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College of Basic and Applied Sciences

School of Mathematical and Physical Education

Department of Computer Science

Crypto Currency Price Prediction

by

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Supervised by Dr. Issac Wiafe

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Table of Contents

Declaration

I hereby declare that the content of this work was entirely produced by me under the supervision of Dr. Issac Wiafe at the Department of Computer Science, University of Ghana, Legon. Other researchers and publications whose work were referenced in this dissertation are duly cited as appropriate.

Signed by

Student : **Vanessa Atta-Fynn** _____ **(10665130)**
Date: 1st October, 2021

Supervisor: **Dr. Issac Wiafe** _____
Date: 1st October, 2021

Chapter One

INTRODUCTION

1.1 Background and Motivation

As the world strides towards becoming a cashless society, crypto currency has gained popularity in recent years. Individuals, groups and organizations investing in crypto currency has grown in number due to high profits from trading. However, investment in crypto currency also comes with high risks because of how highly unstable or volatile the currency is. This high volatility is caused by high price changes in the crypto currency market.

During the covid-19 pandemic, many countries including Ghana migrated all physical interaction and activities to a digital level in order to reduce the spread of the virus and for protection. Many institutions improved and migrated all their activities to a digital level from banking to trading to food delivery to health care to e-learning in education. Thr Covid-19 pandemic encourages investing in digital currencies such as Bitcoin. The Crisis significantly influenced social media networks and crypto currency prices.

Unfortunately due to the risk involved, individuals were reluctant to invest. This study seeks to mitigate risk associated with investment in crypto currency by creating a platform to help forecast future prices, prices ranges and prices movement so as to give individuals a clearer perspective on what goes on in the market and helps individuals make decisions based on analysis aided by the system.

1.2 Problem

The high volatility of crypto currency poses great risk to investor. In order to reduce risk, individuals, organizations and groups come together to discuss and attempt to predict the trend of crypto currency prices and speculate on the market.

Predictions made may not always be accurate and individuals who are not in these groups may incur unnecessary or unexpected losses.

1.3 Aim

The purpose of this project is to create a web application which houses a machine learning model to help predict the prices of six altcoins which are – Bitcoin(BTC), Ethereum(ETH), Stellar Lumens(XLM), Litecoin(LTC), Chainlink(LINK) and Cardano(ADA) on the crypto market. This application will serve as a tool in predicting the price of these coins.

1.4 Objectives

This project seeks to achieve these objectives;

1. To provide a tool in a form of a model to predict crypto currency prices.
2. To display graphically the forecasted prices for better visualization to aid in better and quicker decision making
3. To display graphically and help visualize current prices of coins
4. To compare price trends graphically
5. Create a responsive web-application that can be used on computers and mobile devices.
6. Able individuals, groups and organizations make visualize forecasted trends

1.5 Significance of Project

This project seeks to bring into existence a web application(Coin Compass) with its main purpose being to predict prices of the fore mentioned crypto currency coins so as to mitigate risk associated with investing in crypto currency. This tool will help person(s) who may not have access to groups in which discussions are held to predict and speculate coin prices. It will also be of use to individuals in such groups who need clearer and more certain forecast of trends.

1.6 Scope

This project will run as a web-based application that houses a model that predicts price of six altcoins. It would a section to view current trend of prices and allow for comparison of trends of selected coins. The prediction will be displayed in a form of a graph showing possible range of price changes of the coin that has been selected for prediction.

Chapter Two

SYSTEM ANALYSIS AND DESIGN

2.1 Programming Methodology

Real life problems can be huge and complex to solve. Procedural methodology is the approach used to analyze and plan development of software and controlling of processes involved in development.

The steps taken in effort to understand and develop solution to the problem include:

1. Requirement Specification
2. Problem definition
3. System design
4. Implementation
5. Testing
6. Documentation
7. Maintenance

2.2 Existing Systems

This project considered two existing crypto currency prediction applications namely Tradingbeasts and Wallerinvestor

Tradingbeast is a website that gives crypto currency price prediction over a long period of time. It provides the maximum and minimum price within a given month within a year. Its prediction is based on past performances of prices.

