A

Major Project

On

CRYPTO-CURRENCY PRICE PREDICTION USING MACHINE LEARNING TECHNIQUES

(Submitted in partial fulfillment of the requirements for the award of Degree)

BACHELOR OF TECHNOLOGY

In

COMPUTER SCIENCE AND ENGINEERING

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This is to certify that the project entitled "**CRYPTO-CURRENCY PRICE PREDICTION USING MACHINE LEARNING TECHNIQUES**" being submitted by **D.RUPINI(177R1A0573),G.SHRAVYA(177R1A0578)& V.AKHILA(177R1A05C0)** in partial fulfillment of the requirements for the award of the degree of B.Tech in Computer Science and Engineering of the Jawaharlal Nehru Technological University Hyderabad, during the year 2020-2021. It is certified that they have completed the project satisfactorily.

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ABSTRACT

Crypto-currency such as Bitcoin is more popular these days among investors. In the proposed work, it is attempted to predict the Bitcoin price accurately taking into consideration various parameters that affect the Bitcoin value. For the first phase of investigation, it is aimed to understand and identify daily trends in the Bitcoin market while gaining insight into optimal features surrounding Bitcoin price. The data set consists of various features relating to the Bitcoin price and payment network over the course of time, recorded daily. For the second phase of investigation, using the available information, we will predict the sign of the daily price change with highest possible accuracy

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1.INTRODUCTION

1.1PROJECT SCOPE

This project is titled as “Crypto-Currency Price Prediction Using Machine Learning Techniques”. The aim of this work is to ascertain with what accuracy can the price of Bitcoin be predicted using different machine learning algorithm and compare their accuracy. The application is developed in such a way that any future enhancement can be easily implementable. The project is developed in such a way that it requires minimal maintenance. The software used are open source and easy to install. The application developed should be easy to install and use.

1.2 PROJECT PURPOSE

The objective of study to the price prediction of bitcoin by feature selection of different machine learning techniques. Intuitively, idea is to first transform order book data into features over time, referred as feature series and then to develop prediction models to consume volatility and feature series simultaneously.

1.3 PROJECT FEATURES

The application is developed in such a way that price prediction and price forecast can be predicted using machine learning algorithms Lasso, Linear regression and decision Tree. The dataset is taken from quandl.com. We can compare the accuracy for the implemented algorithms.

2.SYSTEM ANALYSIS

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SYSTEM ANALYSIS

System Analysis is the important phase in the system development process. The System is studied to the minute details and analyzed. The system analyst plays an important role of an interrogator and dwells deep into the working of the present system. In analysis, a detailed study of these operations performed by the system and their relationships within and outside the system is done. A key question considered here is, "what must be done to solve the problem?" The system is viewed as a whole and the inputs to the system are identified. Once analysis is completed the analyst has a firm understanding of what is to be done.

2.1 PROBLEM DEFINITION

Volatility as a measure of price fluctuations has a significant impact on trade strategies and investment decision as well as on option pricing and measures of systemic risk. Bitcoin, as a pioneer in the blockchain financial renaissance plays a dominant role in a whole cryptocurrency market capitalization ecosystem. Therefore, it is of great interest of data mining and machine learning community to be able to predict Bitcoin price fluctuations.

2.2 EXISTING SYSTEM

- ❖ Existing technique have created three time series data sets for 30, 60 and 120minutes followed by performing GLM/Random Forest on the datasets which produces three linear models. These three models are linearly combined to predict the price of Bitcoin.
- ❖ Another existing work analyzed what has been done to predict the U.S. stock market. The conclusion of work is the mean square error of the prediction network was as large as the standard deviation of the excess return.

2.2.1 LIMITATIONS OF EXISTING SYSTEM

This method providing evidence that several basic financial and economic factors have predictive power for the market excess return.

- ❖ Another existing work, predict trend of the stock. The trend can be considered as a pattern. They perform both short term predictions (day or week predictions) and also long-term predictions (months). They found that the latter produced better results with 79% accuracy.

Instead of directly forecasting the future price of the stock, it analyzed trend only

- Another work proposed performance evaluation criteria of the network. Based on the predicted output the performance evaluation algorithm decides to either buy, sell or hold the stock.
- There is no strong method for price prediction

2.2 PROPOSED SYSTEM

- Acquire time-series data recorded daily for five certain time period at different time instances, it must be normalized and smoothened.
- The next step is to select parameters that will be fed to the predictive network. From an array of available features, some are mentioned below:
- After feature selection, the sample inputs will be fed to the model.
- The accuracy can be compared with different models after the final prediction.

2.2.1 ADVANTAGES OF THE PROPOSED SYSTEM

- Implement more than one machine learning to predict the value
- Accuracy are compared to show best algorithm for prediction

2.4 Feasibility Study:

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. Three key considerations involved in the feasibility analysis are

- Economic Feasibility
- Technical Feasibility
- Social Feasibility

2.4.1 Economic Feasibility:

The developing system must be justified by cost and benefit. Criteria to ensure that effort is concentrated on project, which will give best, return at the earliest. One of the factors, which affect the development of a new system, is the cost it would require.

The following are some of the important financial questions asked during preliminary investigation:

- The costs conduct a full system investigation.
- The cost of the hardware and software.
- The benefits in the form of reduced costs or fewer costly errors.

Since the system is developed as part of project work, there is no manual cost to spend forthe proposed system. Also all the resources are already available, it give an indication of the system is economically possible for development.

2.4.2 Technical Feasibility:

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

2.4.3 BEHAVIORAL FEASIBILITY

This includes the following questions:

Is there sufficient support for the users?

Will the proposed system cause harm?

The project would be beneficial because it satisfies the objectives when developed and installed. All behavioral aspects are considered carefully and conclude that the project is behaviorally feasible

2.5 HARDWARE AND SOFTWARE REQUIREMENTS

2.5.1 HARDWARE REQUIREMENTS:

Hardware interfaces specifies the logical characteristics of each interface between the software product and the hardware components of the system. The following are some hardware requirements.

- Processor : Any Processor above 500 MHz.
- Ram : 4 GB
- Hard Disk : 4 GB
- Input device : Standard Keyboard and Mouse.
- Output device : VGA and High Resolution Monitor.

2.5.2 SOFTWARE REQUIREMENTS:

Software Requirements specifies the logical characteristics of each interface and software components of the system. The following are some software requirements,

- Operating System : Windows 7 or higher
- Programming : Python 3.6 and related libraries

3.ARCHITECTURE

3.ARCHITECTURE

3.1 PROJECT ARCHITECTURE

The following diagram shows the major components of the android operating system. Each section is described in more details below.

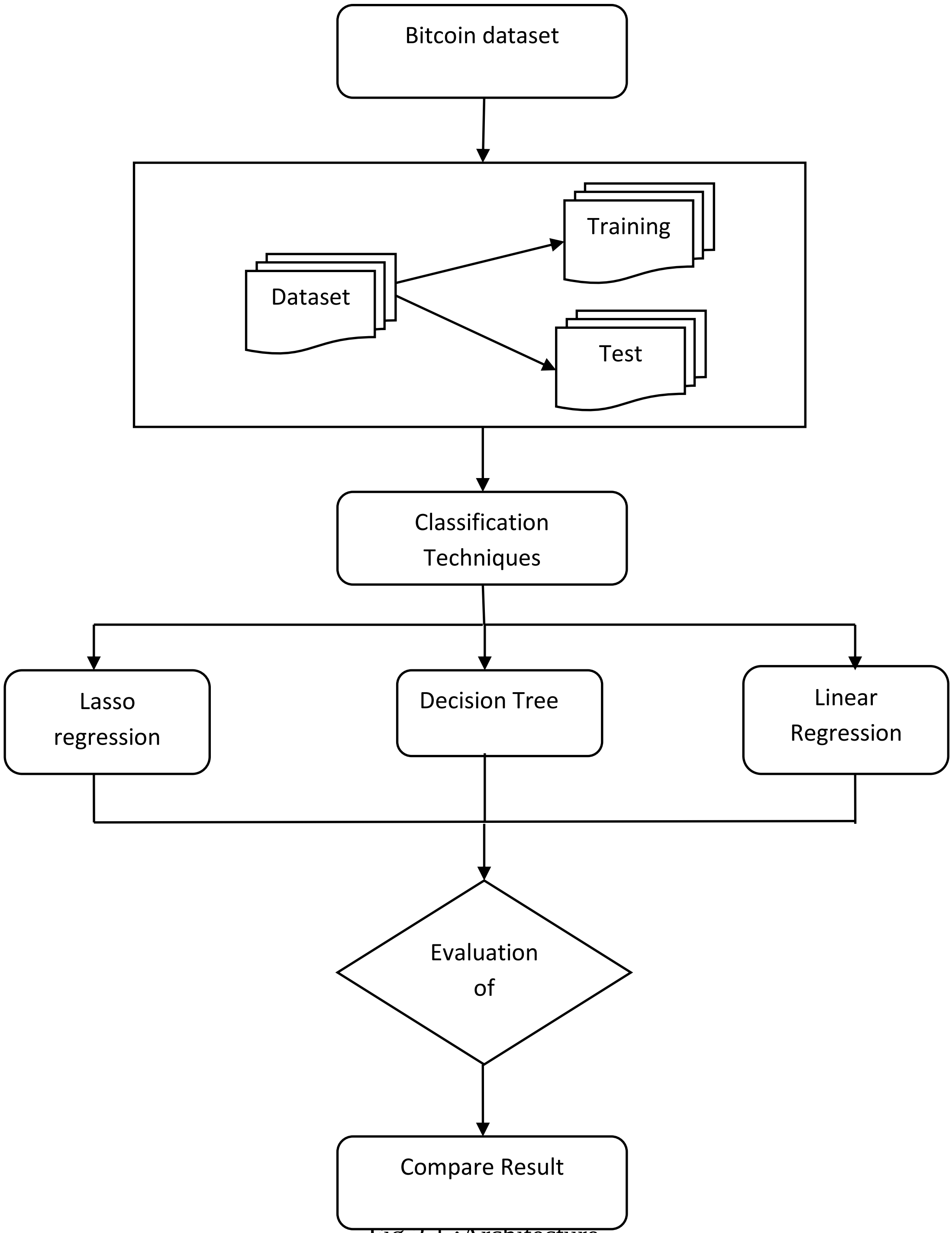


Fig 3.1 :Architecture

3.2 DESCRIPTION

We have collected the dataset for the document with following details from quandl.com and we applied machine learning algorithm such as decision tree and regression for prediction and price forecast.

Special Features:In this following step we are going to separate the features which we take to train the model by giving the dataset to the machine learning algorithms.

Normalization: Normalization is a very important step while we are dealing with the large values in the features as the higher bit integers will cost high computational power and time. To achieve the efficiency in computation we are going to normalize the data values.

Training and test data: Training data is passed to the VGG classifier to train the model. Test data is used to test the trained model whether it is making correct predictions or not.

Dataset: Quandl.com has dataset related to finance, economic data from five hundred publishers. Data published in Quandl.com can be exploited for different development platforms and analysis tools. In this proposed work, we have collected the Quandl.com data with name mentioned as “BITSTAMPUSD”.

The data collected with following features and stored as data.csv “Time_stamp, Open, High, Low, Close, Volume_btc, Volume_currency, Weighted_price”.

A	B	C	D	E	F	G	H
Date	Open	High	Low	Close	Volume (BTC)	Volume (Currency)	Weighted Price
9/13/2011	5.8	6	5.65	5.97	58.37138238	346.0973894	5.929230648
9/14/2011	5.58	5.72	5.52	5.53	61.14598362	341.8548132	5.590797514
9/15/2011	5.12	5.24	5	5.13	80.1407952	408.2590022	5.094271914
9/16/2011	4.82	4.87	4.8	4.85	39.9140068	193.7631466	4.854515047
9/17/2011	4.87	4.87	4.87	4.87	0.3	1.461	4.87
9/18/2011	4.87	4.92	4.81	4.92	119.8128	579.8431027	4.839575594
9/19/2011	4.9	4.9	4.9	4.9	20	98	4.9
9/20/2011	4.92	5.66	4.92	5.66	89.28071068	481.0492629	5.388053693
9/21/2011	5.7	5.79	5.66	5.66	17.62932238	100.5942336	5.706074879

Fig 3.2: Dataset used for study

The dataset variable names are described below

Variable name	Short description
Date	Trading Date
Open	Bitcoin Open price for particular time
High	Bitcoin High price achieved for particular time
Low	Bitcoin Low price achieved for particular time
Close	Bitcoin Close price for particular time
Volume (BTC)	Coin volume traded
Volume (Currency)	Coin value traded
Weighted price	Price per coin traded

3.3 USE CASE DIAGRAM

In the use case diagram we have basically two actors who are the user and the administrator. The user has the rights to login, access to resources and to view thecrime details. Whereas the administrator has the login, access to resources of the users and also the right to update and remove the crime details, and he can also view the user files.

