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**Bhavik Purohit** 

Tutor: Dr. Kalin Penev

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# **CRYPTOCURRENCY PREDICTION SOFTWARE PYTHON**

# Abstract

Whole the paper made on the basis of ML algorithms to forecast the Cryptocurrencies values. It is seen that the value is fixed from the beginning and the falling of the value depends on the market rate and the people who are using it. With the year, the rate of the cryptocurrency fluctuates but does not inflate like the normal currency. Second thing is that the people have full control over the currency. This will also help in preparing the owner to work on certain types of processes and train himself or herself to invest. In addition, they can predict the price of the cryptocurrency, which will be helping them to make sure that the investment can done in a proper way. In addition, the prediction data can used for the rejection process. There are also data collection methods where the qualitative method will be used. Then the data analysis method will be discussed. The forecast model also adapted for the exceptional circumstances and the random events. Any prior knowledge of system was required. There was also some disadvantages of forecast model like there was no correlation comprehensively between then difficulties of variables to identify the variables that was exogenous. By the rate prediction of coins exchange it will provide the cryptocurrency traders and the stockbrokers the upper hand of the market. The algorithm will provide result with the accuracy that will make the trained model towards deployment.

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# **Chapter 1: Introduction**

# **1.1. Introduction**

For the past few years, it seen that all the people are bending toward digital currency. The normal currency that is used is no longer part of the market. Therefore, this research will start with a background study that describes the overall information about cryptocurrency. Then the research aim discussed and the research objectives pointed out. Then the research question discussed. Then the research rationale will be given to explain the reason for the research. Then the importance of the research significance explained that is the importance of the research. The research planning also explains how the research is carried on. Every point of the research noted down to make sure that all the feedback is taken in a proper way. This research will be working to make sure that all the questions and the complexities related to cryptocurrency are fulfilled. It is true that digital currency has made currency exchange quite easier and made exchange quite easier. Therefore, the fact is that this research will be explaining other beneficial things that is seen in research. How the digital currency is meeting the need of the people will be explained in the research.

# **1.2. Background of the study**

Cryptocurrency is one of the major things that the world is discussing in the current situation. Many networks formed to understand the currency unit. They have the ability to organize cryptocurrency transactions. In addition, encryption technology is helping them to share the cryptocurrency can serve the transfer of the currency and receiving it. With the use of cryptocurrency, usage inflation has reduced. The inflation in the normal currency has made the value go down and declined with time. Now for the cryptocurrency, it is seen that the value is fixed from the beginning and the falling of the value depends on the market rate and the people who are using it. With the year, the rate of the cryptocurrency fluctuates but does not inflate like the normal currency. Second thing is that the people have full control over the currency. The government has no control over the currency that is used by the people. Now the developer of the cryptocurrency keeps the bitcoin stores the coin with them and then the transaction of the money gets those rewards. The third is secure and private. The transaction and the currency are totally secure. The person using the currency will be secure when they are using currency. In addition, the currency exchange becomes quite easy when it comes to the transaction between the currency. From Japan to America the transaction is quite possible to transfer without converting the type of transaction. Also, it is one of the fast ways to transfer funds from one to another. Unlike the normal transaction,

the digital transaction provides a small verification process while the transaction is done. This would help the users to be more aware of what is going on around in the market and how to invest in the right product.

# 1.3. Research Aim

The aim of this research is to understand the importance of cryptocurrency. Then the research will be further move to the idea of how cryptocurrency is used in the domination of the market. Then the prediction of the cryptocurrency importance is discussed. Then the use of python in the prediction process of cryptocurrency discussed. The problems that rises when python is used in the prediction process. Also, the solution to the problem related to python will be discussed in the prediction process. Then the process of the python analysis is explained in detail. The python tools will be explained in detail.

# **1.4 Research Objectives**

- To understand the need for the cryptocurrency
- To analyze the use of python in the cryptocurrency
- To analyze the prediction process of the cryptocurrency
- To understand how the python prediction is done based on the cryptocurrency
- To understand the problem that is related to the python prediction process
- To find out the solution to the python prediction process problem
- To discuss the key finding of the python prediction process and how the cryptocurrency prediction will be changing the business

# **1.5 Research Questions**

- 1. What is the importance of cryptocurrency in the market?
- 2. How has cryptocurrency improved the transaction process?
- 3. How is the transaction process secure?
- 4. Why the prediction process of the cryptocurrency is done?
- 5. How is the prediction done based on the cryptocurrency?
- 6. How does the result of the crypto prediction help the owners?
- 7. What are the problems that can occur in the crypto prediction process?
- 8. How the problems related to the prediction process can be improved?

# **1.6 Research Rationale**

This research is done to unfold many mysteries related to cryptocurrency. It is important to understand why a person would be using digital coins for the transaction process. Also, the problems and the benefit of digital coins will be discussed. Then the importance of predicting the value of the digital coins will be discussed. Also, the python software will be discussed on how it can be implemented. This research is also done to understand the detailed process of the prediction of digital coins. Also, the research will be diving into the fact that how the problems can be solved and the prediction process can be improved.

# **1.7 Research Significance**

This research will have detailed information about the cryptocurrency and also information related to the prediction process. Many people think that the prediction of cryptocurrency is quite unreliable. So the reason for this thought will be investigated in this research. This is one of the reasons why the research is so important. Also if it is truly unpredictable then the research will be focusing on the changes that can be introduced to improve the prediction process. Also, the bitcoin's values go up and down so the research will explain how they can work on the investment process of the bitcoin. Also, bitcoin storage is an important thing because it needs high security. So will discuss it as well.

### **1.8 Research Planning**

This research starts with the introduction which provides an idea what is the importance of cryptocurrency and discusses how the whole research will be proceeding. Then the background of the research will be discussed. This explained various parts of cryptocurrency. Then the research aim and the objectives are discussed which shows the goals that are needed to achieve. Then the research rationale explains the importance of the research and why it is done. Then in the next chapter, the literature review will be explained. There are many articles that are taken and explained the prediction process. Then the theories and the model will be discussed. Then the literature gap is explained. Then the third chapter is the methodology section which will be providing an idea of how the research will be done. Then the next chapter will be focused on making the model and testing it in the prediction process of bitcoins or cryptocurrency. Then the research will be concluded. This research planning will be helping them to understand the prediction process and how it can be used to predict the needed value for the cryptocurrency.

### **1.9 Conclusion**

This chapter starts with the introduction process which shows the importance of the prediction process of the cryptocurrency. Also, the research aim and the objectives are discussed which have set the goals for the research. Then the research question is discussed which would help the research to proceed with a certain type of explanation. Then the research rationale is discussed shows why the research is done and the facts that will be explained in the research. Then the research planning is explained which gives whole details of the research work and gives an idea of the facts that are to be discussed in the research. The research question is also used to set a different milestone for the research.

# **Chapter 2: Literature Review**

# **2.1. Introduction**

The bitcoin prediction has started since the start of the digital currency. It is seen that the people who have the bitcoin have to invest it somewhere. The people having the bitcoin always have the urge to know the value of the bitcoin that they possess. This would help them to work on the investment process. The owner of the cryptocurrency will be buying the coins based on their value. This would help them to make sure that the bitcoin gives them back the profit that they need. In addition, the prediction of the cryptocurrency data will be providing the owner with real-time data. This will also help in preparing the owner to work on certain types of processes and train himself or herself to invest. In addition, they can predict the price of the cryptocurrency, which will be helping them to make sure that the investment can done in a proper way. In addition, the prediction data can used for the rejection process. With the help of cryptocurrency prediction, it is possible to make sure that all the owners will be able to know the chances of up and down before it even happens. Therefore, in this chapter the critical ways of using python to predict the currency and understand how they can improved.

# 2.2. Empirical Study

According to Safari, 2021 the first thing is that the crypto prediction gives the idea to the owner to work on the investment process. The first thing is that it provides the owner the idea of whether the investment that they are going to make will be taking them upwards or dropping the share in the market. The recent reading shows that the crypto prediction has started going up and this will

take the transaction to a completely different level. In addition, there are significant factors risk that would help the owner to analyze the risk (Safari *et al*, 2021). This will be increasing the success of the work. The second prediction is that there are investors that will be adopting bitcoin. There is a high chance that the bitcoin investment is possible because the investor is looking for a profit. The investor knows the right way to earn the profit so bitcoins are one of the right places to earn the profit. The investor is ready to invest the money to earn more profit so as the year passes the value of the bitcoin scan be improved (Safari *et al*, 2021). The third prediction made is that the share of the bitcoin is made because the bitcoins developer thinks that the market is large enough to handle the data of the bitcoin. This would also help them to work on certain data. Another prediction was made that the currency regulator will take the chance to use bitcoin to earn a profit. They are also a legal zone for the cryptocurrencies that will be providing the investor the chance to invest in things that are quite important.



