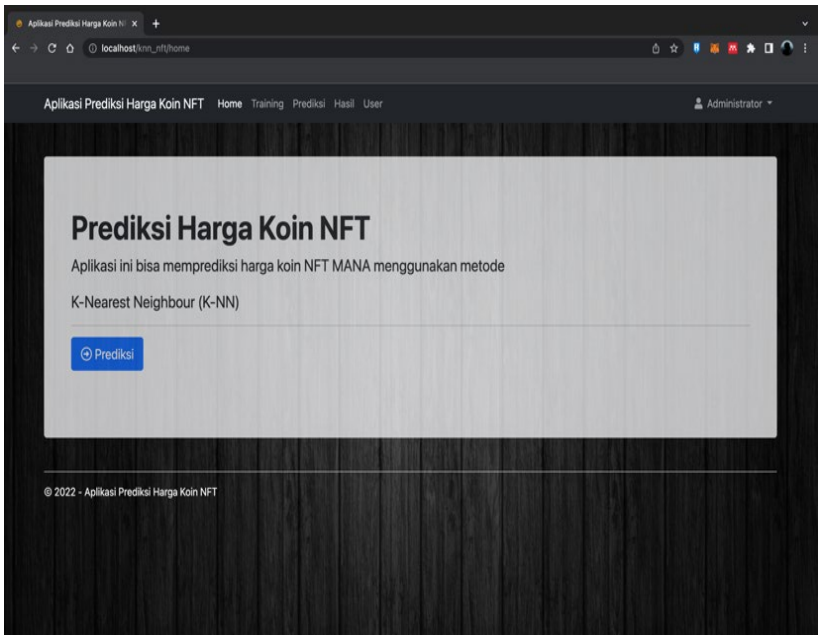

Figure 1. Software Prediction Price NFT Coin

Figure 2 shows the implementation of the NFT coin price prediction system by entering the opening price, closing price, lowest price, volume, and market cap on the NFT coin to predict.