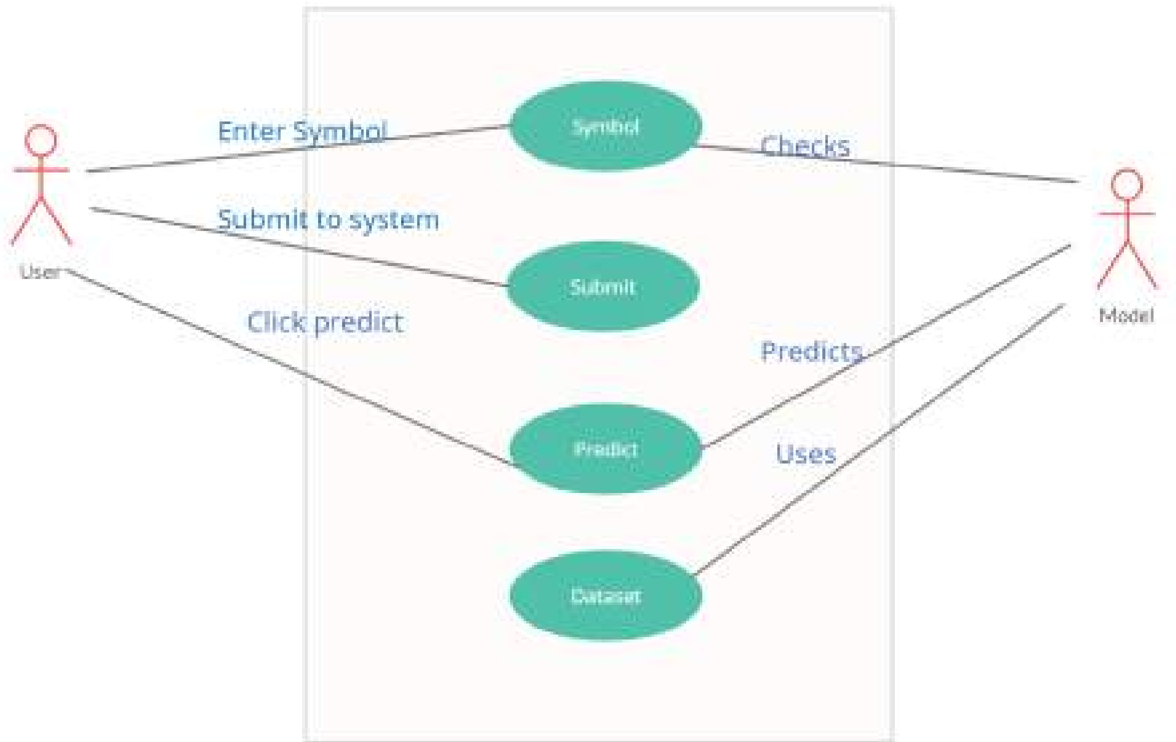


Fig 3.3

3.4 CLASS DIAGRAM

Class Diagram is a collection of classes and objects.