Figure 1: Intention to use

(Source: Self-Created in MS Word)

There are many intentions to use the prediction of bitcoins. The above figure shows the intention like the bitcoins are predicted to understand the event the performance at a certain market. The second thing is the effort efficiency that would define how bitcoin can be efficient. The third thing is the social influence where how the bitcoin is performing in the market and how the people are impressed with it (Safari *et al*, 2021). Another thing is to improve the condition of the downsizing of the market. Then the perceived risk is understood where how bitcoin can create risk. Also, financial literacy is improved. The people are working on understanding the financial status of the usage of the bitcoin and providing them additional knowledge. This provides the idea that bitcoin usage is quite efficient when the right investment is made at the right time.

According to Kanwal, 2022 python have a certain process to work on the prediction process. This process helps the prediction process to be more accurate and the process the perfect result.



# Figure 2: Process of python analysis

(Source: https://www.sciencedirect.com/)

The above figure shows the process that the python analysis uses in the prediction of the model. The block diagrams depict that the bitcoin price travels through various steps of python analysis. The first step is to sort out the features of the coin into two components low and high (Kanwal, 2022). This whole part is feature engineering. Then the feature engineering transfers the process to Bitcoin daily price and the Bitcoin high-frequency trading price. This is the bitcoin price classification process. Then there are two methods that are used for this process. The first one is the statistical methods and also machine learning methods (Kanwal, 2022). The statistical methods consist of two techniques one is logistic regression and linear discriminant analysis. Also, there are machine learning methods guided by the random forest, XG forest, quadratic discriminate analysis, support vector machine, and long short-term memory. Now, these two methods are applied to the prediction process of the bitcoin price classification.





(Source: https://www.researchgate.net/)

The above figure describes the process to make sure that all the bitcoin follow this model to be processed. The first thing is the cryptocurrency exchange market statistics that give the stats of the rise of the currency. The second thing is the blockchain data-based market. This works on the data mining process that would help them to preset the data and let them make sure that the data related to the bitcoin is filtered. The third is the social sentiment which is how people are reacting to the bitcoin on social media. This would help python to understand how people are supporting bitcoin and whether they are ready to invest in social media. These three processes are the part of the data collection process which python will be used for the analysis process. Then the step of the data pre-processing is taken to record. This means the data will be analyzed and the resul,t will be withdrawn. The first thing is the data feature normalization and then creation of the Ndata mask window. Then after the preprocessing process, the whole work is transferred to the perception of

the work and made sure that all the prediction is multi-layered. Finally, the price is predicted for the investor to invest in the market. So in this situation, it is seen that there are many cases that are happening. Python is taking a lot of complexities to understand the changes in the price o bitcoin. Now there are certain problems that python must face decrypting the price that is needed for the bitcoin. This bitcoin would make sure that the python analysis is taking out the exact value for the investor so that they can gain profit from the market. This would help them to work on the shares so that they can invest in the market, later on, to work on the investment process.

According to Liu, 2022 there are many problems that are related to the usage of python in the bitcoin analysis process. The first thing is the speed of the python analysis. The interpretation of the python language is quite a problem when it comes to the analysis of this data. The speed is quite slow in such a case and the result of the bitcoin value might not be gained as desired. Second thing is that python has become a mobile development app where it is seen that all the materials that are related to the bitcoin would be quite complicated related to the device (Liu et al, 2022). This would create problems to work on certain complex codes that are related to bitcoin. The third is memory consumption. The codes of python are quite huge in size making it difficult to run the codes freely and store them to make the code run. The lack of memory makes it tough for people to understand the result of the bitcoin analysis. The developer often finds it difficult to store the data related to the result (Liu et al, 2022). Also, they have the ability to understand the database access which is quite a problem out there. This creates stress on the developer to understand the data from the database. Often it is seen that the whole database is quite complex making it quite difficult for the developers to understand which data must be taken and which should be avoided (Liu *et al*, 2022). This would also make them puzzled about the database that has been used by them. Also, there are a lot of runtime errors that the developer has to fight a lot. This would make the developer struggle; e a lot against the code bugs making it quite problematic. This would make them work on a certain type of situation and take out different types of solutions that might not be effective against the bugs that python creates. These challenges are a part of the developer problem. Also, the developer has to face the problem related to the change in the numeric value that would make the work on the numeric parameter and the numeric value (Liu et al, 2022). Also sorting a list is quite problematic when it comes to debugging the codes. This makes it quite tough for the developer to monitor the data that is related to the battery charging process. Also in the codes, there are a lot of repeats in the character. The developer also has to face the repeat in the character

that makes the use of the python quite problematic. The compilation of all the factors makes python quite problematic.

According to Ortu, 2019 the above-referred problems can be solved. The first thing is to use the proper data structure so that when the analysis is done there is no problem occurring at this place. Second thing is to decrease the use of the loop, which will be helping to make the code run faster. Then in the python codes multiplier assignments can used to make sure that the code stays clean and is a one-liner (Ortu *et al*, 2019). In addition, the global variable cannot be used because they take a lot of time to execute. In addition, the library function can be used to keep the code clean and there is no complexity seen (Ortu *et al*, 2019). In this way, it is possible to make the code easy enough for decoding purposes. Also, it is important to save the codes that are used so that next time when it is used the persons do not have to think much.

# 2.3. Theories and Models





# Figure 4: Impulsive theory based on Cryptocurrency

(Source: https://theconversation.com/)

So in the above figure, it is said that how a person reacts when the python analysis is done based on the cryptocurrency. The structure shows the attitude of the person before investing in cryptocurrency. The model starts with the description of the person who shows a different type of attitude towards the cryptocurrency. The first thing is the Positivity, Conspiracy beliefs, and fear of missing out. The first criterion or the attitude shows how positive a person can be towards the cryptocurrency and how they can invest it in various other places (Fischer *et al*, 2019). Then the next thing is the belief in the conspiracy theories. When an investor is doing the python analysis it is seen that there are negative things rising in the name of the cryptocurrency. So the investor would believe in the problem that is related to the theories. This would make the investor take a step back from the investment that he or she is about to make (Indulkar, 2021). The third is the fear of getting missed out. The investor believes that they might miss the best chance to invest their bitcoins in the market. The python prediction of the cryptocurrency would make them invest the bitcoins on things that do not have much value. Then the structure further moves from positivity to narcissism. The conspiracy beliefs lead to Machiavellianism. The third is the fear of missing out have three branches in which one of Machiavellianism another is psychopathy and finally is the sadism process.



**Figure 5: A prediction process model** 

(Source: https://onlinelibrary.wiley.com/)

The above figure is the model based on the prediction process of cryptocurrency using python analysis. At the beginning of the model, it is seen that first the prediction factors are considered. The two factors are the basic and high dimensional. Then the factor is transferred to the cryptocurrency price prediction (Harshavardhan *et al*, 2021). This would help them to work on the process of predicting the value based on the factors. Then the python analysis is used for the prediction process. The python analysis uses statistical techniques and machine learning

techniques. On the basis of the statistical analysis, this would help them to work on the stats data that would help them to identify the rise and fall of the value that is based on the cryptocurrency. Also, the data from the machine learning analysis gives the data that when the investor will be able to invest in a certain type of market.

#### Models



#### Figure 6: Modelling theory of the bitcoin prediction

(Source: https://pub.towardsai.net/)

The above figure is of the model that is related to the python analysis of the prediction process. The python follows this model to understand the value of the bitcoin that the investor holds. The first thing is transaction 1 which is the bitcoin transmitter and the bitcoin transmitter. These two blocks are numbered A and B. there are peer-to-peer transactions. Then after the transaction is done the data that is related to the transaction needs to be stored (Vaddi *et al*, 2020). So a new model is considered related to the transaction model. At first, the data is inserted in form of the input. Then from Minor 1 to Minor n is used for the checking of the data. Then the verification of the proof work is taken to understand the work that is done. After the minor 1 to n checking is done the whole model is linked up to the validation of all the nodes (Satyaloka *et al*, 2021). Then the block n+1 j transaction is done.