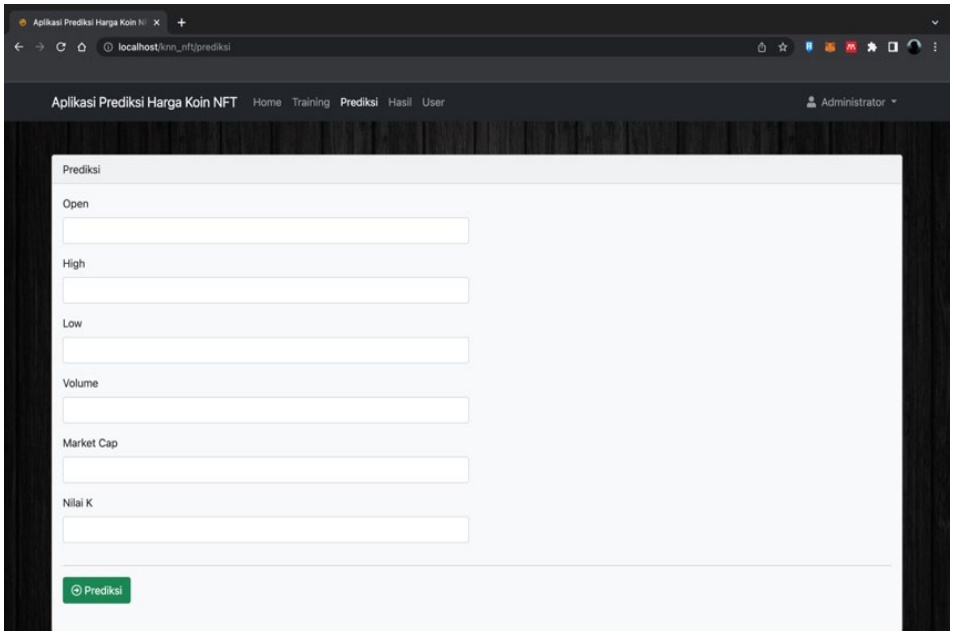

Figure 2. Input Price NFT Coin to Predict

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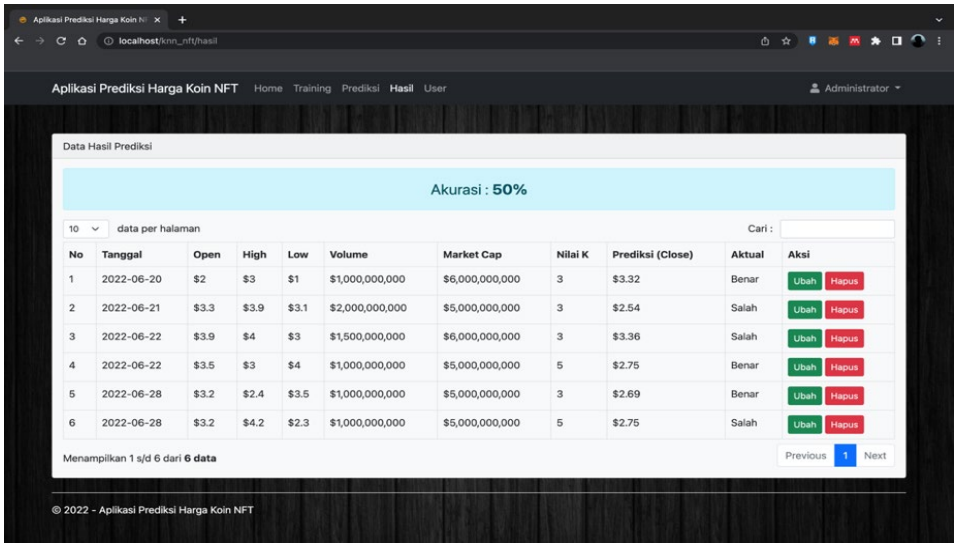
Figure 3 shows the implementation of the NFT coin price prediction system by displaying the prediction results.



No	Tanggal	Open	High	Low	Volume	Market Cap	Nilai K	Prediksi (Close)	Aktual	Aksi
1	2022-06-20	$2	$3	$1	$1,000,000,000	$6,000,000,000	3	$3.32	Benar	Ubah Hapus
2	2022-06-21	$3.3	$3.9	$3.1	$2,000,000,000	$5,000,000,000	3	$2.54	Salah	Ubah Hapus
3	2022-06-22	$3.9	$4	$3	$1,500,000,000	$6,000,000,000	3	$3.36	Salah	Ubah Hapus
4	2022-06-22	$3.5	$3	$4	$1,000,000,000	$5,000,000,000	5	$2.75	Benar	Ubah Hapus
5	2022-06-28	$3.2	$2.4	$3.5	$1,000,000,000	$5,000,000,000	3	$2.69	Benar	Ubah Hapus
6	2022-06-28	$3.2	$4.2	$2.3	$1,000,000,000	$5,000,000,000	5	$2.75	Salah	Ubah Hapus

Figure 3. Prediction Result

Accuracy testing focuses on the process of testing the level of accuracy to calculate the error value using MSE and MAE. The test is carried out using the parameters of K values of 3,5 and 7. The following are the results in Table 1:

Table 1 accuracy to calculate the error value using MSE and MAE.

Date	K Value	Close (Actual)	Close (Prediction)	MSE	MAE
Dec 31, 2021	3	3,27	3,28	0,0000050	0,0005000
Dec 30, 2021	3	3,29	3,28	0,0000050	0,0005000
Dec 29, 2021	3	3,25	3,26	0,0000050	0,0005000
Dec 28, 2021	3	3,35	3,37	0,0000200	0,0010000
Dec 27, 2021	3	3,74	3,76	0,0000200	0,0010000
Dec 26, 2021	3	3,86	3,80	0,0001800	0,0030000
Dec 25, 2021	3	3,75	3,76	0,0000050	0,0005000
Dec 24, 2021	3	3,51	3,47	0,0000800	0,0020000
Dec 23, 2021	3	3,68	3,74	0,0001800	0,0030000
Dec 22, 2021	3	3,29	3,28	0,0000050	0,0005000
Dec 21, 2021	3	3,29	3,27	0,0000200	0,0010000
Dec 20, 2021	3	3,19	3,23	0,0000800	0,0020000
Dec 19, 2021	3	3,26	3,26	0,0000000	0,0000000
Dec 18, 2021	3	3,43	3,41	0,0000200	0,0010000
Dec 17, 2021	3	3,07	3,08	0,0000050	0,0005000
Dec 16, 2021	3	3,14	3,13	0,0000050	0,0005000
Dec 15, 2021	3	3,34	3,32	0,0000200	0,0010000
Dec 14, 2021	3	3,03	3,08	0,0001250	0,0025000
Dec 13, 2021	3	3,17	3,19	0,0000200	0,0010000
Dec 15, 2021	3	3,63	3,71	0,0003200	0,0040000
				0,0011200	0,0260000