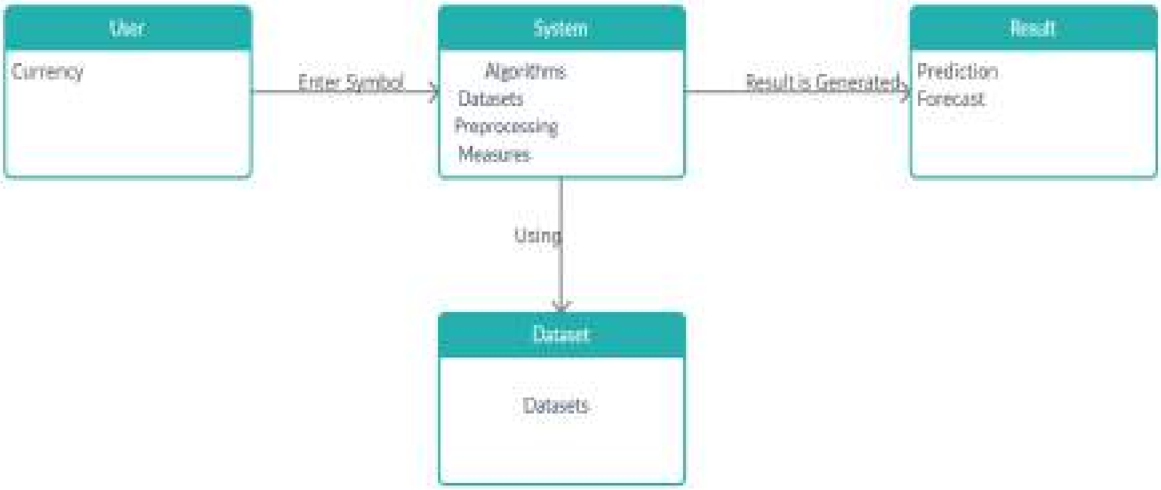


Fig 3.4

3.5 SEQUENCE DIAGRAM

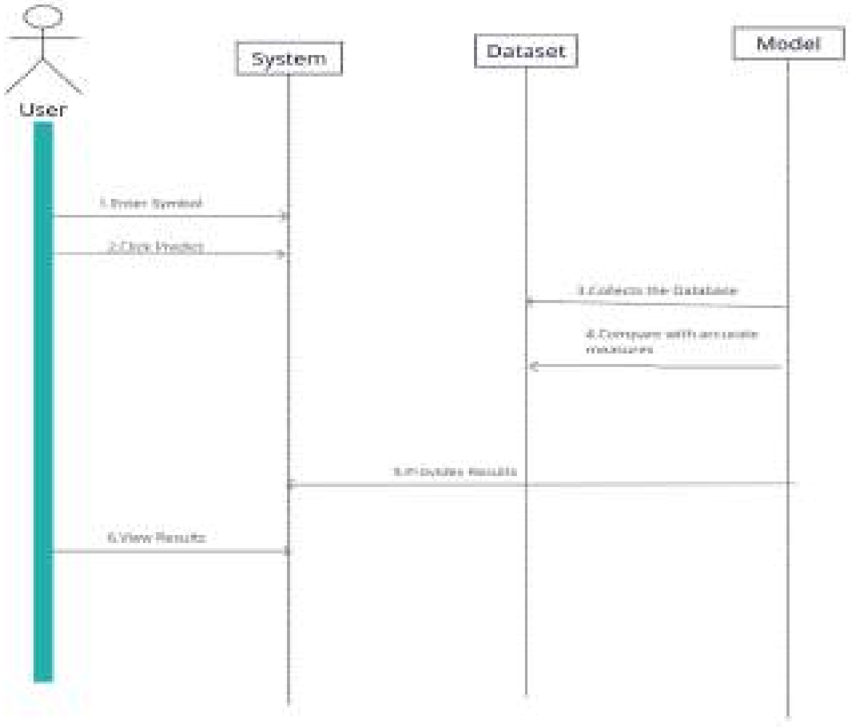


Fig 3.5

3.6 ACTIVITY DIAGRAM

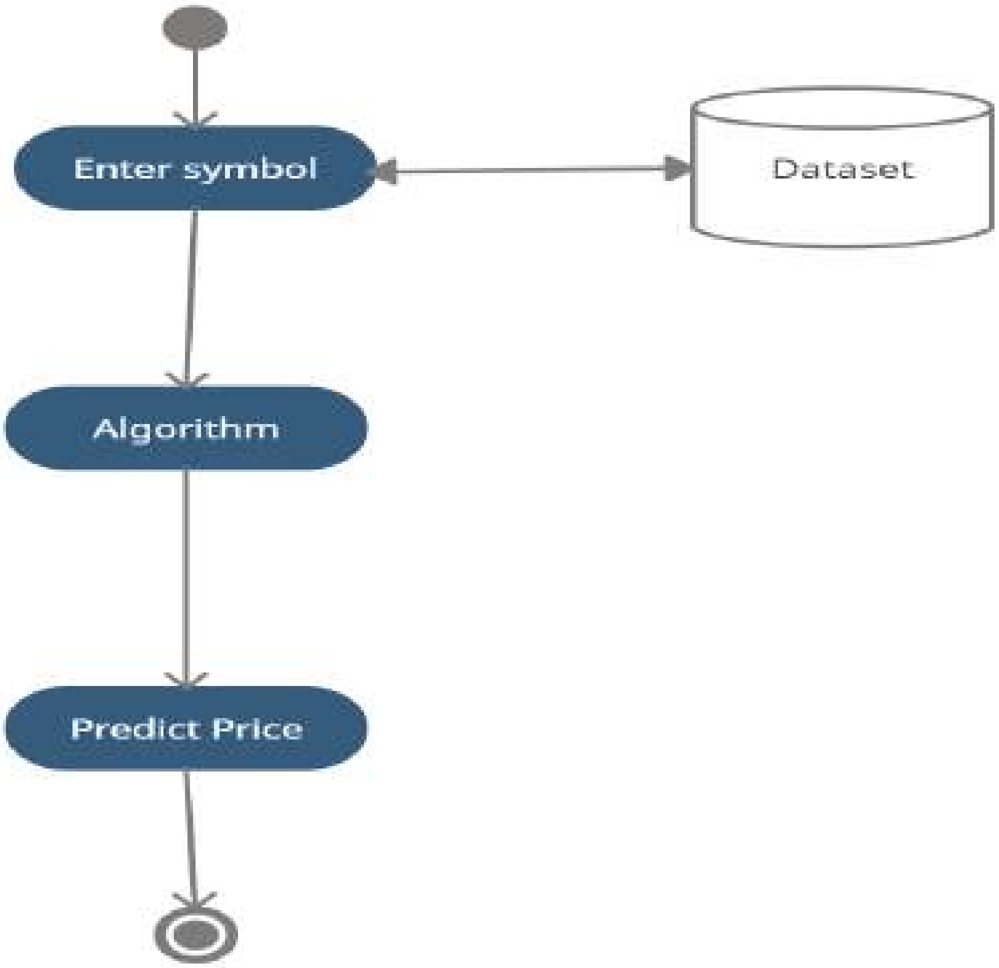


Fig 3.6

4.IMPLEMENTATION

4.IMPLEMENTATION

4.1 SAMPLE CODE

Main.py

```
import tkinter as tk
from tkinter import Message ,Text
import cv2,os
import shutil
import csv
import numpy as np
from PIL import Image, ImageTk
import pandas as pd
import datetime
import time
import tkinter.ttk as ttk
import tkinter.font as font
import Bitcoin as bitc
import Prediction as pred
import PriceForcast as price

from matplotlib import pyplot as plt



from_date = datetime.datetime.today()
currentDate = time.strftime("%d_%m_%y")
font = cv2.FONT_HERSHEY_SIMPLEX
fontScale=1
fontColor=(255,255,255)
cond=0


window = tk.Tk()
window.title("BITCOIN PRICE PREDICTION")


window.geometry('1280x720')
window.configure(background='blue')
#window.attributes('-fullscreen', True)

window.grid_rowconfigure(0, weight=1)
window.grid_columnconfigure(0, weight=1)


message1 = tk.Label(window, text="BITCOIN PRICE PREDICTION" ,bg="blue"
,fg="white"  ,width=50  ,height=3,font=('times', 30, 'italic bold underline'))
```

```
message1.place(x=100, y=20)

lbl = tk.Label(window, text="ENTER SYMBOLE",width=20  ,height=2  ,fg="red"
,bg="yellow" ,font=('times', 15, ' bold ') )
lbl.place(x=100, y=200)

txt = tk.Entry(window,width=20,bg="yellow" ,fg="red",font=('times', 15, ' bold '))
txt.place(x=400, y=215)

lbl = tk.Label(window, text="(ex:BITSTAMPUSD)",width=15  ,height=1  ,fg="red"
,bg="yellow" ,font=('times', 15, ' bold ') )
lbl.place(x=420, y=250)


lbl4 = tk.Label(window, text="Notification : ",width=20  ,fg="red"  ,bg="yellow"  ,height=2
,font=('times', 15, ' bold underline '))
lbl4.place(x=100, y=500)

message = tk.Label(window, text="" ,bg="yellow"  ,fg="red"  ,width=30  ,height=2,
activebackground = "yellow" ,font=('times', 15, ' bold '))
message.place(x=400, y=500)


def clear():
	txt.delete(0, 'end')
	res = ""
	message.configure(text= res)

def submit():
	sym=txt.get()
	if sym != "" :
		bitc.getPrice(sym)
		print("DataSet Created Successfully")
		res = "DataSet Created Successfully"
		message.configure(text= res)
	else:
		res = "Enter Symble"
		message.configure(text= res)
	print("Submit")

def predict():
	print("predict")
	pred.Predict()

def forecast():
	print("forecast")
	price.Forcast()
```

```
clearButton = tk.Button(window, text="Clear", command=clear  ,fg="white"  ,bg="blue"
,width=20  ,height=2 ,activebackground = "Red" ,font=('times', 15, ' bold '))
clearButton.place(x=950, y=200)

addst = tk.Button(window, text="SUBMIT", command=submit  ,fg="red"  ,bg="yellow"
,width=20  ,height=3, activebackground = "Red" ,font=('times', 15, ' bold '))
addst.place(x=100, y=600)

trainImg = tk.Button(window, text="PREDICT", command=predict  ,fg="red"  ,bg="yellow"
,width=20  ,height=3, activebackground = "Red" ,font=('times', 15, ' bold '))
trainImg.place(x=400, y=600)

detect = tk.Button(window, text="FORECAST", command=forecast  ,fg="red"  ,bg="yellow"
,width=20  ,height=3, activebackground = "Red" ,font=('times', 15, ' bold '))
detect.place(x=700, y=600)

quitWindow = tk.Button(window, text="QUIT", command=window.destroy  ,fg="red"
,bg="yellow"  ,width=20  ,height=3, activebackground = "Red" ,font=('times', 15, ' bold '))
quitWindow.place(x=1000, y=600)

window.mainloop()
```

Bitcoin.py

```
import pandas as pd
import quandl, math
import numpy as np
from sklearn import preprocessing,svm
#from sklearn.cross_validation import train_test_split
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn import tree
from sklearn.ensemble import RandomForestRegressor
from sklearn.linear_model import LogisticRegression
import matplotlib.pyplot as plt
from mpl_finance import candlestick_ohlc
import time


def getPrice(sym):
	forecastAccu = []
	shareList1 = []
	shareList2 = []
	finalForecastPrice = []
	count = 0
	#BITSTAMPUSD
	symbol="BCHARTS/"+sym
	print(symbol)
```

```
df = quandl.get(symbol, authtoken="TyoiVKMxwYyUoh-ic92A")
df.dropna(inplace = True)
print(df)
df.to_csv("bitcoin.csv")
print(df.index)
date_list = np.array(df.index.to_pydatetime())
print(date_list)
plot_array = np.zeros([len(df), 5])
plot_array[:, 0] = np.arange(plot_array.shape[0])
print(df.iloc[:, 1:5])
plot_array[:, 1:] = df.iloc[:, 1:5]
# plotting candlestick chart
fig, ax = plt.subplots(figsize=(18, 18))
num_of_bars = 1000  # the number of candlesticks to be plotted
candlestick_ohlc(ax,plot_array[num_of_bars:],colorup='g',colordown=')
ax.margins(x=0.0, y=0.1)
ax.yaxis.tick_right()
x_tick_labels = []
ax.set_xlim(right=plot_array[-1, 0]+10)
ax.grid(True, color='k', ls='--', alpha=0.2)
# setting xticklabels actual dates instead of numbers
indices = np.linspace(plot_array[-num_of_bars, 0], plot_array[-1, 0],
8, dtype=int)
for i in indices:
        date_dt = df.index[i]
        date_str = date_dt.strftime('%b-%d')
        x_tick_labels.append(date_str)

ax.set(xticks=indices, xticklabels=x_tick_labels)
plt.title("BitCoin Price")
ax.set_xlabel('Date')
ax.set_ylabel('price')
plt.savefig("BitCoin Price.png")
plt.pause(5)
plt.show(block=False)
plt.close()
```

prediction.py

```
import pandas as pd
import quandl, math
import numpy as np
from sklearn import preprocessing,svm
#from sklearn.cross_validation import train_test_split
from sklearn.model_selection import train_test_split
import matplotlib.pyplot as plt
from mpl_finance import candlestick_ohlc
from sklearn import tree
from sklearn.linear_model import LinearRegression
```

```
from sklearn.tree import DecisionTreeClassifier

from sklearn.metrics import mean_squared_error
from sklearn.metrics import mean_absolute_error
from sklearn.metrics import r2_score
from sklearn.metrics import accuracy_score
from sklearn import linear_model



def Predict():
        mse=[]
        mae=[]
        rsq=[]
        rmse=[]
        acy=[]

        df=pd.read_csv("bitcoin.csv")
        print(df)

        train = df[:1800][[ 'Open', 'High', 'Low','Close','Volume (BTC)','Volume
        (Currency)','Weighted Price']]
        test = df[1801:][[ 'Open', 'High', 'Low','Close','Volume (BTC)','Volume
        (Currency)','Weighted Price']]

        X_train =train[[ 'Open', 'High', 'Low','Volume (BTC)','Volume
       (Currency)','Weighted Price']]
        y_train =train[['Close']]


        X_test =test[[ 'Open', 'High', 'Low','Volume (BTC)','Volume
       (Currency)','Weighted Price']]
        y_test =test[['Close']]


        clf = linear_model.Lasso(alpha = 0.1)
        clf.fit(X_train, y_train)
        y = clf.predict(X_test)

        print("MSE VALUE FOR Lasso IS %f "  % mean_squared_error(y_test,y))
        print("MAE VALUE FOR Lasso IS %f "  % mean_absolute_error(y_test,y))
        print("R-SQUARED VALUE FOR Lasso IS %f "  % r2_score(y_test,y))
        rms = np.sqrt(mean_squared_error(y_test,y))
        print("RMSE VALUE FOR Lasso IS %f "  % rms)
        ac = clf.score(X_test, y_test) * 100
        print ("ACCURACY VALUE Lasso IS %f" % ac)

        mse.append(mean_squared_error(y_test,y))
        mae.append(mean_absolute_error(y_test,y))
```

```
rsq.append(r2_score(y_test,y))
rmse.append(rms)
acy.append(ac)



x = np.arange(len(X_test))
plt.plot(x, y_test,label='Original Vale')
plt.plot(x, y,label='Predicted Value')
plt.legend()
plt.title('Original Value vs Predicted Value In Lasso ')
plt.xlabel("Day (s)")
plt.ylabel("Predicted Value")

plt.pause(5)
plt.show(block=False)
plt.close()

clf = linear_model.LinearRegression()
clf.fit(X_train, y_train)
y = clf.predict(X_test)

print("MSE VALUE FOR Regression IS %f "  %
mean_squared_error(y_test,y))
print("MAE VALUE FOR Regression IS %f "  %
mean_absolute_error(y_test,y))
print("R-SQUARED VALUE FOR Regression IS %f "  % r2_score(y_test,y))
rms = np.sqrt(mean_squared_error(y_test,y))
print("RMSE VALUE FOR Regression IS %f "  % rms)
ac = clf.score(X_test, y_test) * 100
print ("ACCURACY VALUE Regression IS %f" % ac)

mse.append(mean_squared_error(y_test,y))
mae.append(mean_absolute_error(y_test,y))
rsq.append(r2_score(y_test,y))
rmse.append(rms)
acy.append(ac)



x = np.arange(len(X_test))
plt.plot(x, y_test,label='Original Vale')
plt.plot(x, y,label='Predicted Value')
plt.legend()
plt.title('Original Value vs Predicted Value In Regression ')
plt.xlabel("Day (s)")
plt.ylabel("Predicted Value")
plt.pause(5)
plt.show(block=False)
```

```
plt.close()


al = ['Lasso','Regression']


result2=open('MSE.csv', 'w')
result2.write("Algorithm,MSE" + "\n")
for i in range(0,len(mse)):
    result2.write(al[i] + "," +str(mse[i]) + "\n")
result2.close()

colors = ["#1f77b4", "#ff7f0e", "#2ca02c", "#d62728", "#8c564b"]
explode = (0.1, 0, 0, 0, 0)


#Barplot for the dependent variable
fig = plt.figure(0)
df =  pd.read_csv('MSE.csv')
acc = df["MSE"]
alc = df["Algorithm"]
plt.bar(alc,acc,align='center', alpha=0.5,color=colors)
plt.xlabel('Algorithm')
plt.ylabel('MSE')
plt.title("MSE Value");
fig.savefig('MSE.png')
plt.pause(5)
plt.show(block=False)
plt.close()




result2=open('MAE.csv', 'w')
result2.write("Algorithm,MAE" + "\n")
for i in range(0,len(mae)):
    result2.write(al[i] + "," +str(mae[i]) + "\n")
    result2.close()

fig = plt.figure(0)
df =  pd.read_csv('MAE.csv')
acc = df["MAE"]
alc = df["Algorithm"]
plt.bar(alc,acc,align='center', alpha=0.5,color=colors)
plt.xlabel('Algorithm')
plt.ylabel('MAE')
plt.title('MAE Value')
fig.savefig('MAE.png')
plt.pause(5)
```

```
plt.show(block=False)
plt.close()


result2=open('R-SQUARED.csv', 'w')
result2.write("Algorithm,R-SQUARED" + "\n")
for i in range(0,len(rsq)):
    result2.write(al[i] + "," +str(rsq[i]) + "\n")
result2.close()

fig = plt.figure(0)
df =  pd.read_csv('R-SQUARED.csv')
acc = df["R-SQUARED"]
alc = df["Algorithm"]
colors = ["#1f77b4", "#ff7f0e", "#2ca02c", "#d62728", "#8c564b"]
explode = (0.1, 0, 0, 0, 0)
plt.bar(alc,acc,align='center', alpha=0.5,color=colors)
plt.xlabel('Algorithm')
plt.ylabel('R-SQUARED')
plt.title('R-SQUARED Value')
fig.savefig('R-SQUARED.png')
plt.pause(5)
plt.show(block=False)
plt.close()


result2=open('RMSE.csv', 'w')
result2.write("Algorithm,RMSE" + "\n")
for i in range(0,len(rmse)):
    result2.write(al[i] + "," +str(rmse[i]) + "\n")
result2.close()



fig = plt.figure(0)
df =  pd.read_csv('RMSE.csv')
acc = df["RMSE"]
alc = df["Algorithm"]
plt.bar(alc, acc, align='center', alpha=0.5,color=colors)
plt.xlabel('Algorithm')
plt.ylabel('RMSE')
plt.title('RMSE Value')
fig.savefig('RMSE.png')
plt.pause(5)
plt.show(block=False)
```

```
plt.close()
result2=open('Accuracy.csv', 'w')
result2.write("Algorithm,Accuracy" + "\n")
for i in range(0,len(acy)):
    result2.write(al[i] + "," +str(acy[i]) + "\n")
result2.close()



fig = plt.figure(0)
df =  pd.read_csv('Accuracy.csv')
acc = df["Accuracy"]
alc = df["Algorithm"]
plt.bar(alc, acc, align='center', alpha=0.5,color=colors)
plt.xlabel('Algorithm')
plt.ylabel('Accuracy')
plt.title('Accuracy Value')
fig.savefig('Accuracy.png')
plt.pause(5)
plt.show(block=False)
plt.close()
```