#### Figure 7: Bitcoin price prediction model and analysis

#### (Source: https://link.springer.com/)

The prediction model analysis would help them in the bitcoin price prediction model. At first, the bitcoin data set is downloaded. Then all the data individually are called. This is done with the max and min normalization and also preprocessing. The scaling will help the investor to understand which data is good for the investment process. Then the data is split into two. The first one is the training data that and another one is the testing data that is taken for the analysis. Python will be taking the second model to understand the data for tjhe testing process (Sinha *et al*, 2020). Now the training model has 80% involvement and the testing data has 20% of the designing the model. Then the value of designing the model would help in the bitcoin price prediction. So it can be said that by using the theory and the model it can be said that the investor will be able to work on a certain investment that can be made in the market.

## 2.4 Literature Gap

In this chapter, the literature starts with a discussion on how investors can influence themselves with the right intention to use. The investor must have certain ideas to make sure that when the investment of the bitcoin is done they do not have to face a lot of losses in the market. Then few articles are taken to understand the process of the python prediction of the cryptocurrency. Then it further moves on to how the various model can be used to do a minute analysis of the data related to the cryptocurrency. Now the literature review fails to discover the facts like how python usage in the prediction process might give wrong results. Then it could have discussed with the facts that explain how the prediction process becomes easy for the python process. This could have made the literature review more strong and it could have been easier. Also, the literature review failed to explain how the cryptocurrency prediction will be changing the digital market. The changes in the digital market could have made the transaction more easier. Also the literature could have explained how the prediction of the cryptocurrency influences the change in the value and how the investor can work on making it more attractive.

# **2.5** Conclusion

This chapter starts with the introduction, which discusses the origins of the prediction that started for the bitcoin to predict the value. Then few articles were taken to understand how the software python takes the prediction of the bitcoin to different criteria. Then the python analysis is explained how the value of the bitcoin is determined. Then review further dives into understanding how python analysis can be a problem in the prediction process. The model is defined by how python is predicting the value of the bitcoin. Then the theories and the model related to the prediction process are explained. The theory starts with the explanation of the investor mindset on how they think about the investment of the bitcoin in the nearby market around them. The thinking process is also divided into many parts that show how deeply the investor thinks about the result that is derived from the python prediction process.

# **Chapter 3: Methodology**

# **3.1. Introduction**

In this research, there are things that will be discussed. In this section, the methods that will be used for this research will be discussed. At first, the outline of the method will be discussed. Then the research approach will be discussed. Then the research strategy will be discussed. Then the research method will be discussed which will give the idea of how the data will be collected and how all the data will be analyzed. Then the data sampling method will be discussed. This will shed the light on how the data was filtered. Then the research ethics will be discussed on how the researchers can maintain the legality of the research. Finally, the time horizon will be discussed. This will give an idea of how the research will be proceeding.

# 3.2. Method Outline

The research will start with the how approach will be. In this case, the inductive research approach will be used. This part will be discussing how the approach will discussed. Then the research strategy will be discussed which is why all the methods are used in the research. There are also data collection methods where the qualitative method will be used. Then the data analysis method will be discussed. In this case, the primary method is used and this part will discuss how the data analysis is done using this method. Then the data sampling method will be discussed. This will show the technique of how the filter will be done. Then the research ethics will be discussed. This part will shed light on the fact that how the whole research will be done with legal support. It will also show how the participants of the research will be discussed which would help in understanding the way of the research.

## **3.3 Research Approach**

The inductive approach is used in this research because the data that will be collected for this research will be helpful to gather the information that is related to the topic of interest. Before the data is collected first the interest data for the actual data will be collected (Azam, 2021). This will also help in determining the pattern of the data that are collected. There are relations that are related to the data that are available (Azam, 2021). Therefore, the researcher will be able to understand the pattern and work on the data. In this way, the research can be taken further with the details of the data.

# **3.4 Research Strategy**

Now starting with the idea of the approach the researcher will be using the inductive approach. This will be providing the research with enough time to make a certain set of observations and also collect the data that would be helping them to work. The researcher will be able to make a certain set of predictions that would provide a way to understand a certain set of experiences (Safari *et al*, 2021). In addition, in other words they are able to move with the data to the theory process. Second thing is that the qualitative data collection method is used for the research. In this case, it is seen that there are many data that are available for the research but which one to use and which one to leave can be decided (Safari *et al*, 2021). The qualitative research method will be discussed to make sure that the decision-making process for the data can be improved. Finally, the primary

analysis would be using the technique to understand which data has irrelevant things for the research.

# 3.5 Data Collection Method

A data collection method is qualitative. In this case, there are many methods that are used for the research. The first thing is to have one on one interview that would help the researcher to gather information that is highly personalized. Second thing is to have an open-ended survey and also questionnaires (Satyaloka *et al*, 2021). This will give the researcher an understanding of how the data can gathered from the people to work on it. Then the researchers can create a group to work on certain information and help them to control the schedule of the work that is done (Satyaloka *et al*, 2021). In addition, the researcher will be using the observation process where he or she will be taking the samples of the data and observing them patiently to work on the data.



# Figure 8: Data collection qualitative

# (Source: https://statswork.com/)

In this method, one of the best techniques is group discussion. This gives the chance to the people in the team to conduct a brainstorming session and make sure that the brainstorming session develops the needed idea.

# 3.6 Data Analysis method

In this research, primary data analysis is used. There are many different reasons that are lying behind it. The first thing is that the reliability of the data can be handled. The data analysis result can be trusted because the researcher (Harshavardhan et al, 2021) will perform the analysis. Also in the analysis, there are chances that would help is collecting the information that is needed for the analysis process. Now in the case of the primary analysis, the exact data that is collected for the research is used in the analysis process (Harshavardhan *et al*, 2021). Also during the analysis, many exact volumes are needed for this analysis.



# Figure 9: data analysis method

## (Source: https://www.datapine.com/)

In this analysis method at first, the researcher will be working on identifying the data. Then the data will be cleaned and analyzed for the needed result. Then the data will be interpreted to work on it (Harshavardhan *et al*, 2021). This cycle will keep going for all the data that are collected. They can also ensure the availability of the necessary skills. In addition, this analysis method will provide the backup to use the data collection method. In addition, there are many inappropriate analyses of the data.

# 3.7 Data sampling method

Now many data are used in the research. The first thing is to make sure that all the data are filtered. Now during the filtering or the sampling process, many things are related to the research. This would help them to be focused on the goal. The research goals can be handled (Liu *et al*, 2022). This would help in understanding the goals and also work on the combination of the price and the goals of the research. Then use the data to work on the goals of the research (Liu *et al*, 2022). The probability sampling process would be working to test each method and work on achieving the goal. This sampling is used in the prediction process.



# **3.8 Research Ethics**

#### **Figure 10: Research ethics**

(Source: https://www.ucd.ie/)

This research will be proceeding with the key ethical issues that should be avoided. The first thing is that when data is used the owner of the data will asked if he or she holds a certain amount of problems, they have the right to take away the data. The second thing is the freedom to harm. In this way, the owner can stay away from any kind of problem (Ho *et al*, 2021). There might be dissatisfaction among the people who own the data. Third, the owner must know that the data is used for the work and the researcher must inform as well. In addition, confidentiality must be maintained (Ho *et al*, 2021). The owner must be aware of what is happening and they have the

right to demand some privacy to keep the data quite secure. Therefore, the researcher has to agree to the terms that are related to the data. In addition, the ethics resources can be handled. This would help the researcher to work quite successfully and maintain the law based on the research.

# 3.9 Time Horizon



# Figure 11: Time horizon and time allocation

(Source: Self-Created in Project Libre)

# 3.10 Conclusion

This chapter started by providing an outline of the method that would be used in this research. Then the research will discussed. Then the research strategy was discussed. After that, the data collection method will used to understand the way the data will collected. Then the data analysis method will used to understand how the data will analyzed. Then the data is filtered and also sampled. Then the research ethics will be discussed. In situation, there are many laws that must be discussed that will be leading the research. Then the time horizon would be showing how much time is needed for the methodology section and how much time will be taken to analyze the data and produce the result.