Walletinvetor is also a website which predicts price of coins. They gave a daily forecast for a maximum of 14-days price forecast. The weakness with this application is short period for prediction. It is more desirable if span of prediction is longer to give investors a cue on what is to come.

2.3 Proposed System

Coin Compass is a web-application taking a cue from existing systems which is aiming to mitigate risk involved in crypto currency trading and investments by making use of deep learning models and data science techniques to predict possible price movement in crypto currency market. It provides the price range within which prices may move and can forecast prices for a maximum of 4 years ahead.

Functional Requirements

1. The application must allow users to specify time frame within with prediction should be made
2. It must allow users to predict price range
3. It must allow users to view price trends over specified time frame or over a given period of time.
4. It must be able to allow users view real-time prices of coins selected
5. It must allow users select multiple coins and display simultaneously on a graph to aid in visual comparison on price changes in selected coins
6. It allow for prediction to made for a maximum of 4 years.

Non-Functional Requirements

1. The application must accurate data forma reliable source to produce accurate results
2. It must have a well-structured layout
3. It should be interactive and responsive
4. It should be able to load data seamlessly from sources.

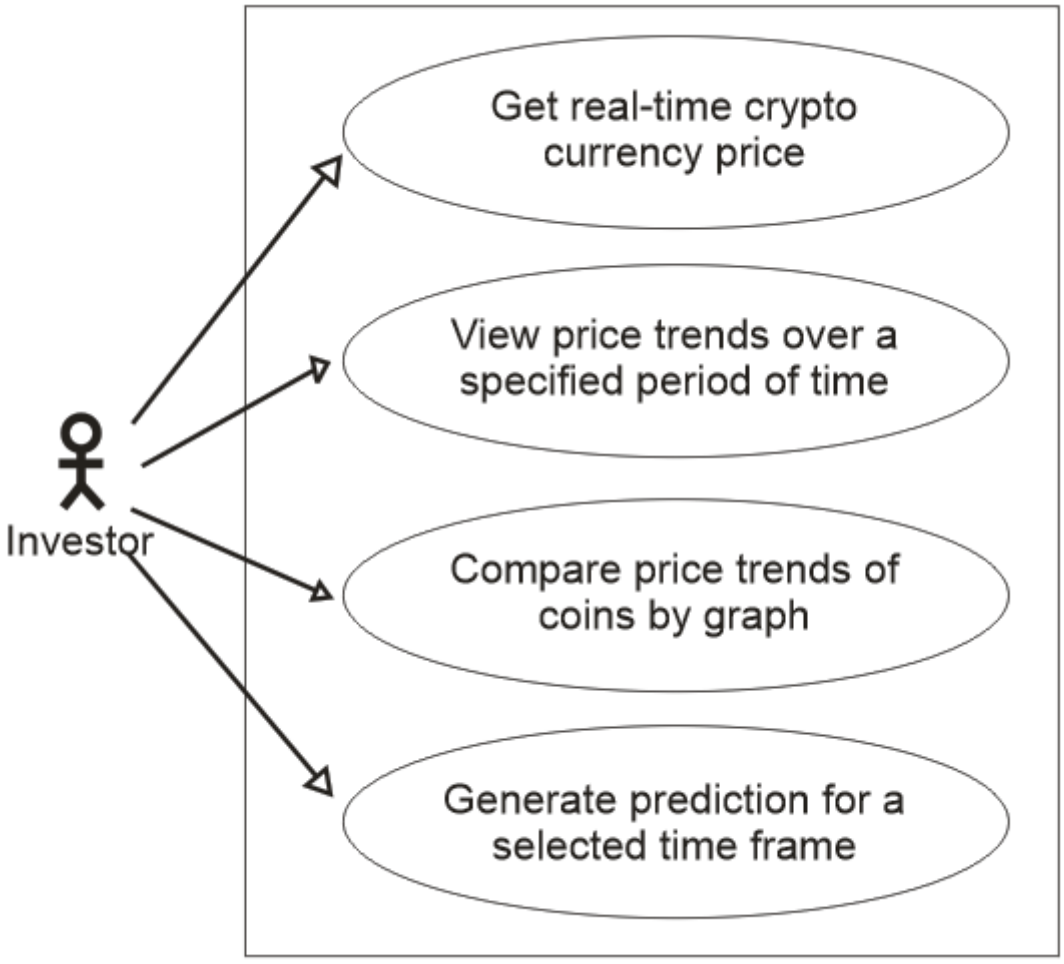
Project Constraints

1. Access to internet before application can be used
2. Needs to run on a web browser

2.4 System Design

This section focuses on the application of concepts of proposed system in development of product.

