INTERNATIONAL JOURNAL of DYNAMICS in ENGINEERING and SCIENCES (IJDES)
LLDIKTI WILAYAH X
Vol. 8, No. 1, Mei 2023
e-ISSN: 2502-0692

ANALYSIS IN PREDICTING BITCOIN PRICE MOVEMENT ON INDODAX PLATFORM USING ARTIFICIAL INTELIGENT

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Article Information

Submitted :
15 Mar 2023

Accepted :
20 May 2023
Published :
30 May 2023

Abstract

Rapid technological advances have made many fields change, including the field of digital asset investment, especially crypto. There are many ways for traders and investors to trade Bitcoin which is one of the digital assets in the crypto world. Indodax is a platform made locally in Indonesia that serves digital asset trading transactions. Technical and fundamental analysis is carried out to predict bitcoin price movements, but high volatility makes bitcoin movements difficult to predict. The use of the Reccurrent Neural Network which is part of Machine Learning is one way to be able to make predictions on bitcoin

.
Keywords: RNN, LSTM, Bitcoin, Indodax, Training, Testing

1. Introduction

Technological advances will drive change, these changes have a significant impact on various fields, one of which is the investment sector. The types and forms of investments themselves are very diverse, ranging from bank savings, deposits, Forex, Gold, Land, Buildings, Insurance, Mutual Funds and Cryptocurrencies or digital currency, one of which is Bitcoin.

To help invest in crypto optimally, we need a tool that can help investors and traders predict Bitcoin price movements. These tools use Deep Learning architecture, namely Recurrent Neural Network which is a Deep Learning algorithm which is a type of Neural Network that is very good at finding temporal patterns in making predictions.

Predictionis a process of systematically estimating something that is most likely to happen in the future based on past and present information that is owned, so that the error (difference between something that happened and the predicted result) can be minimized. Prediction does not have to provide a definite answer to events that will occur, but rather tries to find answers as close as possible to what will happen (Herdianto, 2013: 8). Prediction allows the results achieved to approach the truth value that can be used as a reference in decision making.

According to Larose (2015:4), Data mining is the activity of finding interesting patterns from large amounts of data Larose (2015:5) also revealed that based on research conducted by Marketsand Markets, the global data market is expected to grow by 26% for 2013 until 2018, so that almost all companies in the world are competing to study data mining with the aim of finding useful patterns and trends as opportunities to increase profits.

Larose (2005:6-8) revealed that the projectData Mininghas a life cycle consisting of six stages. The six stages are known as the Cross-Industry Standard Process for Data Mining, if they are described as shown in Figure 1.

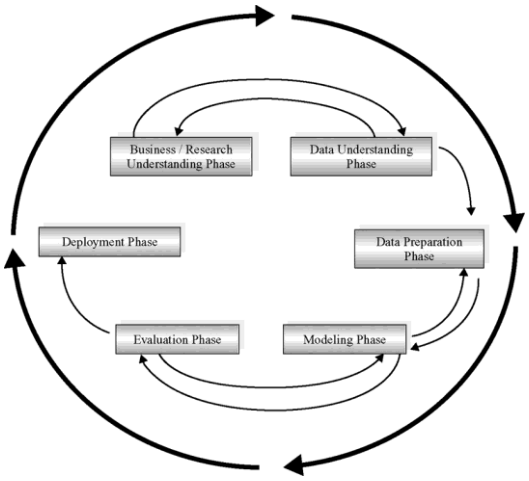


Figure 1. CRISP-DM (Larose, 2015:4)

Artificial Intelligence (AI)is a general concept of how to make machines that can think intelligently (smart machines) like humans, or machines that can learn from various inputs given to them. So as to produce accurate outcomes (Primartha, 2018).

Machine Learningis computer programming to achieve certain criteria or performance by using a set of training data or past experiences (Primatha, 2018). Machine Learning requires a model that is defined based on certain parameters. The learning process is the execution of a computer program to optimize the parameters of the model, by utilizing Data Mining.

Neural Networkis a computational technique that processes information, relating the input variable to the desired output. ANN based their calculations on the interconnection of simple units called artificial neurons. These models are inspired by the function of cell neurons and how they generate and propagate electrical impulses (Loyo, 2017).