# Chapter 4: Artifact Design, Development & Testing

# 4.1 Introduction

# 4.2 Analysis

```
[4] # First we will import the necessary Library
        import os
        import pandas as pd
        import numpy as np
        import math
        import datetime as dt
        import matplotlib.pyplot as plt
        # For Evalution we will use these library
        from sklearn.metrics import mean_squared_error, mean_absolute_error, explained_variance_score, r2_score
        from sklearn.metrics import mean_poisson_deviance, mean_gamma_deviance, accuracy_score
        from sklearn.preprocessing import MinMaxScaler
        # For model building we will use these library
        import tensorflow as tf
        from tensorflow.keras.models import Sequential
        from tensorflow.keras.layers import Dense, Dropout
        from tensorflow.keras.layers import LSTM
        # For PLotting we will use these library
        import matplotlib.pyplot as plt
        from itertools import cycle
        import plotly.graph_objects as go
        import plotly.express as px
        from plotly.subplots import make_subplots
```

# Figure 12: The import of packages code

(Source: Self-created in Google Colab)

In the above snip, the import of various packages are shown such as os, pandas, numpy, math, datetime, matplotlib.pyplot and various other packages as well. The necessary library is imported first, then for evaluation, these library will be used here such as mean squared error, mean absolute error, explained variance score, r2 score, mean poisson deviance, mean gamma deviance, accuracy score, MinMaxScaler then for building of the model, the libraries which are imported here are tensorflow, Sequential, Dense, Dropout, LSTM and after this, finally for plotting the library which will be used here are matplotlib.pyplot, cycle, plotly.graph\_objects, plotly.express and make\_subplots. These packages are used here using the dataset "BTC-USD.csv" which is used for "Cryptocurrency Prediction".

[19] d	f.head()							
	ſ	Date	Open	High	Low	Close	Adj Close	Volume
0	2014-0	9-17 46	5.864014	468.174011	452.421997	457.334015	457.334015	21056800
1	2014-0	9-18 45	6.859985	456.859985	413.104004	424.440002	424.440002	34483200
2	2014-0	9-19 42	4.102997	427.834991	384.532013	394.795990	394.795990	37919700
3	3 2014-0	9-20 39	4.673004	423.295990	389.882996	408.903992	408.903992	36863600
4	4 2014-0	9-21 40	8.084991	412.425995	393.181000	398.821014	398.821014	26580100

## Figure 13: The dataset header values

(Source: Self-created in Google Colab)

In the above snip, the header values that is the first five values of the dataset are displayed here and the columns such as "Date", "Open", "High", "Low", "Close", "Adj Close" and "Volume" of the dataset for the 5 rows are displayed in the above snip using the data frame of the dataset which is "BTC-USD.csv" which is based on "Cryptocurrency Prediction".

20]	df.tai	1()							
		Date	Open	High	Low	Close	Adj Close	Volume	
	2708	2022-02-15	42586.464844	44667.218750	42491.035156	44575.203125	44575.203125	22721659051	
	2709	2022-02-16	44578.277344	44578.277344	43456.691406	43961.859375	43961.859375	19792547657	
	2710	2022-02-17	43937.070313	44132.972656	40249.371094	40538.011719	40538.011719	26246662813	
	2711	2022-02-18	40552.132813	40929.152344	39637.617188	40030.976563	40030.976563	23310007704	
	2712	2022-02-19	40022.132813	40246.027344	40010.867188	40126.429688	40126.429688	22263900160	

## Figure 14: The end values of the dataset

## (Source: Self-created in Google Colab)

In the above snip, the end values that is the tail values of the dataset are displayed here and the columns such as "Date", "Open", "High", "Low", "Close", "Adj Close" and "Volume" of the dataset for the 5 rows are shown in the above snip using the data frame of the dataset which is "BTC-USD.csv" which is based on "Cryptocurrency Prediction".

```
[21] print('Total number of days present in the dataset:',df.shape[0])
print('Total number of fields present in the dataset:',df.shape[1])
Total number of days present in the dataset: 2713
Total number of fields present in the dataset: 7
```

#### Figure 15: The total number of days and fields of the dataset

### (Source: Self-created in Google Colab)

In the above snip, the total number of days and the fields of the dataset that is "BTC-USD.csv" which is based on "Cryptocurrency Prediction" is clearly shown in which the shape of the total number of days and fields of the dataset in which the total number of days are 2713 and total number of fields are 7 which is based on the dataset that is "BTC-USD.csv" in which the cryptocurrency is predicted here carefully. This is very vital in the context of the topic which is given here regarding the dataset.

( <b>G</b> )	df.desc	ribe()					
C•		Open	High	Low	Close	Adj Close	Volume
	count	2713.000000	2713.000000	2713.000000	2713.000000	2713.000000	2.713000e+03
	mean	11311.041069	11614.292482	10975.555057	11323.914637	11323.914637	1.470462e+10
	std	16106.428891	16537.390649	15608.572560	16110.365010	16110.365010	2.001627e+10
	min	176.897003	211.731003	171.509995	178.102997	178.102997	5.914570e+06
	25%	606.396973	609.260986	604.109985	606.718994	606.718994	7.991080e+07
	50%	6301.569824	6434.617676	6214.220215	6317.609863	6317.609863	5.098183e+09
	75%	10452.399414	10762.644531	10202.387695	10462.259766	10462.259766	2.456992e+10
	max	67549.734375	68789.625000	66382.062500	67566.828125	67566.828125	3.509679e+11

#### **Figure 16: The whole description of the dataset**

#### (Source: Self-created in Google Colab)

In the above snip, the whole description of the dataset that is "BTC-USD.csv" which is based on "Cryptocurrency Prediction" is clearly displayed here (Rebane *et al.* 2018). The columns of the dataset that is "BTC-USD.csv" such as "Open", "High", "Low", "Close", "Adj Close" and "Volume" is also shown with their respective values such as count, mean, std, min, 25%, 50%, 75% and max as well. This is very vital in the context of the dataset using which the "Cryptocurrency Prediction" is to be performed here in this case.

<mark>∕</mark> 0s	0	df['C	ate'] = pd.	to_datetime	(df['Date'],	, format='%Y	-%m-%d')				
		y_2014 = df.loc[(df['Date'] >= '2014-09-17') & (df['Date'] < '2014-12-31')]									
		y_201	4.drop(y_20	14[['Adj Cl	ose','Volume	e']],axis=1)					
	[-}		Date	Open	High	Low	Close				
		0	2014-09-17	465.864014	468.174011	452.421997	457.334015				
		1	2014-09-18	456.859985	456.859985	413.104004	424.440002				
		2	2014-09-19	424.102997	427.834991	384.532013	394.795990				
		3	2014-09-20	394.673004	423.295990	389.882996	408.903992				
		4	2014-09-21	408.084991	412.425995	393.181000	398.821014				
		100	2014-12-26	319.152008	331.424011	316.627014	327.924011				
		101	2014-12-27	327.583008	328.911011	312.630005	315.863007				
		102	2014-12-28	316.160004	320.028015	311.078003	317.239014				
		103	2014-12-29	317.700989	320.266998	312.307007	312.670013				
		104	2014-12-30	312.718994	314.808990	309.372986	310.737000				
		105 ro	ws × 5 colum	ns							

# Figure 17: Showing all the values of the dataset

(Source: Self-created in Google Colab)

In the above snip, the code of the dataframe in the dataset shows the columns such as "Date", "Adj Close" & "Volume" as well (Khedr et al. 2021). The output and the whole description of the dataset is printed here due to which all the columns such as "Date", "High", "Open", "Low" & "Close" due to which all of the values with respect to the dataset "BTC-USD.csv" which is vital for "Cryptocurrency Prediction" is clearly shown in the above snip (Patel *et al.* 2020). For the year 2014, the respective details of the dataset is given here and based on this the work is to be performed here using the dataset here.