Forecast.py

```
import pandas as pd

import quandl, math

import numpy as np

from sklearn import preprocessing,svm

#from sklearn.cross_validation import train_test_split

from sklearn.model_selection import train_test_split

import matplotlib.pyplot as plt

from mpl_finance import candlestick_ohlc

from sklearn import tree

from sklearn.linear_model import LinearRegression

from sklearn.linear_model import Lasso
```

```
def Forcast():
    acy=[]
    df=pd.read_csv("bitcoin.csv")
    print(df)
    df = df[['Open','High','Low','Close']]
    df['HL_PCT'] =(df['High'] - df['Close'])/df['Close'] * 100.0
    df['PCT_Change'] =(df['Close'] - df['Open'])/df['Open'] * 100.0
    df = df[['Close','HL_PCT','PCT_Change']]
    forecast_col = 'Close'
    df.fillna(-9999999, inplace = True)
    forecast_out = int(5)
    print(forecast_out)

    df['label'] = df[forecast_col].shift(-forecast_out)
    X = np.array(df.drop(['label'],1))
    X = preprocessing.scale(X)
    X_lately = X[-forecast_out:]
    X = X[:-forecast_out]

    df.dropna(inplace = True)
    y = np.array(df['label'])



    print(X)
    print(y)
```

```
X_train, X_test, y_train, y_test = train_test_split(X,y, test_size = 0.2)




clf = Lasso()
clf.fit(X_train, y_train)
y = clf.predict(X_lately)
print("Lasso")
print(y)
ac = clf.score(X_test, y_test) * 100
print ("ACCURACY VALUE Lasso IS %f" % ac)
acy.append(ac)
print("----------------------------------------------------------------")

fig = plt.figure(0)
x = np.arange(forecast_out)
plt.plot(x, y,label='Lasso')
plt.legend()
plt.title('Lasso')
plt.xlabel("Day (s)")
plt.ylabel("Predicted Value")
fig.savefig('Lasso.png')
plt.pause(5)
plt.show(block=False)
plt.close()
```

```
clf = tree.DecisionTreeRegressor()
clf.fit(X_train, y_train)
y1 = clf.predict(X_lately)
print("Decision Tree Forcast")
print(y1)
ac = clf.score(X_test, y_test) * 100
print ("ACCURACY VALUE Decision Tree IS %f" % ac)
acy.append(ac)
print("-----------------------------------------------------------------")


x = np.arange(forecast_out)
plt.plot(x, y1,label='Decission Tree')
plt.legend()
plt.title('Decission Tree')
plt.xlabel("Day (s)")
plt.ylabel("Predicted Value")
fig.savefig('Decision Tree Regressor.png')
plt.pause(5)
plt.show(block=False)
plt.close()


clf = LinearRegression(n_jobs = -1)
```

```
clf.fit(X_train, y_train)
y2 = clf.predict(X_lately)
print("Regression Tree Forcast")
print(y2)
ac = clf.score(X_test, y_test) * 100
print ("ACCURACY VALUE Regression IS %f" % ac)
acy.append(ac)
print("----------------------------------------------------------------")


x = np.arange(forecast_out)
plt.plot(x, y2,label='Linear Regression')
plt.legend()
plt.title('LinearRegression')
plt.xlabel("Day (s)")
plt.ylabel("Predicted Value")
fig.savefig('Linear regression.png')
plt.pause(5)
plt.show(block=False)
plt.close()

al = ['Lasso','DecisionTree','Linear Regression']

colors = ["#1f77b4", "#ff7f0e", "#2ca02c", "#d62728", "#8c564b"]
explode = (0.1, 0, 0, 0, 0)
```

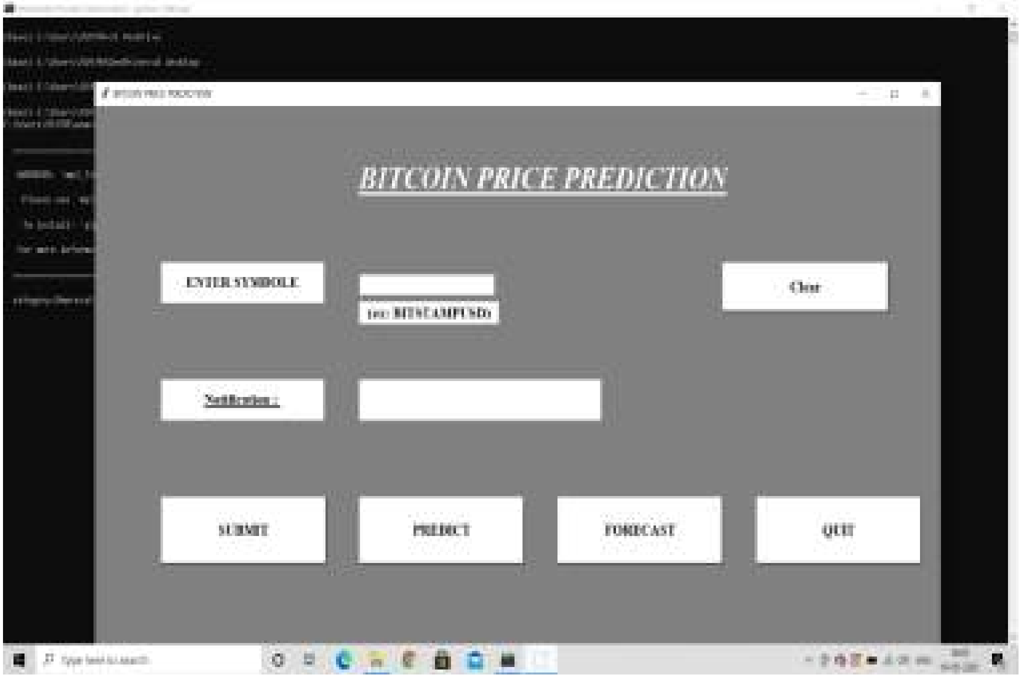
```
result2=open('Accuracy.csv', 'w')
result2.write("Algorithm,Accuracy" + "\n")
for i in range(0,len(acy)):
    result2.write(al[i] + "," +str(acy[i]) + "\n")
result2.close()

fig = plt.figure(0)
df =  pd.read_csv('Accuracy.csv')
acc = df["Accuracy"]
alc = df["Algorithm"]
plt.bar(alc, acc, align='center', alpha=0.3,color=colors)
plt.xlabel('Algorithm')
plt.ylabel('Accuracy')
plt.title('Accuracy Value')
fig.savefig('Accuracy.png')
plt.pause(5)
plt.show(block=False)
plt.close()

fig = plt.figure(1)
x = np.arange(forecast_out)
plt.plot(x, y,label='Lasso Regression',linewidth=4, markersize=12)
plt.plot(x, y1,label='Decission Tree')
plt.plot(x, y2,label='Linear
Regression',linewidth=1,markersize=5,color="yellow",linestyle='dashed')
```

```
plt.legend()
plt.title('lasso vs Decission Tree vs Regression')
plt.xlabel("Day (s)")
plt.ylabel("Predicted Value")
fig.savefig('Forecast ALGO.png')
plt.pause(5)
plt.show(block=False)
```

5.SCREENSHOTS

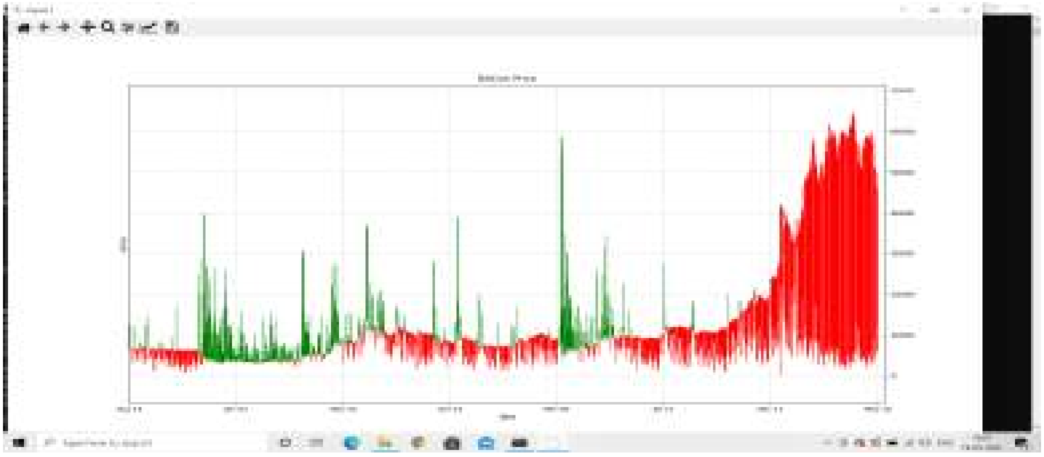
5.SCREEN SHOTS

5.1 BITCOIN PRICE PREDICTION



5.1. Screenshot: Bitcoin Price Prediction

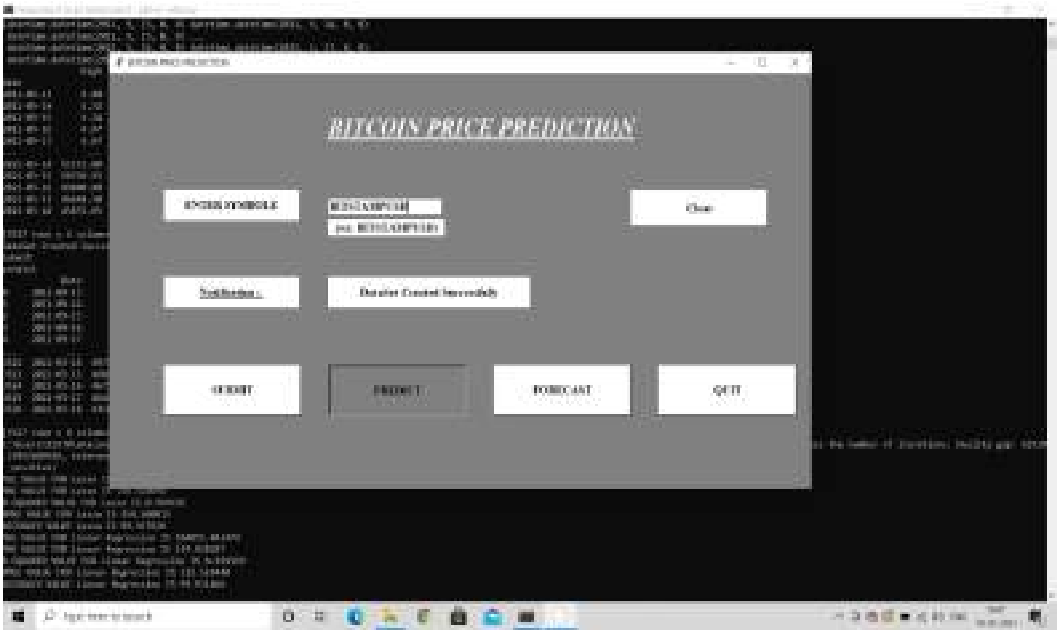
5.1.1 Screenshot: The command screen showing the dataset collection