2.4.1 Use Cases



2.4.2 Wireframes

COIN COMPASS WIREFRAMES

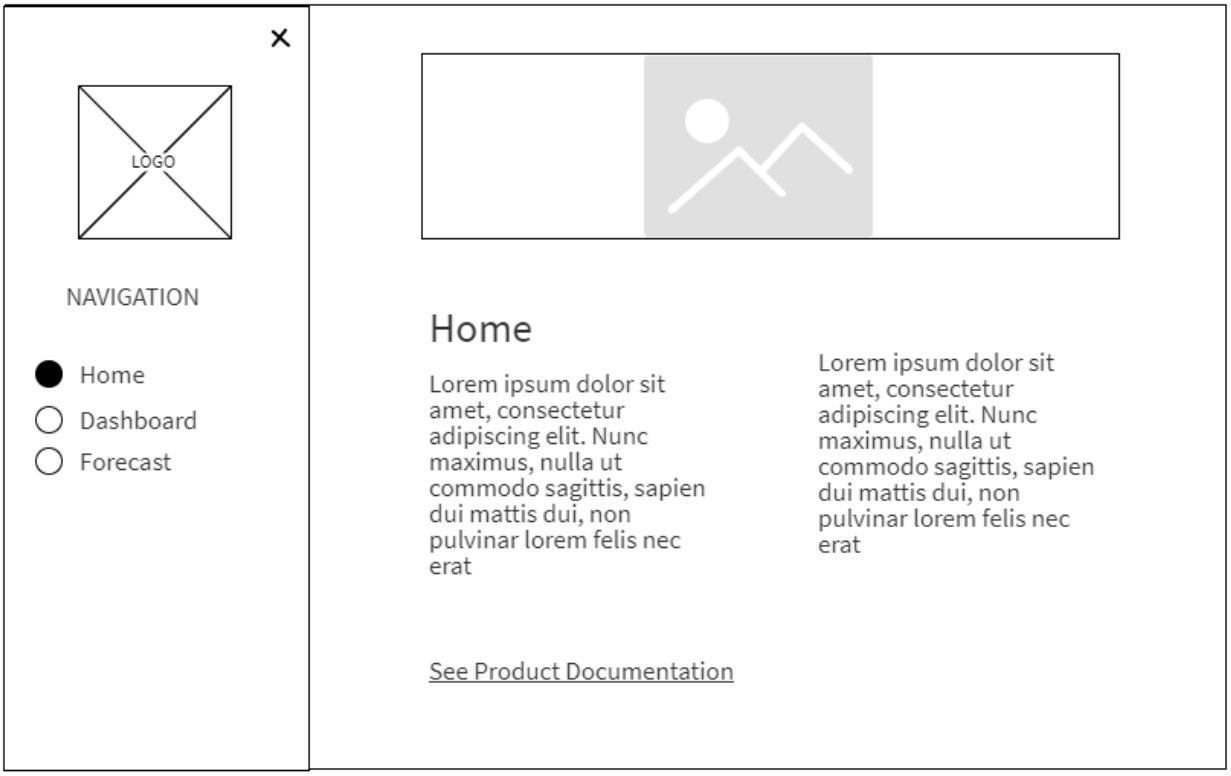