∑a 0a	0	<pre>monthvise= new_order = monthvise = monthvise</pre>	y_2014.group ['January', 'September monthvise.n	oby(y_2014['[ , 'February', r', 'October reindex(new_o	Date'].dt.strftime('%B'))[['Open','Close']].mean() , 'March', 'April', 'May', 'June', 'July', 'August', ', 'November', 'December'] order, axis=0)
	C,		0pen	Close	· //.
		Date			
		January	NaN	NaN	
		February	NaN	NaN	
		March	NaN	NaN	
		April	NaN	NaN	
		May	NaN	NaN	
		June	NaN	NaN	
		July	NaN	NaN	
		August	NaN	NaN	
		September	412.654003	407.182428	
		October	365.748000	364.148873	
		November	364.850235	366.099799	
		December	344.146864	341.970366	

#### Figure 18: Details of the months

# (Source: Self-created in Google Colab)

The above snip the months from january to december and their respective values in the open and close column is displayed. The values such as 412.65,407.18 are shown for the months from September to December (Charandabi and Kamyar, 2021). The month wise value contains new order and axis value which is zero (Huang *et al.* 2021). Apart from this the 2014 details of the dataset such as date, volume, etc is clearly shown which is vital for cryptocurrency prediction. The monthwise reindex values are also helpful in case of giving appropriate data values of the data set.

<b>0</b> a	<pre>fig = go.Figure()</pre>
	fig.add_trace(go.Bar(
	x=monthvise.index,
	y=monthvise['Open'],
	name='Stock Open Price',
	marker_color='crimson'
	))
	fig.add_trace(go.Bar(
	x=monthvise.index,
	y=monthvise['Close'],
	name='Stock Close Price',
	marker_color='lightsalmon'
	))
	<pre>fig.update_layout(barmode='group', xaxis_tickangle=-45,</pre>
	title='Monthwise comparision between Stock open and close price')
	fig.show()

# Figure 19: Modification of the graph of the Stock price

(Source: Self-created in Google Colab)





# (Source: Self-created in Google Colab)

In the above snip, the stock comparison of September to December which is related to the high price is shown in the dataset (Jay *et al.* 2020). The possible values in the graph are clearly shown in which the month wise comparison between the Open stock and the Close stock price is clearly shown in the above snip.



# Figure 21: Modification of the stock low price graph

(Source: Self-created in Google Colab)

In the above snip, the modification of the graph for the low price of the stock is shown or displayed and the plotted graph is shown or displayed for which the figure based on the months is clearly displayed and name and the marker color is also shown in the above snip in which the group and month wise high and low stock price is clearly calculated here.



# Figure 22: Stock comparison of September to December (Low Price)

(Source: Self-created in Google Colab)



# Figure 23: Stock price calculation from "open price to close price and stock high price to low price"



(Source: Self-created in Google Colab)

# Figure 24: Graphical representation of the "open price to close price and stock high price to low price" from September 21, 2014 to December 28, 2014



(Source: Self-created in Google Colab)

# Figure 25: Comparison of the stock price over the months of January to December for Annual prediction



(Source: Self-created in Google Colab)

# Figure 26: Comparison of the stock price over the months of January to December for Annual prediction from High stock price to low stock price

(Source: Self-created in Google Colab)
#### Modeling, Validation and Processing of Data

For all the dataset the inputs had significance in the deep learning model of training. By the extensive testing in the chapter 5 there could be observed the layout or lexical features played little role comparing the code which was sourced in the training of deep learning and the validation. Resulted an adoption of model on the source code that was based on character. The neural network that included the layer of LSTM with 5123 dimension for the space of output. Activation of Softmax Function was applied to the layer of output and then the network was trained (Ejaz, *et al*, 2022).. Those parameters were chosen for the repeated train and the validation trial. The output of training and validation lost data was attached in the figure 15. From the samples of input some percentage of samples was selected for the training and rest was selected for the validation.



Figure 27: Output of Plotted Training and Validation Loss Data

(Source: provided)

Every data of the training or the validation generated a model. The weights of network mwere randomly initialized. Model's final behavior would differ somehow from the particular training to the next training.

#### **Modelling the Data**

Unlike the code of computer source which was character based the raw data was based on the English words. The sequences of word were partitioned into the size which was fixed. From the every samples the network of neural randomly picked the training samples and rest picked for validation. Every validation and the training generated a model. The processing was type of probabilistic. On the same samples set the process ran several times. The accuracy of average training reached a good level, with the standard deviation of 0.015. The epoch number averaged deviation reached 14.67, with the deviation standard of 0.957. It could be noted that the validation accuracy of 52% was achieved over the labels I comparison with the other labels.

#### Applying the Deep Models on the System Calls

By combining the data of cryptosystem calls the creation of system calls created. Data of benign system calls was introduced as the main dataset on the process of embedding. Similar for opposing the structure which was sequential applied on the models of Deep Learning. The crypto system calls was used for investigation of possibility detecting the malware of crypto miner by the use of system calls. For applying models of system calls there was needed the performance of word embedding. Classifier's evaluation method was similar to the opcodes (Ortu, *et al*, 2022). Here also presented the representation of average performance of the model which were trained which experimented ion the data that were unseen. The classifiers which was trained showed the high accuracies, low rates of false positive, and the high MCCs that were close to the prediction which were perfect. To crypto mine the detection of malware. Though the dataset was unbalanced and the rate of accuracy might not be the ideal; metric for judging the models, the MCC's high values and the F-measure implied on the models' effectiveness for the detection of malware samples crypto mining.

## **Defining Solutions Objectives**

At first a tool should capture the attributes, status and dynamics of the related elements in environment. And then putting them in the  $2^{nd}$  step of relation to the relevant elements of environment. At third step a tool of awareness situational must had ability for the prediction of the elements would do in further. With the accuracy the collection of data happened and then consisted to avoid the misinterpretation. Here also some historical data could be suggested for the analytics to facilitate the recognition of pattern and then learning (Tindell, *et al*, 2022). Additionally the challenges which were context specified were required to describe. The indicators of

cryptocurrencies like the prices and the volumes of transaction or the current difficulties had to be collected based on regular market. Those quantitative data must be set to current discussion context in the community of operating system. To support and indicate the developments of the interpretation. For the board's high frequency the contributions of community must be filtered and then pre-analyzed for presenting the more relation with the user. But user also would had the possibility to go into deeper and then get a very detailing information about the cryptocurrencies' trends. So it's became necessary for switching between the views of data centric and the community centric.

## Conclusion

By the artifact design here it could be known that cryptocurrency gaining the increasing popularity. The mining of Crypto and the malware which associated would remain growing threat. The static analysis by the use of LSTM and CNN on the opcodes of crypto mining malware were achieved the accuracy rate of .96 with the positive rate of low false. In the upcoming chapter the result testing and discussion would be done.

# **Chapter 5: Testing Results and Discussion**

## Introduction

From the methodology the collection of data was done as the first stage to start a project. The measurement, collection, analyzation with the accurate insights for the research by the techniques of standard validation was done. As a result testing part for assessing the theory the gathered information dependency was done by in the analysis. The result's effect and an assortment of information were diversed for different study field. And these were contingent on the data that were necessary. The significant objective of testing and discussing the result was ensuring that all the information that was gathered was richly contented and was very reliable for the analysis of statistics. To get a decision that was data driven could be made effectively and efficiently. The dataset contained transactions of 2014 to onward. All the data firstly tweeted out by the regression techniques and then the model of deep learning was implemented for providing the best accuracy in comparing the concepts of ML when there were high datasets. From the regression of linearity, the relationship between independent and dependent variables was identified. While using the one independent and a dependent variable then that was called a regression of multi linearity. By the concept of deep learning a particular concept of Recurrent Neural Network avoided the particular gradient problem that was vanished.

Analysis

	<pre>data['Date'] = pd.to_datetime(data['Date'], format='%Y-%m-%d')</pre>							
	<pre>y_2017 = data.loc[(data['Date'] &gt;= '2017-01-01')</pre>							
		Date	Open	High	Low	Close		
	837	2017-01-01	963.658020	1003.080017	958.698975	998.325012		
	838	2017-01-02	998.617004	1031.390015	996.702026	1021.750000		
	839	2017-01-03	1021.599976	1044.079956	1021.599976	1043.839966		
	840	2017-01-04	1044.400024	1159.420044	1044.400024	1154.729980		
	841	2017-01-05	1156.729980	1191.099976	910.416992	1013.380005		
	1197	2017-12-27	16163.500000	16930.900391	15114.299805	15838.500000		
	1198	2017-12-28	15864.099609	15888.400391	13937.299805	14606.500000		
	1199	2017-12-29	14695.799805	15279.000000	14307.000000	14656.200195		
	1200	2017-12-30	14681.900391	14681.900391	12350.099609	12952.200195		
	1201	2017-12-31	12897.700195	14377.400391	12755.599609	14156.400391		
3	365 rows × 5 columns							

# Figure 28: Considering the volume of 2017 for high and low price of currencies

# (Source: provided)

This is the testing of 2017 years from where the high and low prices during the ups and downs (Ao, *et al*, 2022). In the close and open column, the values came as the dataset considered from the data.