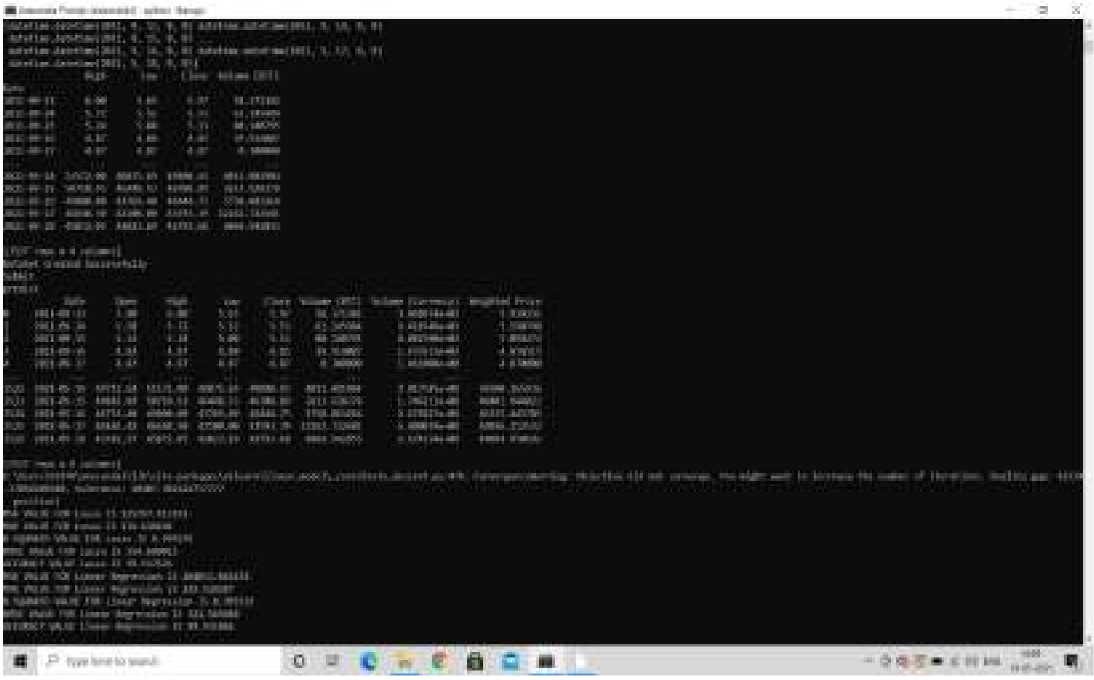
5.1.2 Screenshot: The following screen represents the data visualization of

Complete dataset

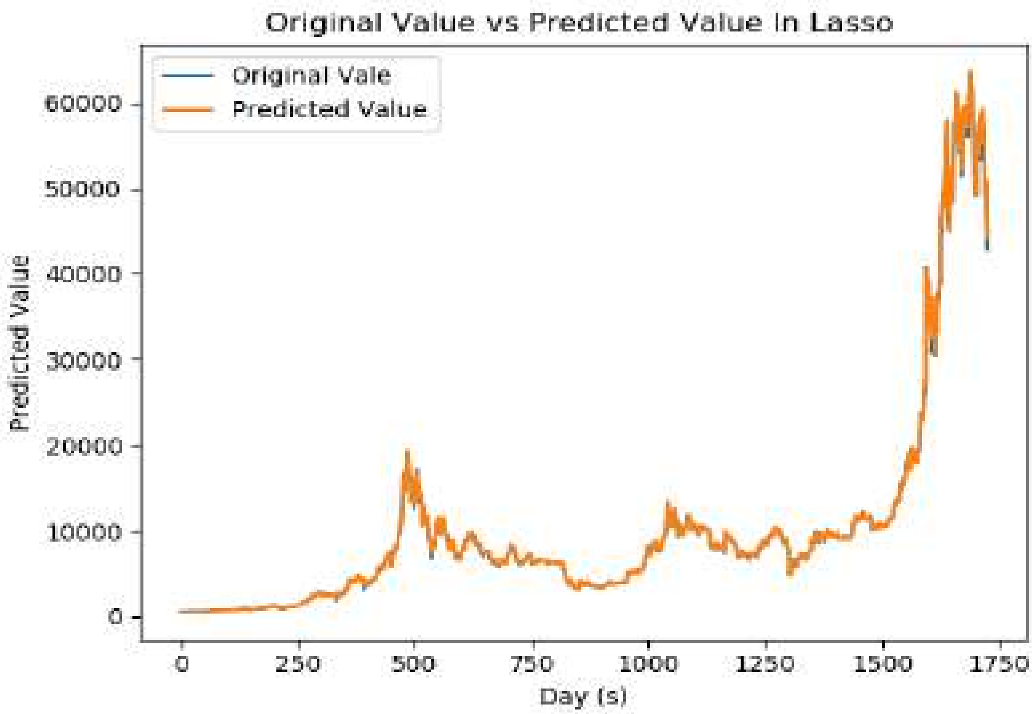
5.2 PREDICTION



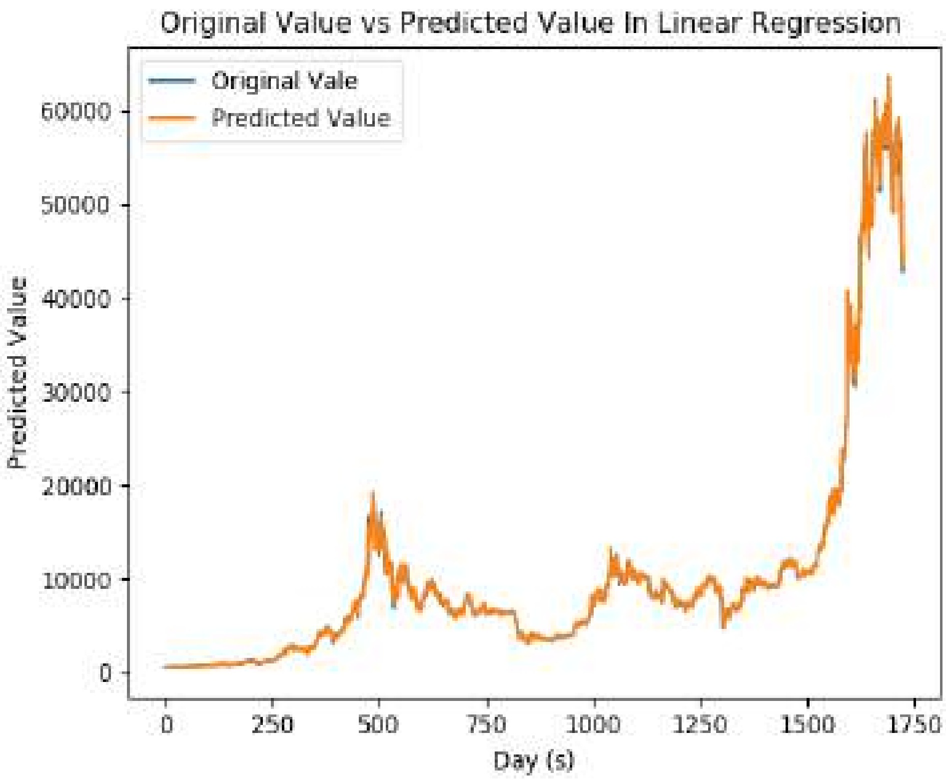
5.2 Screenshot: Prediction



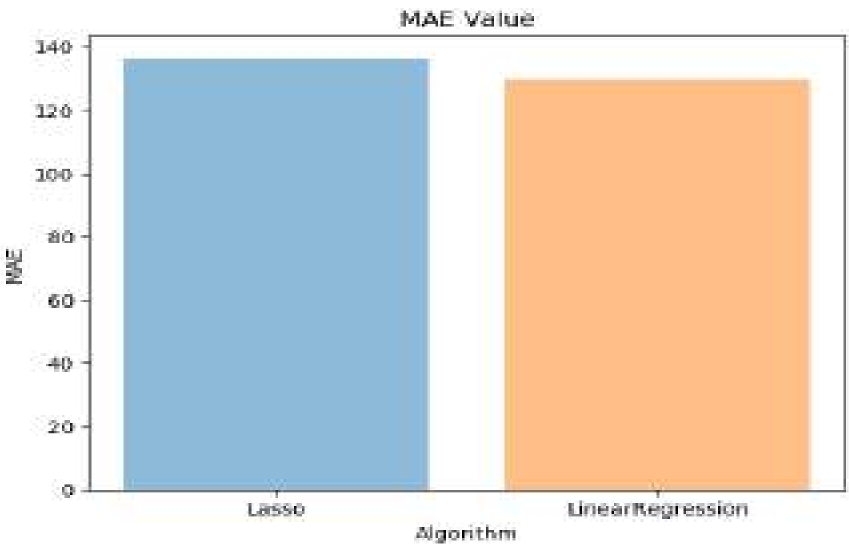
5.2.1 Screenshot: The command screen showing the dataset collection for prediction



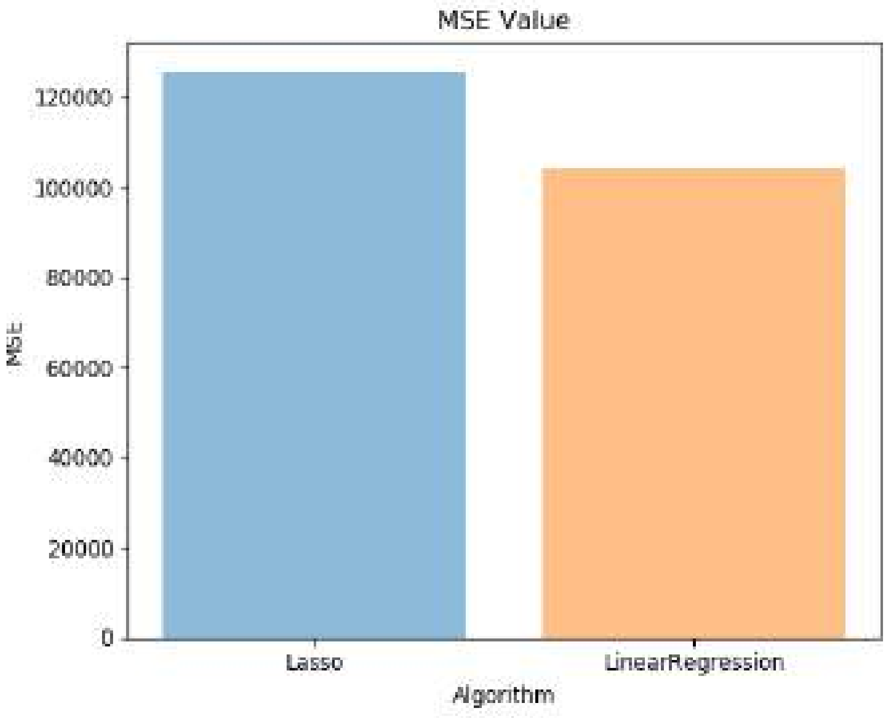
5.2.2 Screenshot: The following screens shows the predicted value of Lasso and original value



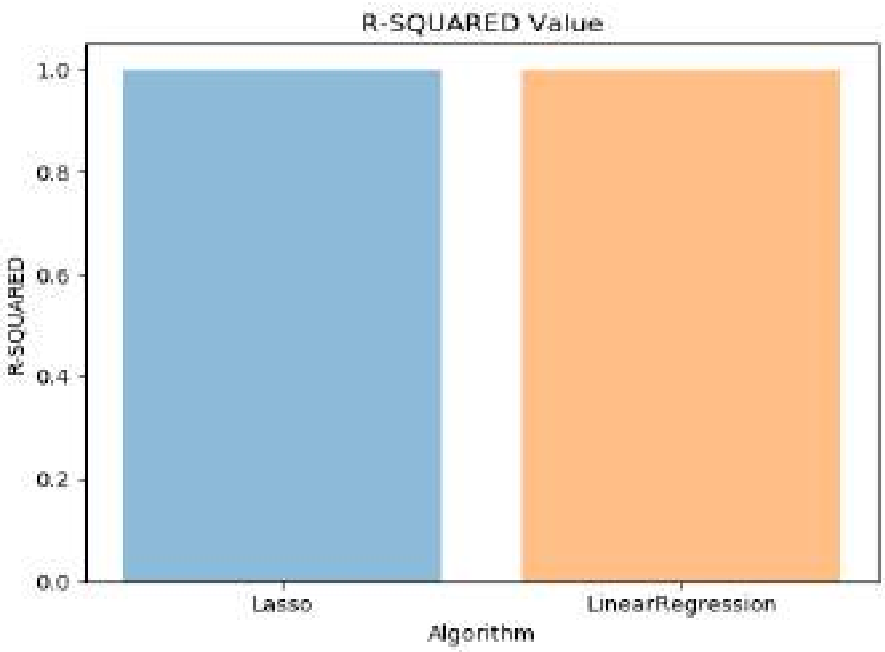
. **5.2.3 Screenshot**: The following screens shows the predicted value of Linear regression and original value