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Date	K Value	Close (Actual)	Close (Prediction)	MSE	MAE
Dec 31, 2021	5	3,27	3,28	0,0000050	0,0005000
Dec 30, 2021	5	3,29	3,28	0,0000050	0,0005000
Dec 29, 2021	5	3,25	3,25	0,0000000	0,0000000
Dec 28, 2021	5	3,35	3,37	0,0000200	0,0010000
Dec 27, 2021	5	3,74	3,75	0,0000050	0,0005000
Dec 26, 2021	5	3,86	3,75	0,0006050	0,0055000
Dec 25, 2021	5	3,75	3,76	0,0000050	0,0005000
Dec 24, 2021	5	3,51	3,49	0,0000200	0,0010000
Dec 23, 2021	5	3,68	3,71	0,0000450	0,0015000
Dec 22, 2021	5	3,29	3,27	0,0000200	0,0010000
Dec 21, 2021	5	3,29	3,28	0,0000050	0,0005000
Dec 20, 2021	5	3,19	3,22	0,0000450	0,0015000
Dec 19, 2021	5	3,26	3,28	0,0000200	0,0010000
Dec 18, 2021	5	3,43	3,42	0,0000050	0,0005000
Dec 17, 2021	5	3,07	3,13	0,0001800	0,0030000
Dec 16, 2021	5	3,14	3,13	0,0000050	0,0005000
Dec 15, 2021	5	3,34	3,33	0,0000050	0,0005000
Dec 14, 2021	5	3,03	3,12	0,0004050	0,0045000
Dec 13, 2021	5	3,17	3,17	0,0000000	0,0000000
Dec 15, 2021	5	3,63	3,68	0,0001250	0,0025000
				0,0015250	0,0265000

Date	K Value	Close (Actual)	Close (Prediction)	MSE	MAE
Dec 31, 2021	7	3,27	3,26	0,0000050	0,0005000
Dec 30, 2021	7	3,29	3,25	0,0000800	0,0020000
Dec 29, 2021	7	3,25	3,24	0,0000050	0,0005000
Dec 28, 2021	7	3,35	3,33	0,0000200	0,0010000
Dec 27, 2021	7	3,74	3,70	0,0000800	0,0020000
Dec 26, 2021	7	3,86	3,75	0,0006050	0,0055000
Dec 25, 2021	7	3,75	3,75	0,0000000	0,0000000
Dec 24, 2021	7	3,51	3,43	0,0003200	0,0040000
Dec 23, 2021	7	3,68	3,68	0,0000000	0,0000000
Dec 22, 2021	7	3,29	3,26	0,0000450	0,0015000
Dec 21, 2021	7	3,29	3,28	0,0000050	0,0005000
Dec 20, 2021	7	3,19	3,25	0,0001800	0,0030000
Dec 19, 2021	7	3,26	3,27	0,0000050	0,0005000
Dec 18, 2021	7	3,43	3,38	0,0001250	0,0025000
Dec 17, 2021	7	3,07	3,17	0,0005000	0,0050000
Dec 16, 2021	7	3,14	3,17	0,0000450	0,0015000
Dec 15, 2021	7	3,34	3,31	0,0000450	0,0015000
Dec 14, 2021	7	3,03	3,16	0,0008450	0,0065000
Dec 13, 2021	7	3,17	3,19	0,0000200	0,0010000
Dec 15, 2021	7	3,63	3,70	0,0002450	0,0035000
				0,0031750	0,0425000

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6. Conclusion

The conclusions from the research carried out are: From the experimental results of the KNN (K-Nearest Neighbors) method on the dataset using the parameter values of K 3, 5, and 7, it can be concluded that the KNN model that has the best accuracy is KNN with a value of K = 3. The greater the value of K, the greater the value of Mean Square Error and Mean Absolute Error. The research conducted predicts the Close value of the NFT coin price in a period of 1 day.

Subsequent research will add more datasets used, so that the resulting error is smaller, and the results are more accurate.

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Biographies

Adena Wahyu Gumelar is a final year undergraduate student in the department of informatics, Jenderal Achmad Yani University, Cimahi, Indonesia. His primary interests are systems analysis, data mining and software engineering.

Tacbir Hendro Pudjiantoro is an Associate Professor. Doctoral Candidate from the Indonesian University of Education. Researcher in the field of Knowledge Management and handles several Information Systems projects.

Puspita Nurul Sabrina she is a lecturer at the Department of Informatics, Faculty of Science and Informatics, Jenderal Achmad Yani University. Among his research interests are information systems, database engineering, and data mining.

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