<pre>monthwise= y_2017.groupby(y_2017['Date'].dt.strftime('%B'))[['Open','Close']].mean() new_order4 = ['January', 'February', 'March', 'April', 'May', 'June', 'July', 'August'</pre>					
	Open	Close			
Date					
January	914.680971	914.916159			
February	1055.620071	1062.533672			
March	1133.212576	1129.365228			
April	1197.646997	1206.641007			
May	1865.748712	1895.383529			
June	2630.573332	2636.204346			
July	2509.213233	2519.418386			
August	3819.812579	3880.989998			
September	4077.400993	4064.836312			
October	5291.370007	5360.071604			
November	7685.745996	7813.132975			
December	15175.219601	15294.270980			

## Figure 29: In 2017 the testing result of January to December

#### (Source: provided)

From this value the testing of 2017 cryptocurrencies transactions was successfully done on the basis of month. Here it can be seen that in January the open value was approx. 915 and in close time more approximately 915. Not so many differences. But after comparing each month at last in the December the open time transaction was approx. 151756 and in the close time the approx. (Ho, *et al*, 2021). Value was 15295 which was quite impressing.



Figure 30: Index of Close and open file

Here is the input given for the testing were tracing the values of monthwise index. In the x-axis the monthwise axis was given and on the y-axis the open time value and the close time values were given respectively.



Figure 31: Adding the bar for high and low price time as per the monthwise

In the 2017 the high time and low time tested here in the upon input. The tracing of the values were done by the inputs that high price of stocks and low price of stocks taken as the Y axis for the figure and x axis was considered as the index parameters (Nagilla, *et al*, 2022).

from dataclasses import dataclass data['Date'] = pd.to_datetime(data['Date'], format='%Y-%m-%d')							
y_2018 = data.loc[(data['Date'] >= '2018-01-01') & (data['Date'] < '2019-01-01')]							
y_2	2018.drop(y_	2018[['Adj Cl	ose','Volume'	]],axis=1)			
	Dete	0	U:-L		C1		
4202			nign	10454 700405	42657 200405		
1202	2018-01-01	14112.200195	14112.200195	13154.700195	13657.200195		
1203	2018-01-02	13625.000000	15444.599609	13163.599609	14982.099609		
1204	2018-01-03	14978.200195	15572.799805	14844.500000	15201.000000		
1205	2018-01-04	15270.700195	15739.700195	14522.200195	15599.200195		
1206	2018-01-05	15477.200195	17705.199219	15202.799805	17429.500000		
1562	2018-12-27	3854.688477	3874.416992	3645.448486	3654.833496		
1563	2018-12-28	3653.131836	3956.135986	3642.632080	3923.918701		
1564	2018-12-29	3932.491699	3963.758789	3820.408691	3820.408691		
1565	2018-12-30	3822.384766	3901.908936	3797.219238	3865.952637		
1566	2018-12-31	3866.839111	3868.742920	3725.867432	3742.700439		
365 rows × 5 columns							

Figure 32: 2018 Data considering low and high price at the open and close time

(Source: provided)

Here also the values of the high and low time indexing of the 2018 data (Park, *et al*, 2022). In the time of high and low and also market opening and closing time the dependencies of the customers on the cryptocurrencies were discussed from these data.

monthwis new_orde monthwis monthwis	se= y_2018.gro er5 = ['Januar    'Septemb se = monthwise se	oupby(y_2018[ 'y', 'Februar oer', 'Octobe e.reindex(new
	Open	Close
Date		
January	13212.074219	13085.558090
February	9462.242920	9472.001151
March	9156.591718	9040.557097
April	7963.618311	8033.596631
May	8505.240675	8450.997732
June	6829.257975	6793.507666
July	7101.466450	7146.349987
August	6723.800955	6700.129946
September	6622.821338	6610.675033
October	6494.016491	6485.118747
November	5481.615120	5404.250171
December	3726.475106	3717.488344

Figure 33: 2018 monthwise cryptocurrency testing for the open and close time

From this data plotting the 2018 data values for the time of opening and closing were decided for the month-wise index from the month of January to December a full year. As testing of comparison here it can be stated that in January at the open time the value was approx. 13213 and at the close time the value was approx. (Patil, *et al*, 2021). 13086. But in December at the time of opening the value was 3727 approx. and at the close time, it was approx. 3718. Hence here is the proof that the differences and decreases and increase factors of the data as per each month wise from the data of 2018 testing.



# Figure 34: Plotting monthwise high and low indexes of the values

(Source: provided)

From the input of the x and y axis the values of the high index and low indexes can be plotted from where the traces of monthwise index are4 on the x-axis and low and high plotted in the y axis correspondently.



**Figure 35: Updating the axes** 

From here the updation of the values of x and y axis here open and the close time value could be revealed comparatively. Here it's the analysis of the chart and the font size and font colors were taken as for the traces and x & y axes.

ř	<pre>data['Date'] = pd.to_datetime(data['Date'], format='%Y-%m-%d')</pre>							
	<pre>y_2019 = data.loc[(data['Date'] &gt;= '2019-01-01')</pre>							
		Date	Open	High	Low	Close		
	1567	2019-01-01	3746.713379	3850.913818	3707.231201	3843.520020		
	1568	2019-01-02	3849.216309	3947.981201	3817.409424	3943.409424		
	1569	2019-01-03	3931.048584	3935.685059	3826.222900	3836.741211		
	1570	2019-01-04	3832.040039	3865.934570	3783.853760	3857.717529		
	1571	2019-01-05	3851.973877	3904.903076	3836.900146	3845.194580		
	1927	2019-12-27	7238.141113	7363.529297	7189.934082	7290.088379		
	1928	2019-12-28	7289.031250	7399.041016	7286.905273	7317.990234		
	1929	2019-12-29	7317.647461	7513.948242	7279.865234	7422.652832		
	1930	2019-12-30	7420.272949	7454.824219	7276.308105	7292.995117		
	1931	2019-12-31	7294.438965	7335.290039	7169.777832	7193.599121		
	365 rows × 5 columns							

## Figure 36: The values at the time of close and open considering the high and low ranges

#### (Source: provided)

As per the discussion done here was also presented the inputs of the values in the 365 rows concerning a whole year means 365 days value on the consideration of high and low price at the time of open and close. From here the range of 1567 to 1931 all were detected for the tasting of the values. In the upcoming the readings of the values corresponding several years till 2021 are going towards the considering the value of close and end times.

🖌 Goi	Started		v prediction invol	X E Release Notes: 1710	33 M	
					₩ 	
E: > santanu > September > 5.09.2022 > Jobcard_DMGS_SID_15306_3 > Cryptocurrency prediction.jpynb > @ import par						
	Code + Markdown   > Run All   Clear Outputs of All Cells     Outline ····					
		Open	Close		. ,	
	Date					
	January	8318.949597	8389.270476			
	February	9656.215113	9630.722185			
	March	6943.507009	6871.016113			
	April	7150.611328	7224.477328			
	May	9237.761530	9263.151745			
	June	9499.797005	9489.227214			
	July	9519.383852	9589.899729			
	August	11639.097215	11652.394185			
	September	10689.700163	10660.276856			
	October	11791.307491	11886.978201			
	November	16450.121647	16645.757422			
	December	21680.540827	21983.137097			
	fig - g	Figure()				

Figure 37: 2020 Monthwise Cryptocurrency testing for open and close time

From this plotting, it was tested that in the year 2020 the open and close time result testing. There were the differences could be seen as per the whole year basis. In January the open time value was 8319 approx. and the close time value was more than 8319. But in the month of December, the open time value was approx. 231680 but in the close time the value was more than 21983. Hence was the proof that the differences of increasement and decrement followed as per month wise in the 2020 year testing.