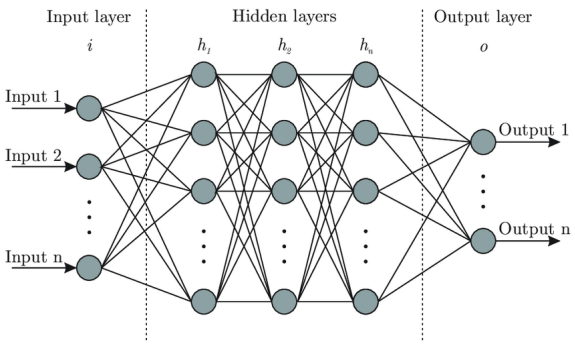


Figure 2. Artificial Neural Network Architecture (Bre, 2017)

2. Research Method

The design of this study follows the six stages contained in theCross Industry Standards Process For Data Mining (CRISP-DM)as explained in the previous sub-chapter. While the research method used is experimental. The data used is time series data for the period 9 June 2017 – 9 September 2019. The steps in conducting this experimental method are:

1. Data Preprocessing
a. Data Gathering/Obtaining
b. Data Cleansing
c. Data Normalization
2. Processing Data
3. Post Processing Data

3. Results of the Discussion

In generating profits, traders must be able to trade by following the trend where when conditions are uptrend (uptrend), then*traders*should open a long position. On the other hand, during a downtrend, you should open a short position. Broadly speaking, traders can open a buy with conditions when the bitcoin price is at the lowest level (support level), with the expectation that after reaching the lowest level then the price will reverse up. For short positions, you should sell when the price is at the peak (resistance level) where the price will reverse from rising to falling.

From the results of observations and analysis of data variables that have a major influence on bitcoin price movements, namely Date, Open, High, Low, Close, Volume, and change.

Data Comprehension Phase /*Data Understanding Phase*

The second phase of this research, namely the data understanding phase where in this phase the process of identifying and defining the data collected is carried out. The stages of defining and identifying the data attributes are carried out by collecting data indicators found on the indodax.com platform.

After the data collected has been defined, the next step is to filter the data variables by selecting the data variables that are considered influential and have a strong relationship between several variables that determine bitcoin price movements. The stages of data selection are summarized in table 1.

No	Stages	Data selection
	Collecting Data	
1	Collect a list of Bitcoins and Altcoins listed on Indodax.com	Choosing Bitcoin as the object of research in predicting bitcoin price movements
2	Collects bitcoin price movement indicators, such as Market, Date, Price, Volume, Change, Open, Low, High, Close	The indicators taken are Date, Open, Low, High, Close, and Volume
3	Recording data on bitcoin price movements, namely on November 3, 2014 – September 9, 2019	*Data records*taken on January 1, 2017 – September 9, 2019

Table 1. Stages of selection of indicator data

After the collection and selection of indicator data is complete, the next step is to enter the data that has been collected based on predetermined variables, data entry is done with the help of the Sublime Text text editor. The data entered is based on the period January 1, 2017 – September 9, 2019 into a CSV file format. The data that has been collected can be seen in Figure 2.

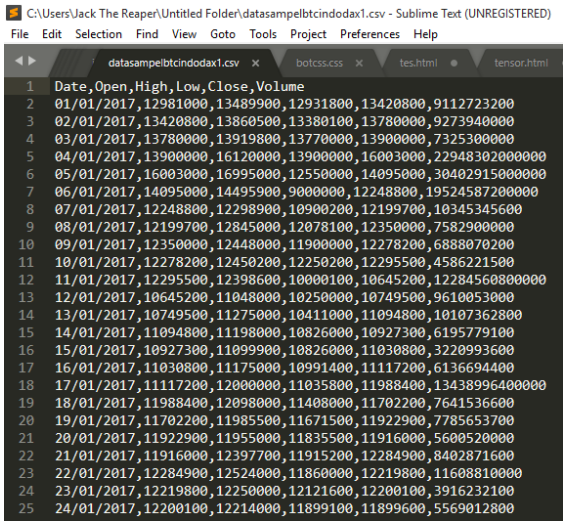
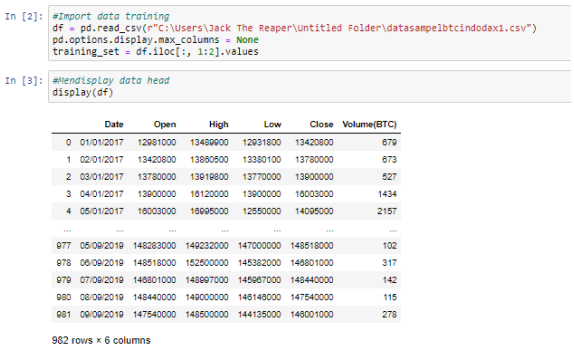


Figure 2. Bitcoin Price CSV file display on Sublime Text

After Anaconda has been installed, to be able to perform data processing easily, several special libraries are needed such as Tensor Flow which is the Backend Deep Learning System, Keras which is the Front End for building Neural Networks, Pandas which functions to process data, Numpy which functions for vector operations and matrix, Scikit-Learn which has features for data science and data analysis, and Plotly which is a python library for creating and displaying graphs. The library can be activated on the environment menu tab in the Anaconda Navigator.



```
In [2]: #Import data training
df = pd.read_csv(r"C:\Users\Jack The Reaper\Untitled Folder\datasampelbtcindodax1.csv")
pd.options.display.max_columns = None
training_set = df.iloc[:, 1:2].values

In [3]: #Mendisplay data head
display(df)
```