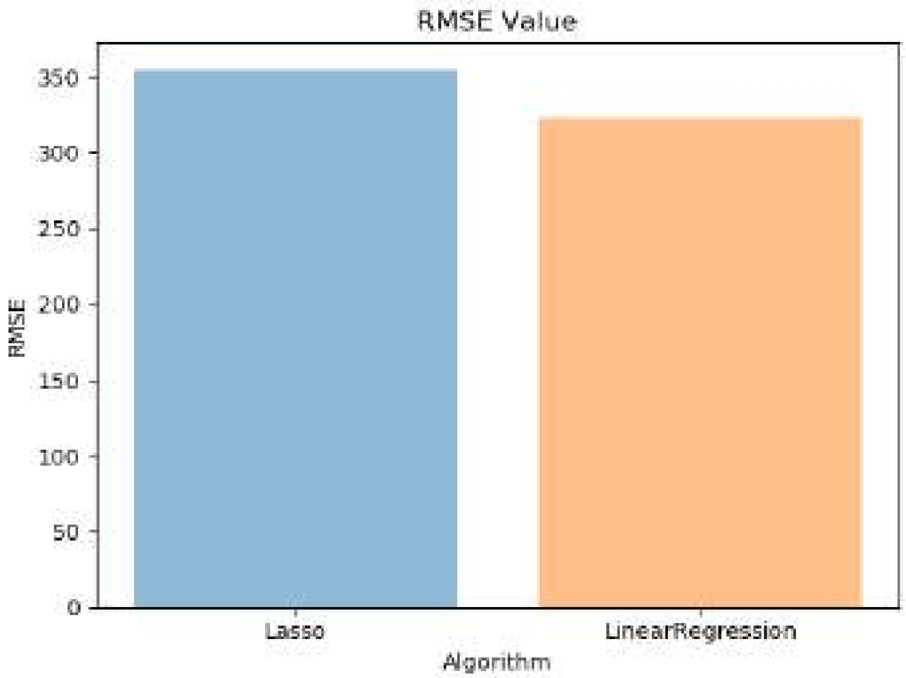
. **5.2.4 Screenshot**: The following screens shows the MAE error value



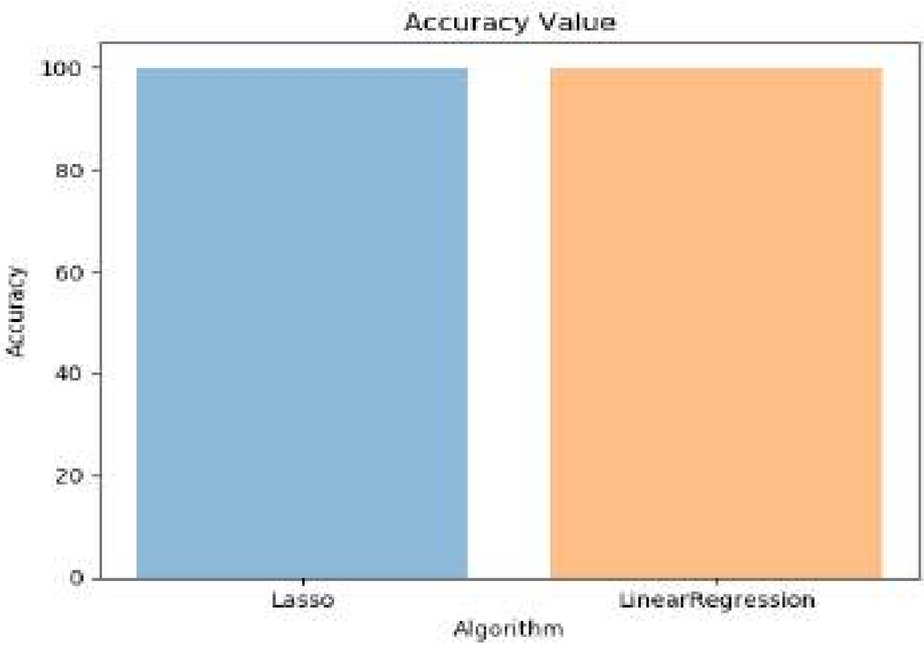
5.2.5 Screenshot: The following screens shows the MSE error value



5.2.6 Screenshot: The following screens shows the R_SQUARRED error value

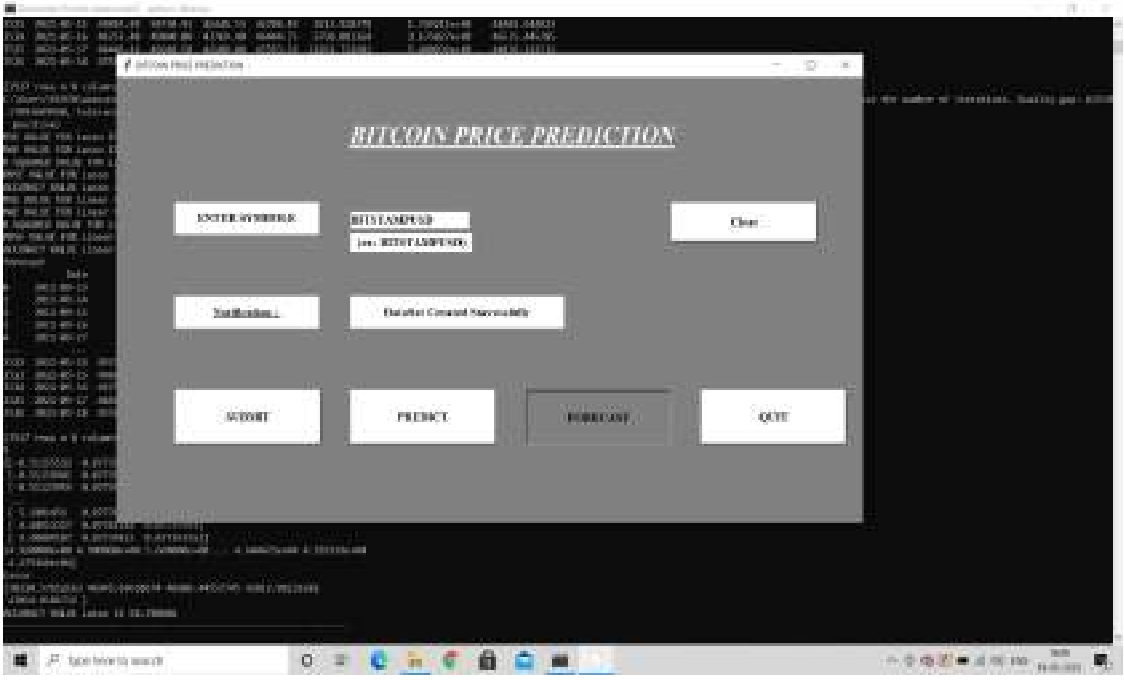


5.2.7 Screenshot: The following screens shows the RMSE error value

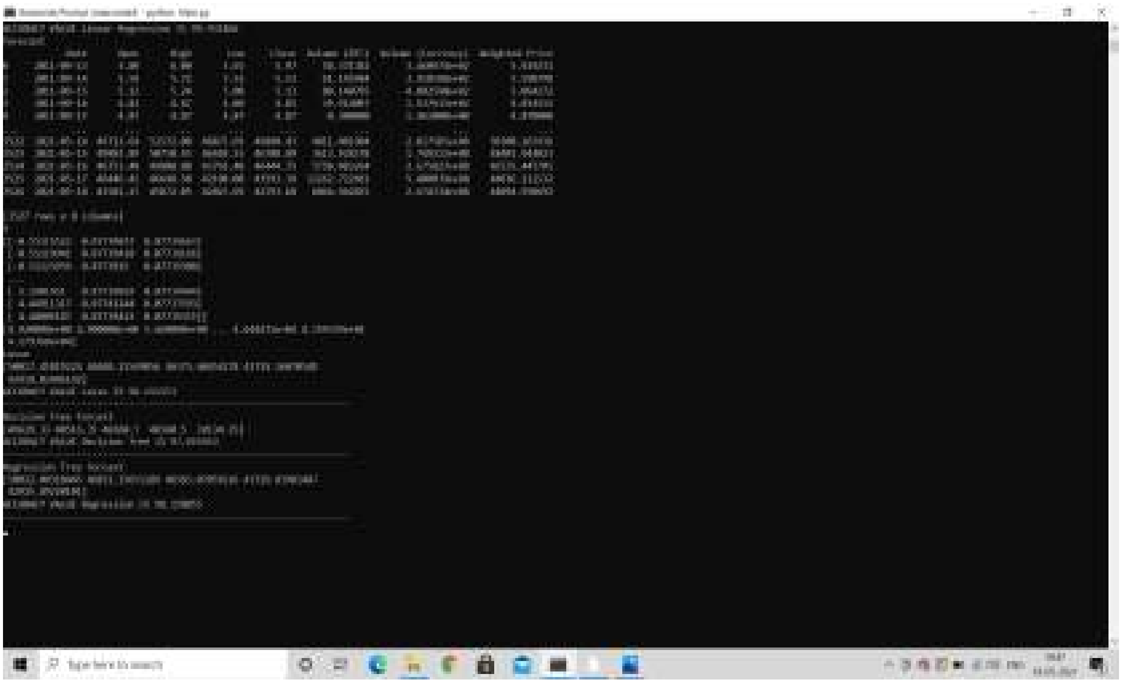


5.2.8 Screenshot: The following screens shows the Accuracy of Lasso and Linear regression

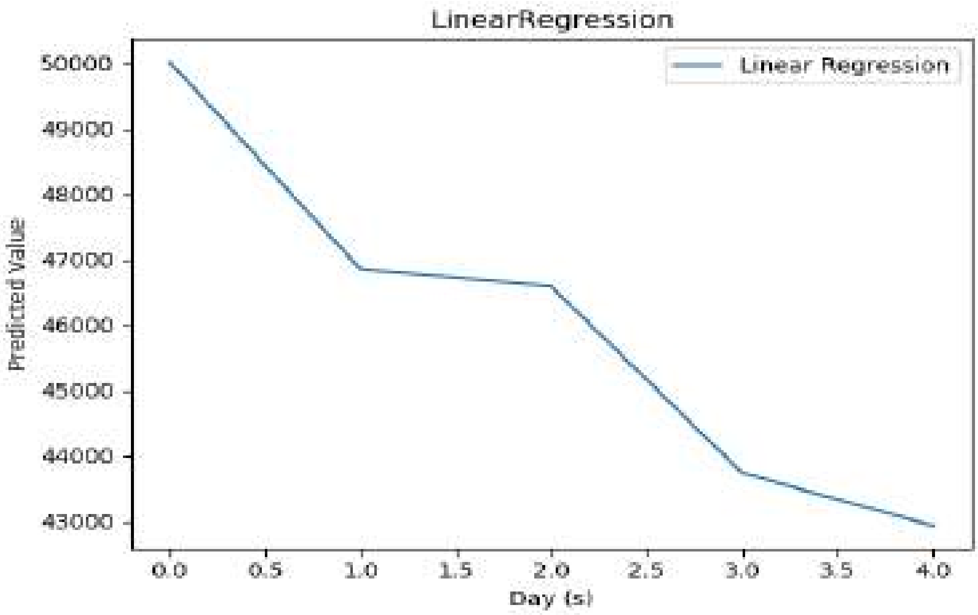
5.3 FORECAST



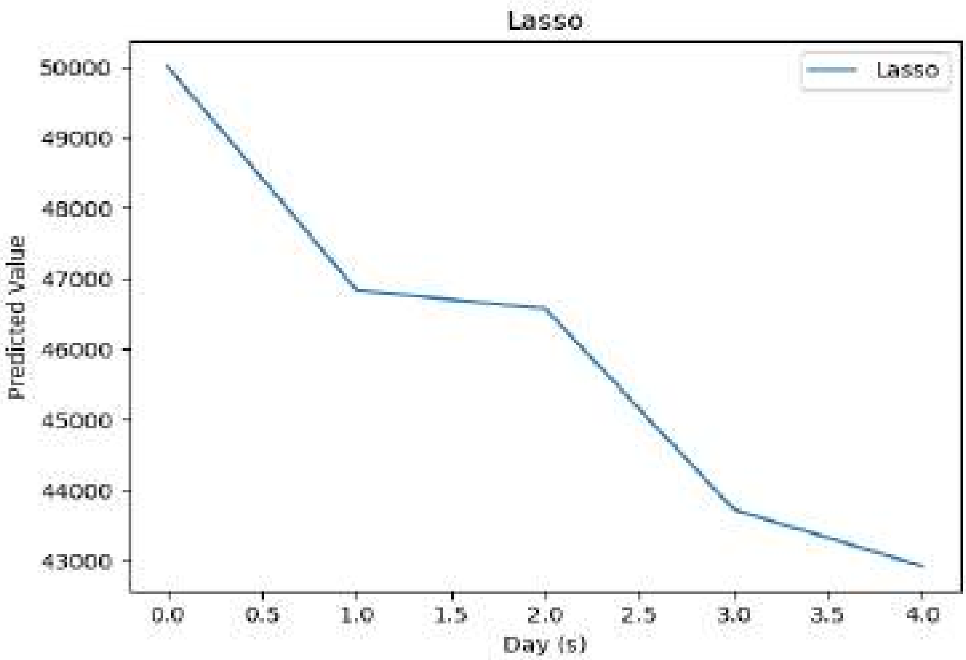
5.3 Screenshot: The following screens shows the Forecast Price