+ cor	le 🕂 Markd	own 👘 🏷 Run A	II 🗮 Clear Outr		Connect to a lunvter
	monthvi new_ord monthvi monthvi	se= y_2022.gro er = ['January   'Septeml se = monthvise se	bupby(y_2022[' /', 'February' per', 'October e.reindex(new_	<pre>Abate'].dt.strftime('%B')) , 'March', 'April', 'May' ', 'November', 'December' order, axis=0)</pre>	[['Open','Close']].mea , 'June', 'July', 'Aug ]
		Open	Close		
	Date				
	January	41368.073463	41114.422379		
	February	41722.190538	41811.714627		
	March	NaN	NaN		
	April	NaN	NaN		
	May	NaN	NaN		
	June	NaN	NaN		
	July	NaN	NaN		
	August	NaN	NaN		
	September	NaN	NaN		
	October	NaN	NaN		
	November	NaN	NaN		
	December	NaN	NaN		

Figure 38: 2022 Monthwise Cryptocurrency testing for open and close time

From like these till the February of 2022 the values of cryptocurrency were trained and showcased from the output result.



Figure 39: 2022 Monthwise Cryptocurrency testing for open and close time

Here 60% was set as training data and 40% was set as testing data. Some append of time step was added to test data synchronously.

#### **Sentiment Analysis Testing**

The estimation was that many of data in world had been created in last 2 years. But here the text data was unstructured for the form of cryptocurrencies. Some amount of the unstructured data led a creation of NLP or processing of natural language. As a study area or to be developed. In paper, the processing of natural language tools named also analysis of sentiment. The sentiment analysis was a measuring and extracting act for the opinions or the emotions which was depressed in the text. The ending goal of the analysis was for applying the analysis of sentiment for collecting cryptocurrencies to determine the values which will be optimistic and negative in the cryptocurrencies' opinion.

#### **Discussion of Findings**

#### Modeling

In the research the ML of regression was chosen for the values which was continuous for the price of bitcoin. With library of scikit learn, the most valued 2 models of regression were followed primarily. The regression of TheilSen and The regression of Huber were selected for comparing to discuss the matter. For the regression models based on the deep learning, the library of Keras was used for creation of LSTM models.

#### Theil Sen Regression

The method of Theil-Sen used a slope median of all the lines through data point's pairs. In this cause, outliers could grow up to 29% for the two dimensional data or data pairs.



Figure 40: Code for regression modeling

Somehow if the data dimension increased, the outliers robust would be decreased.

## **Regression of Huber**

Regression of Huber used a loss of linearity to separate the data of outlier and inlier. The meaning of Outlier was its weight was less than the weight of the inlier. The scikit learn parameters were set by the regression of Huber following the python code example (Vlachos-Giovanopoulos, M., 2022). Epsilon was the outliers' parameters and the alpha was the parameter of regularization.



Figure 41: Code for regression modeling

In the mean gamma deviance, the data was tested and also in the mean Poisson deviance the data for MPD was trained. For these the test data MGD which was trained revealed the value was 0.002251694910518886. The data MGD which were tested appareled the value of 0.0014614593250727764.

# LSTM (Long Short Term Memory)

The memory for long short term was discussed for solving the problem which wsa gradient in problem in the RNN. The state which was state and hidden were used for the collection and sending data for processing in the next state. I/P, O/P and the forget gates were to define if the data could pass via or not on depending the data's priority.



Figure 42: Code for LSTM Modeling

Keras Parameters for modeling were first set by the LSTM as followed in the Python code example in the figure 14.

There were 2 most common metrics were used for the accurate measurement in the variables which were continuous. The error of Mean Squared and square of R showed the  $R^2$  and MSE of all the models that was implemented. The time here showed also for the implemented models. The result was discussing here for the regression models based on the deep learning: LSTM gave better result than the regression of Huber and TheilSen.

Model	<b>R</b> <sup>2</sup>	MSE
Regression of TheilSen	.99177	.000376
Regression of Huber	.99180	.000374
LSTM	.993	.000432

## **Table 1: Time of Implemented Models**

Model	Time in sec
Regression of TheilSen	0.9019
Regression of Huber	0.0003
LSTM	111.0602



#### **Performance of Baseline**

A major problem in the market prediction was the poor result in the performance in the tested real life. Overfitting was The Culprit Usually, with the system of prediction delayed the outputs and the inputs. These could be lead to low MSE, while deployment of the system performance poorly. For the evaluation whether the value was being added by the system for serving the defined baseline. The prediction of system was on the basis of the trend imitation from the day before. Whether on the day that was given the prices went down and up, then it would be shortly sold or invested on later day accordingly. This type of system was named as Follower of Trend and then its performance was compared against final tests network.



Figure 43: Comparing Original Days Value vs Predicted Days Value

Here from the input the temp\_mat was input as last days' real value vs the prediction days. The list was reshaped by the algorithm. In the frame of data the day's value of last original days and the values of later predicted days was taken as the input. In the x-axis the prediction plot was given and in the y-axis the new prediction plot of original day and the upcoming forecasted days were plotted for the discussion of the right output properly which was taken very primarily by the dataset. In the labels the values as prices of stock, and index as timestamp was given. In the updation of layout for the discussion the comparison was between the next 30 days and the 15 days.

The network importantly outperformed the follower of Trend shoeing the network available for the extraction of valuable information (Rayyan, H., 2022). The network represented price

production improvement from the use of price variation as the data of input. By the mentioning prediction from price to price resulting the overfitting data of network. MSE was a low and analyzer of resulting profit and compared it to the follower of trend profit and the performance of low was very clear. Impression of the network outcome, comparisons were made against the existing prediction algorithms online. Result was which the network performance happened better than complicated existed networks. Evaluation of performance for various numbers of delays and neurons were done and showed the network producing optimistic results for the simpler networks. After the analysis of the code, it could be found that there was some problem in the kind of data for time series was formatted and then fed to evaluation of performance function during the performance of tending to tend analyzation.

## Conclusion

From the discussion of the implemented LSTM showed well accuracy but took calculated time more than regression on Huber. The parameters which was set and the dataset numbers could affect results. Additionally, the features which were selected like Open, Close, Low and the High might not enough for the forecasting of cryptocurrencies prices depending on multiple factors, like the social media reaction, laws, and policies of every country announced for dealing with these digital currencies For good results of the models and the datasets should always be collected the updated data and appended.

# Chapter 6: Conclusion & Further Work 6.1 Introduction

The paper explained workings of LSTM model and linear regression for the prediction of cryptocurrencies values. For the raising popularity, Cryptocurrencies was becoming like the investments. This made it much difficult to forecast the value and then the algorithm of Machine Learning and the network model of Artificial Network predictor was tested in chapter 5. In the methodology part sets for cryptocurrencies have been used to test and train the Artificial Intelligence and Machine Learning Model. With the libraries of Python, the process of filtering data was done. Python had provided some well feature for the analyzing and visualizing of data. After understanding the data, the data was trimmed and used features or the attributes nicely suitable for the model. Model implementation was done and then the result was recorded. In the design and development chapter the thing was discovered that the model's accuracy of linear regression rate was very high comparing the models of other Machine Learnings. In the planning of demand where the cake was being baked was the prediction. The recipe generally entailed approaches and methods of various prediction. The input's sequences and steps, methods configuration, steps repeating, and then outputs came altogether for forming an algorithm. Operations could be chained together in the extraordinarily complicated ways, at core, algorithms were built from the associations of simple rational and steps' limited series. After it was defined the necessity ad had the right data in the correct format, one should get to stage of predictive modeling that analyzed multiple algorithms for the identification of well future demand for the selected dataset. Python was a language of popular programming created by Guido Van Rossum and then released in the year of 1991.