	Date	Open	High	Low	Close	Volume(BTC)
0	01/01/2017	12981000	13489900	12931800	13420800	679
1	02/01/2017	13420800	13860500	13380100	13780000	673
2	03/01/2017	13780000	13919800	13770000	13900000	527
3	04/01/2017	13900000	16120000	13900000	16003000	1434
4	05/01/2017	16003000	16995000	12550000	14095000	2157
...	...	...	...	...	...	...
977	05/09/2019	148283000	149232000	147000000	148518000	102
978	06/09/2019	148518000	152500000	145382000	146801000	317
979	07/09/2019	146801000	148997000	145967000	148440000	142
980	08/09/2019	148440000	149000000	146146000	147540000	115
981	09/09/2019	147540000	148500000	144135000	146001000	278

982 rows × 6 columns

Figure 3. Anaconda Navigator Display

Furthermore, at this stage it is necessarythe data selection process as a capital to carry out the training and testing stages in modeling. In conducting the data selection process from several indicators such as Date, Open, Low, High, Close, and Volume, which indicators will be selected for the modeling process.As is known, to be able to carry out the modeling process, it is necessary to have a feature scaling process on the dataset. The feature scaling formula is as shown in table 2.

Standardization	Normalization
$X_{Stand} = \frac{x - mean(x)}{standard\ deviation\ (x)}$	$X_{norm} = \frac{x - min(x)}{max\ (x) - \min(x)}$

Table 2. Feature scaling formula

The use of feature scaling formulas using python makes it easy for developers not to enter manually because it is already available on the Jupyter Notebook platform. The modeling phase begins by initializing and defining the variables x_train and y_train which will be used for the training process for the dataset where the training process for the dataset is a process in building the model.After the data structure has been created, the next step is the reshaping process. Processes are required to modify the dimensions of the original generated matrix to the desired dimensions. In order for a dimension to be multiply-able it must have the same dimensions.

The next step is to import several libraries and packages, namely Sequential, Dense, LSTM, and Dropout where this package will work on the TensorFlow backend in processing data. The process of importing the four Hard and Package libraries on Jupyter Notebook.

Then by adding several LSTM layers and some Dropout Regulations, it is hoped that the stages leading to the training process will run well. The number of additional LSTM Layers is four. The process of adding the four LSTM layers and several Dropout Regulations.

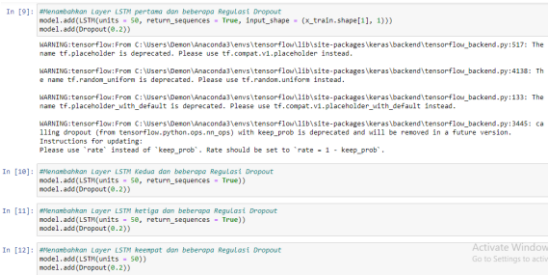


Figure 4. The process of adding LSTM Layer and Dropout

Then the next step is to addoutputlayer uses a model, where the model is used to predict the target variable by adding Dense with a unit value of 1.

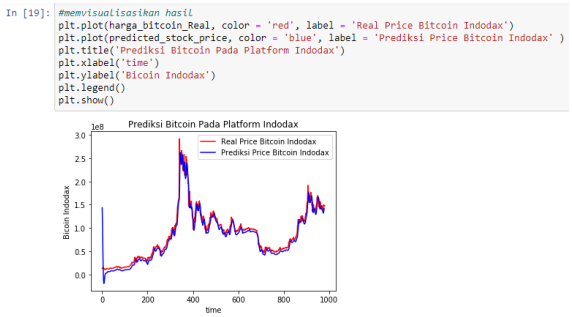


Figure 5. The process of displaying the visualization of the prediction results

4. Conclusion

Based on the results of experiments and analysis, the conclusions of this study can be concluded into several points. First, in doing the correlation between variables, the data recorded in the Date, Open, High, Low, Close, and Volume variables are imported into the Jupyter Notebook. The next step is to perform feature scaling on the data. The data is then initialized and defined into variables x_train and y_train which are used for training the dataset and used to create a data structure with 60 timesteps and 1 output to store data in an efficient form which is then used in the modeling process. Furthermore, the use of reshaping in modifying the dimensions of the resulting matrix to the desired dimensions. Then the process of importing the Keras library and its packages is carried out, namely Sequential, Dense, LSTM, and Dropout. The next stage is to carry out the RNN Initialization process and add four LSTM layers and some Dropout regulations. The next step is to add an output layer and compile the RNN using the big data optimizer, Adam. Then fitting the RNN to the training set on the variables x_train and y_train with the value of epoch = 100 and batch size = 32. From the fitting stage then make predictions by getting bitcoin price data in the previous CSV file and the results obtained in bitcoin predictions are then visualized. Second. in building a prediction model for bitcoin price movements using the RNN algorithm and architecture and the RNN variant, namely LSTM in building a model to predict Bitcoin. The three levels of accuracy of the prediction model obtained from the evaluation stage are 0.11%

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