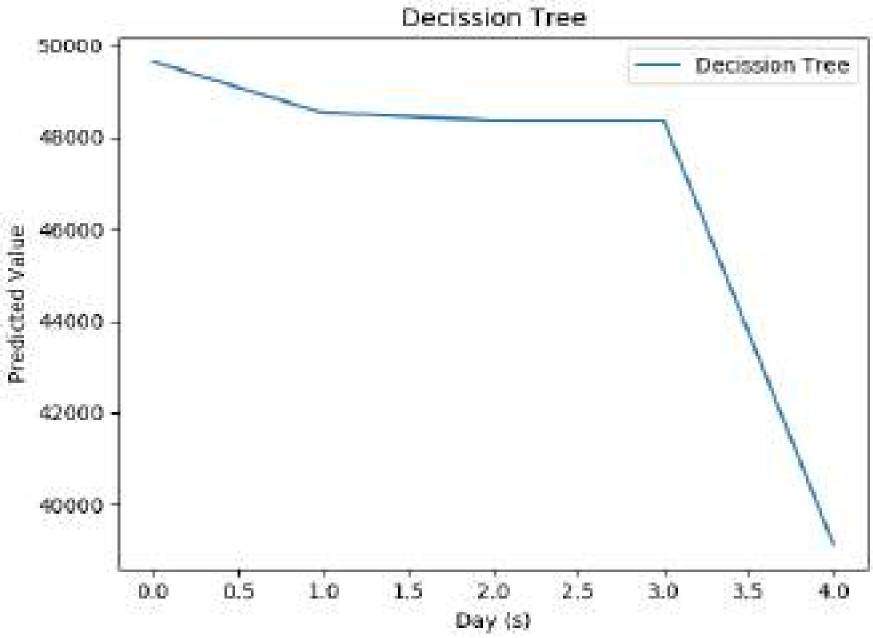
5.3.1 Screenshot: The command screen showing the dataset collection for Forecasting



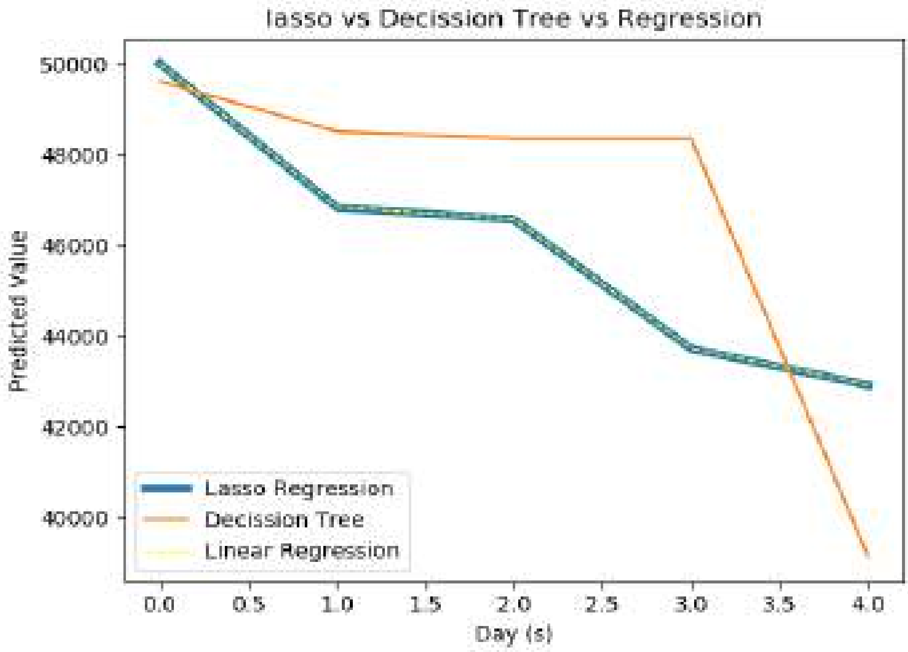
5.3.2 Screenshot: The following screens shows the forecast price of Linear Regression



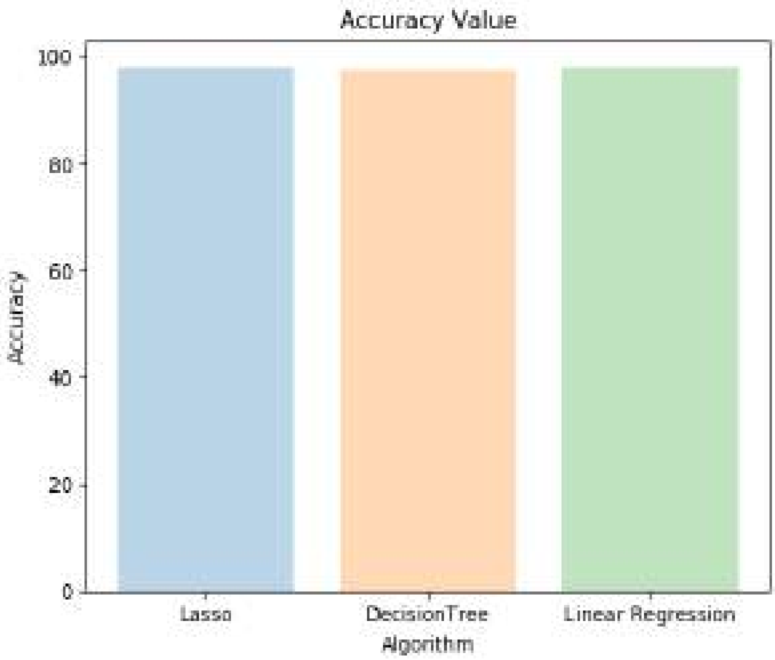
5.3.3 Screenshot: The following screens shows the forecast price of Lasso Regression



5.3.4 Screenshot: The following screens shows the forecast price of Decision tree



5.3.5 Screenshot: The following screens shows the forecast price between Decision Tree and Linear regression and lasso model



5.3.6 Screenshot: The following screens shows the Accuracy of Lasso, Decision tree and Linear regression

6.TESTING

6.TESTING

6.1 INTRODUCTION TO TESTING

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub assemblies, assemblies and/or a finished product It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

6.2 TYPES OF TESTS:

UNIT TESTING

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

INTEGRATION TESTING

Integration tests are designed to test integrated software components to determine if they actually run as one program.Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

FUNCTIONAL TESTING

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals.

Functional testing is centered on the following items:

Valid Input : identified classes of valid input must be accepted.

Invalid Input : identified classes of invalid input must be rejected.

Functions : identified functions must be exercised.

Output : identified classes of application outputs must be exercised.

Systems/Procedures: interfacing systems or procedures must be invoked.

Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identify Business process flows; data fields, predefined processes, and successive processes must be considered for testing. Before functional testing is complete, additional tests are identified and the effective value of current tests is determined.

6.3 TEST CASES

BITCOIN PRICE PREDICTION

Test case ID	Test case name	Purpose	Test Case	output
1	Submit	To check the dataset	A country Bitcoin is entered and clicks on submit button.	Dataset collected succesfully
2	Predict	To predict the price of Bitcoin at time instance.	Click on predict button to predict and uses different algorithms	Predicts the prices with algorithms measures
3	Forecast	Forecast the future price of bitcoin	Click on forecast and uses different algorithm to forecast	Forecasts the price and shows accuracies of the algorithms

7.CONCLUSION

7.CONCLUSION AND FUTURE ENHANCEMENTS

7.1 PROJECT CONCLUSION

Bitcoin is a successful cryptocurrency, and it has been extensively studied in fields of economics and computer science. In this study, we analyze the time series of Bitcoin price with a Decision Tree and Linear regression models. Also the price forecast for five days is done using Lasso and Linear regression models. After establishing the learning framework and completing the normalization, we intend to use the two methods mentioned above and choose the best method to solve the crypto currency prediction problem. The experimental results show that linear regression outperforms the other by high accuracy on price prediction.

7.2 FUTURE ENHANCEMENTS

As future work, we intend to work on more cryptocurrencies in a more extended period to receive more accuracy. Moreover, we plan to apply variate models on the cointegration's estimated equation. Another common way to predict the price of cryptocurrencies is to utilize deep learning and its algorithms, which, due to their complexity, they are expected to predict prices more accurately. We plan to implement these algorithms to analyze their performances too.

8.BIBLIOGRAPHY

8.BIBLIOGRAPHY

8.1 REFERENCES

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[2] Huisu Jang and Jaewook Lee, “An Empirical Study on Modelling and Prediction of Bitcoin Prices with Bayesian Neural Networks based on Blockchain Information,” in IEEE Early Access Articles, 2017, vol. 99, pp. 1-1.

[3] F. Andrade de Oliveira, L. Enrique ZÃ¡rate and M. de Azevedo Reis; C. Neri Nobre, “The use of artificial neural networks in the analysis and prediction of stock prices,” in IEEE International Conference on Systems, Man, and Cybernetics, 2011, pp. 2151-2155

[4] M. Daniela and A. BUTOI, “Data mining on Romanian stock market using neural networks for price prediction”. informatica Economica, 17,2013.

Crypto-Currency Price Prediction Using Machine Learning Techniques

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***Abstract*: In this paper, it is attempted to predict the Bitcoin price accurately taking into consideration various parameters that affect the Bitcoin value. For the first phase of investigation, it is aimed to understand and identify daily trends in the Bitcoin market while gaining insight into optimal features surrounding Bitcoin price. The data set consists of various features relating to the Bitcoin price and payment network over the course of time, recorded daily. For the second phase of investigation, using the available information, we will predict the sign of the daily price change with highest possible accuracy.**

***Keywords*: Lasso Algorithm, Decision Tree, Linear Regression, MSE, RMSE, MAE, RSQUARED.**

Introduction

The objective of Bitcoin Prediction is to ascertain with what accuracy can the price of Bitcoin be predicted using different machine learning algorithm and compare their accuracy.

The objective of study to the price prediction of bitcoin by feature selection of different machine learning techniques. Intuitively, idea is to first transform order book data into features over time, referred as feature series and then to develop prediction models to consume volatility and feature series simultaneously.

Volatility as a measure of price fluctuations has a significant impact on trade strategies and investment decision as well as on option pricing and measures of systemic risk. Bitcoin, as a pioneer in the blockchain financial renaissance plays a dominant role in a whole cryptocurrency market capitalization ecosystem. Therefore, it is of great interest of data mining and machine learning community to be able to predict Bitcoin price fluctuations.

Bitcoin is a crypto currency which is used worldwide for digital payment or simply for investment purposes. Bitcoin is decentralized i.e. it is not owned by anyone. Transactions made by Bitcoins are easy as they are not tied to any country. Investment can be done through various marketplaces known as “bitcoin exchanges”. These allow people to sell/buy Bitcoins using different currencies. The largest Bitcoin exchange is Mt Gox. Bitcoins are stored in a digital wallet which is basically like a virtual bank account. The record of all the transactions, the timestamp data is stored in a place called Blockchain. Each record in a blockchain is called a block. Each block contains a pointer to a previous block of data. The data on blockchain is encrypted. During transactions the user’s name is not revealed, but only their wallet ID is made public.