## 6.2 Linking with Objectives

Here for the dataset testing, training, and then final prediction held by the total use of Python programming Language. Python mainly used for web development, mathematics, software development and the scripting of system. Python connected with the systems of dataset. It could also study and then modify the files. Python vastly used for the handling big data and performing the complicated mathematics. This programming language also used for the rapidity in prototyping and then for the production ready software development. Python also working on multiple platforms like Mac, Windows, Raspberry Pi, Linux etc. The facility of using python was for the similar simple syntax to the language of English. Python included the syntax which allowed developers for writing the programs with few lines than the other languages of programming. Python ran on the system of interpreter that meant the code could be executed as fast as it was written. It meant the prototyping could be very fast. Python also be treated in a path of procedure of way of object orientation or functional way. By the embedding of the exterior variables in the model. The accuracy of increased prediction accuracy by the overfitting reduction and then addressing the dimensionality curse. The forecast model also adapted for the exceptional circumstances and the random events. Any prior knowledge of system was required. There was also some disadvantages of forecast model like there was no correlation comprehensively between then difficulties of variables to identify the variables that was exogenous. Also the forecast horizon was limited to a couple of days to ahead with explanatory of limited search. In all forecasting a variable which was price related was difficult to give the forces multitude to impact the market. Additionally, fact of the prices by a larger extent depended on the future prospects more than the data which was historic. By the uses of networks of deep neural had provided us the well understandings of cryptocurrencies and the architecture of LSTM. In the temporal length terms, LSTM was considerably good to learn the long term dependencies. The result picked a long window which was small in detrimental for the Long Short Term Model. The process followed similar process to RNN in that the lag of auto correction was utilized as the guideline.

### **6.3 Recommendations**

#### 6.3.1 Exchange Rate based on Extreme Gradient Boosting

XGBoost was a boosting algorithm of ML famous for the high performance on the basis of supervised learning. Algorithm's highest usage was for the regression and classification problems. The algorithm was preferred due to high speed in the core computation. The working process of XGBoost was based on following to forecast the output.

$$E=(n_x, d_x): X = 1...i, n_x \in \mathbb{R}^y, d_x \in \mathbb{R}^y$$

For the prediction of  $d_x$ , the process was generated. For finding the bet functions required minimizing loss and the regularization of the objective. Y for the further implementation will be showed the function pf loss on the basis of prediction differences between the actual value and the output value.

#### 6.3.2 Exchange Rate on the basis of Blockchain

To model a complicated system in the framework of blockchain is based on the network, and it is required process perspectives. The network is available every places in the physical, social, technical basis interconnected instruments and the systems of financial. For the further implementation it is recommended that network analysis in the transaction of cryptocurrencies will be used to improve the characteristic terms of the user activities and then to check the structure of network and properties which was temporal. Previously, the first cryptocurrency was the Bitcoin for the much to cover the media. By the time much other cryptocurrencies have been emerged in the digital coin world. The 2 keybases of the cryptocurrency were the networks that were decentralized and the cryptology of computer. Cryptology can authorize the security of transnational data and save them in the blockchain, a ledger of public. Across network the ledger will distributor the nodes, and the power that was computational contributed to the transactions encryption and the validation of cross. The cryptocurrency will process without the central authority limitations. The cryptocurrency will use a framework of blockchain, ledger of the money in an advanced level. And will avoid the issue which will be double spent without the necessity of the authority of trust on the basis of the central server. The security of Blockchain also will define the features on the basis of ledgers of user, blocked chains and the applications that were

decentralized. If Blockchain implemented as recommended then the ledger will have the recording responsibility of information for every transaction in blockchain. The information of ledger will remain changeless and very famous for the applications that will be decentralized. In case no one will gain the access to the information of data or its file read only for the users. Every Block will contain the value of hash, and then the blocks will be connected with each other on the basis of prior hash information. The approach of blockchain will be the peer to peer communication which will be contained the nodes of network and thousands of nodes will have to containing the distributed ledger copy. This process will contain the authentication of transaction. In case if node will not allow transaction, then the future process cannot be held. This particular process will avoid the transactions that detect as fraudulent in the framework of blockchain. Pricing of cryptocurrency on the basis of blockchain network will follow the marketing conditions. These aspects will assume the digital currency's value, currencies which will be traditional, the currencies that will be exchangeable.

#### 6.4 Future Work

The work in progress including the hyper parameter implementation tuning to get a more accurate architecture of network. Also the other features can be considered in future, though from the experiments of the project, in the matter of Cryptocurrencies prediction more features will not be led to batter output than this. Factors of microeconomics might be added in the model to the better prediction of the result. Furthermore an evolutionary breakthrough in the peer to peer transactions will ongoing and then will transform the payment services landscape. It can be seen that every doubt had not been discussed, time should be perfect for acting. It is also difficult to produce a mature thought on the futuristic matter of cryptocurrencies. By the rate prediction of coins exchange it will provide the cryptocurrency traders and the stockbrokers the upper hand of the market. The algorithm will provide result with the accuracy that will make the trained model towards deployment. Comparing other algorithms, The XGBoost will produce great result in the rate prediction of exchange of digital coin's daily records mainly the Litecoin, Ether, Monero. The prediction model performance will can be evaluated in the further establishment by the utilization of RMSE, MAE and MAPE.

There is also some envisions on the engine that can be generalized for the work of real time changing in the market trend like stock prices, the loyalty towards company or product or even in the result of election also. The real world sentiments can be excluded from news or other sources like twitter, IRC channels' chat. YouTube or from the TV channels. This implying that platform will be customized for the tasks where the objectives will to create predictions on the basis of sentiments of social media. In future there also a plan for creating the system's front end which will can be used for visual capturing of the trends and then to view the data that will be historically aggregated as per the input of user. Like front end will also allow a time window for the prediction to be tweaked for prediction of prices for ahead in the time. Demand and supply of the coin and major investor's interest are the 2 important factors. For capturing the factors one must have to add some extra features for training the data with multiple sources interfaces like political reforms, the news, and the external factors of macro financial like rates of gold, stocks and the rates of exchange. If the performance will be happened like this the values of cryptocurrencies will not go through the much changes. And like this the engine also will need to be tested with the more fluctuations which will be adverse. One way will be that to capture fluctuations by tracing back

the features which will be passed through much changes and then adaptively will assign them with more weights during training of the ML model.

# 6.5 Conclusion

The models of Deep Learning like The LSTM and RNN were used as evidently effective for the cryptocurrencies prediction with LSTM much capable to recognize dependencies in the longer term. A task of high variance of nature made it tough to transpire this to the results of impressive validation. And result it remained a tough task. There was a line finely presented between a model overfitting and preventing this from the learning sufficiently. Dropout was also acted as valuable feature for assisting the improving. BY the use of Bayesian Optimization for optimizing the dropout selection which could not guarantee the results of well validation. Despite the sensitivity metrics, the precision and specificity indicated the well performance, and the performance of actual to predict on the basis of errors that was importantly worse than models of neural network. LSTM marginally outperformed RNN. Considerably LSTM took longer for training. In the terms of the dataset on the basis of weight analysis of the model the hash and difficult variables for rating could be used to prune. The models of Deep Learning Required an important amount of data for effectively learning process. Whether data granularity was changed based on every minute then a big data points would be provided in a particular year. This type of data was not available for past but currently can be gathered from the CoinDesk also on the basis of daily input in a year. The algorithms parrelization not only limited to the GPU devices. FPGA or the Gate Arrays of Field Programmable can be used as significant alternatives to the devices of GPU in parallelization terms and in the models of ML which for implementation can perform better on the FPGA rather than on the GPU.

# Appendices

Appendix 1: Train and Test the data considering Time Step

```
# convert an array of values into a dataset matrix

def create_dataset(dataset, time_step=1):
    dataX, dataY = [], []
    for i in range(len(dataset)-time_step-1):
        a = dataset[i:(i+time_step), 0]  ###i=0, 0,1,2,3----99 100
        dataX.append(a)
        dataY.append(dataset[i + time_step, 0])
    return np.array(dataX), np.array(dataY)
```

```
time_step = 15
X_train, y_train = create_dataset(train_data, time_step)
X_test, y_test = create_dataset(test_data, time_step)
```

```
print("X_train: ", X_train.shape)
print("y_train: ", y_train.shape)
print("X_test: ", X_test.shape)
print("y_test", y_test.shape)
```

```
... X_train: (203, 15)
    y_train: (203,)
    X_test: (130, 15)
    y_test (130,)
```

**Appendix 2: Code and Output of LSTM Model** 





**Appendix 3: Code for Training Loss Data and Validation Loss Data** 



Appendix 4: Output of Plotted Training and Validation Loss Data

**Appendix 5: Training and Testing of Predicted Data** 



(Source: provided)

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