Bitcoin (BTC) is a novel digital currency system which functions without central governing authority. Instead, payments are processed by a peer-to-peer network of users connected through the Internet. Bitcoin users announce new transactions on this network, which are verified by network nodes and recorded in a public distributed ledger called the blockchain. Bitcoin is the largest of its kind in terms of total market capitalization value. They are created as a reward in a competition in which users offer their computing power to verify and record transactions into the blockchain. Bitcoins can also be exchanged for other currencies, products, and services. The exchange of the Bitcoins with other currencies is done on the exchange office, where "buy" or "sell" orders are stored on the order book. "Buy" or "bid" offers represent an intention to buy certain amount of Bitcoins at some price while "sell" or "ask" offers represent an intention to sell certain amount of Bitcoins at some price. The exchange is done by matching orders by price from order book into a valid trade transaction between buyer and seller.

1. Literature Survey

P. Ciaian, M. Rajcaniova, and D. Kancs, Appl. Econ., vol. 48, no. 19, pp. 1799–1815, 2016

This is the first article that studies BitCoin price formation by considering both the traditional determinants of currency price,e.g,market forces of supply and demand, and digital currencies specific factors, e.g., BitCoin attractiveness for investors and users. The conceptual framework is based on the Barro (1979) model, from which we derive testable hypotheses. Using daily data for five years (2009–2015) and applying time-series analytical mechanisms, we find that market forces and BitCoin attractiveness for investors and users have a significant impact on BitCoin price but with variation over time. Our estimates do not support previous finding that macro-financial developments are driving BitCoin price in the long run.

S. McNally, Ph.D. dissertation, School Comput., Nat. College Ireland, Dublin, Ireland, 2016.

The goal of this paper is to ascertain with what accuracy the direction of Bitcoin price in USD can be predicted. The price data is sourced from the Bitcoin Price Index. The task is achieved with varying degrees of success by the implementation of a Bayesian optimised recurrent neural network (RNN) and a Long Short Term Memory (LSTM) network. The LSTM achieves the highest classification accuracy of 52% and a RMSE of 8%. The popular ARIMA model for time series forecasting is implemented as a comparison to the deep learning models. As expected, the non-linear deep learning methods outperform the ARIMA forecast which performs poorly. Finally, both deep learning models are benchmarked on both a GPU and a CPU with the training time on the GPU outperforming the CPU implementation by 67.7%.

I. Madan, S. Saluja, and A. Zhao, Dept. Comput. Sci., Stanford Univ., Stanford, CA, USA, Tech. Rep., 2015

In this project, they attempt to apply machine-learning algorithms to predict Bitcoin price. For the first phase of our investigation, we aimed to understand and better identify daily trends in the Bitcoin market while gaining insight into optimal features surrounding Bitcoin price. Our data set consists of over 25 features relating to the Bitcoin price and payment network over the course of five years, recorded daily. Using this information we were able to predict the sign of the daily price change with an accuracy of 98.7%. For the second phase of our investigation, we focused on the Bitcoin price data alone and leveraged data at 10-minute and 10-second interval timepoints, as we saw an opportunity to evaluate price predictions at varying levels of granularity and noisiness. By predicting the sign of the future change in price, we are modeling the price prediction problem as a binomial classification task, experimenting with a custom algorithm that leverages both random forests and generalized linear models. These results had 50-55% accuracy in predicting the sign of future price change using 10 minute time intervals.

P. Katsiampa, Econ. Lett., vol. 158, pp. 3–6, Sep. 2017

This work explored the optimal conditional heteroskedasticity model with regards to goodness- of-fit to Bitcoin price data. It is found that the best model is the AR-CGARCH model, highlighting the significance of including both a short-run and a long-run component of the conditional variance.

The references are mentioned at the end of the paper.

2.Methodology

A. System Architecture

In this project, the bitcoin dataset is collected from quandl. The dataset is trained and tested first. The dataset is classified using the three different algorithms like Lasso algorithm, linear regression and decision tree. From the three algorithms predictions the accuracies of the algorithms is measured. Finally results are compared and the accurate price is taken.

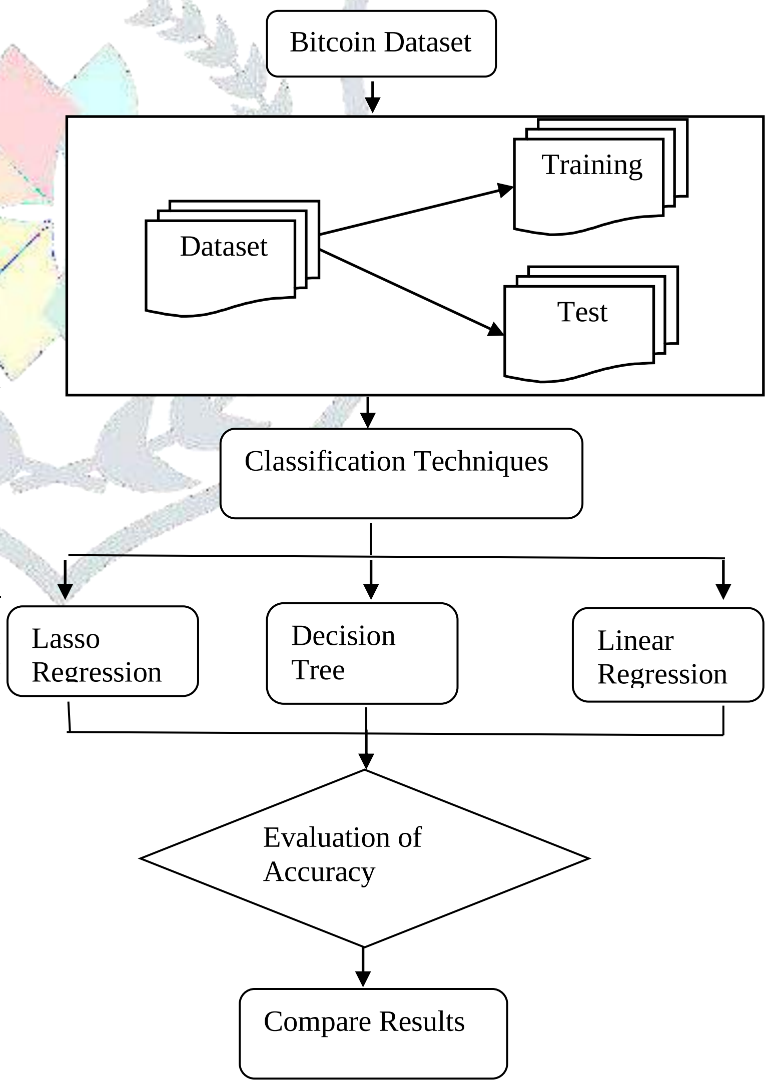

Fig 1. System Architecture

B.Machine Learning Classifiers

1.Linear Regression – Linear regression is a type of regression analysis where the number of independent variables is one and there is a linear relationship between the independent(x) and dependent(y) variable.

$$minimize \frac{1}{n}\sum_{i=1}^{n}(pred_i - y_i)^2$$

$$J = \frac{1}{n}\sum_{i=1}^{n}(pred_i - y_i)^2$$

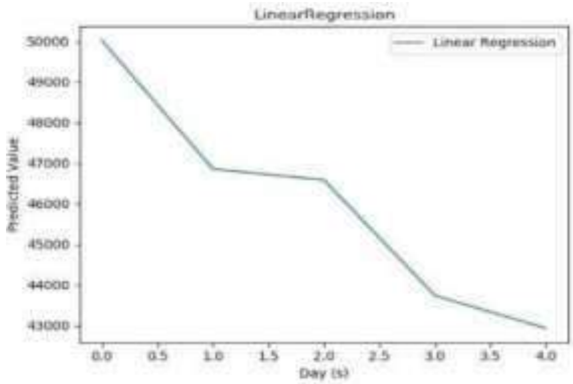

Fig 2.Forecast Price Of Linear Regression

2.Lasso Regression – Lasso (least absolute shrinkage and selection operator; also Lasso or LASSO) is a regression analysis method that performs both variable selection and regularization in order to enhance the prediction accuracy and interpretability of the statistical model it produces.

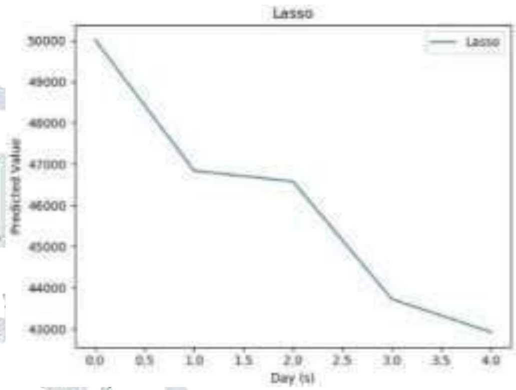

Fig 3.Forecast Price Of Lasso Regression

3.Decision Tree – Decision trees are constructed via an algorithmic approach that identifies ways to split a data set based on different conditions. It is one of the most widely used and practical methods for supervised learning. Decision Trees are a non parametric supervised learning method used for both classification and regression tasks.

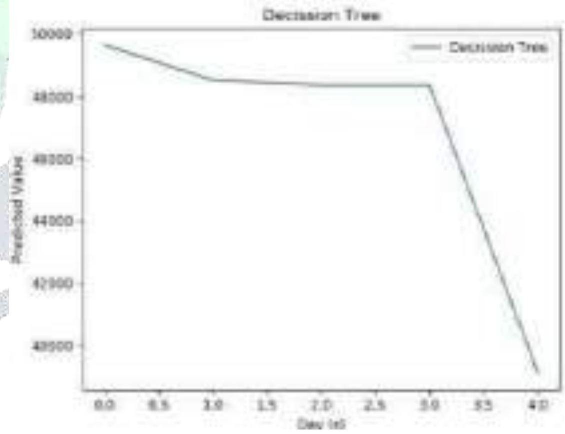

Fig 4.Forecast Price Of Decision Tree

2. Results And Discussion

The test set for this evaluation experiment calculated value. Python software platform is use to perform the experiment. The PC for experiment is equipped with an Intel Core 2.4GHz Personal laptop and 3GB memory. The proposed scheme is tested using ordinarily machine learning. From the simulation of the experiment results, we can draw to the conclusion that this method is robust to many kinds Bitcoin data set images.

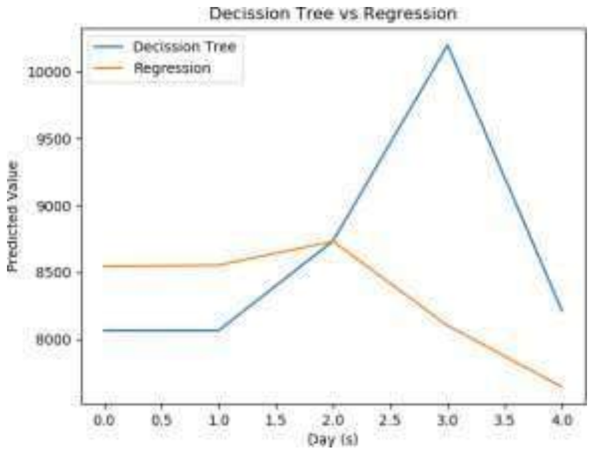

Fig 5.Represents The Decision Tree Vs Linear Regression

Table 1

	Lasso	Regression
MSE	126154.7505	105644.6069
MAE	137.1256	130.8279
R-Squared	0.9991	0.9993
RMSE	355.1827	325.0301
Accuracy	99.9176	99.9310

Table 2

	Decision Tree	Linear Regression
Accuracy	98.3895	99.0558

Table 1 shows the Predicted values of Bitcoin data set using Lasso and Regression algorithm MSE MAE R-Squared RMSE & Accuracy are compared each other.
Table 2 shows forecasted values of Bitcoin data set using Decision tree and Regression algorithm finding the accuracy and compared each other.

3. CONCLUSION

As Bitcoin is very fluctuating in nature, segregated witness and distributed immutable ledger as fetching the real-time data and put into the regression models. According to the model analysis, the Lasso regression model provides the accuracy is 98.6% and linear regression model accuracy is 98.7% for the prediction. The forecasting using the decision tree accuracy is 97.5% and by the linear regression will be the 97.7%. Therefore, to the best results of all models, datasets should be always updated.

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