Fig 2.1 Wireframe of Coin Compass home screen

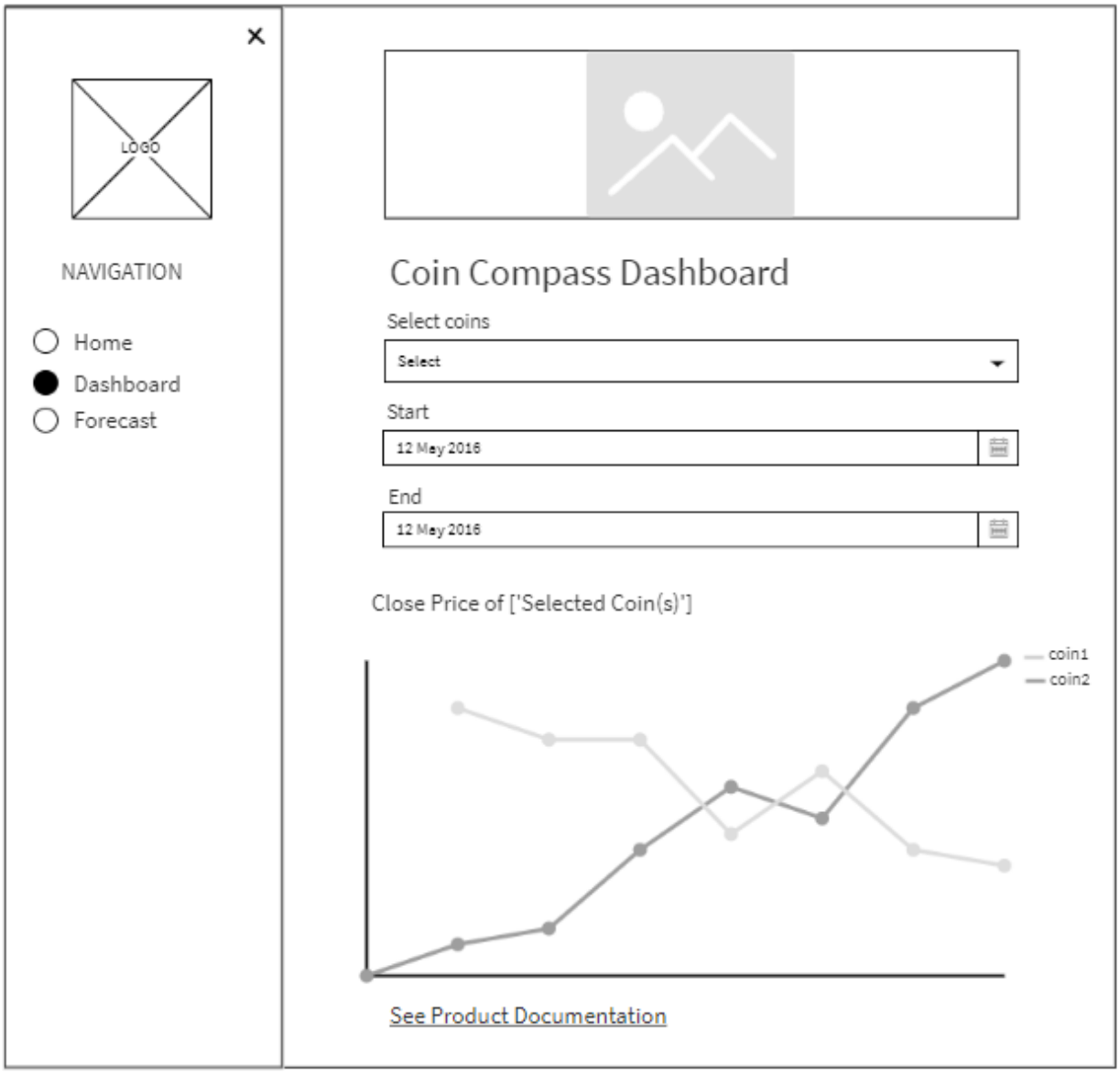


Fig 2.2 Wireframe of Coin Compass Dashboard

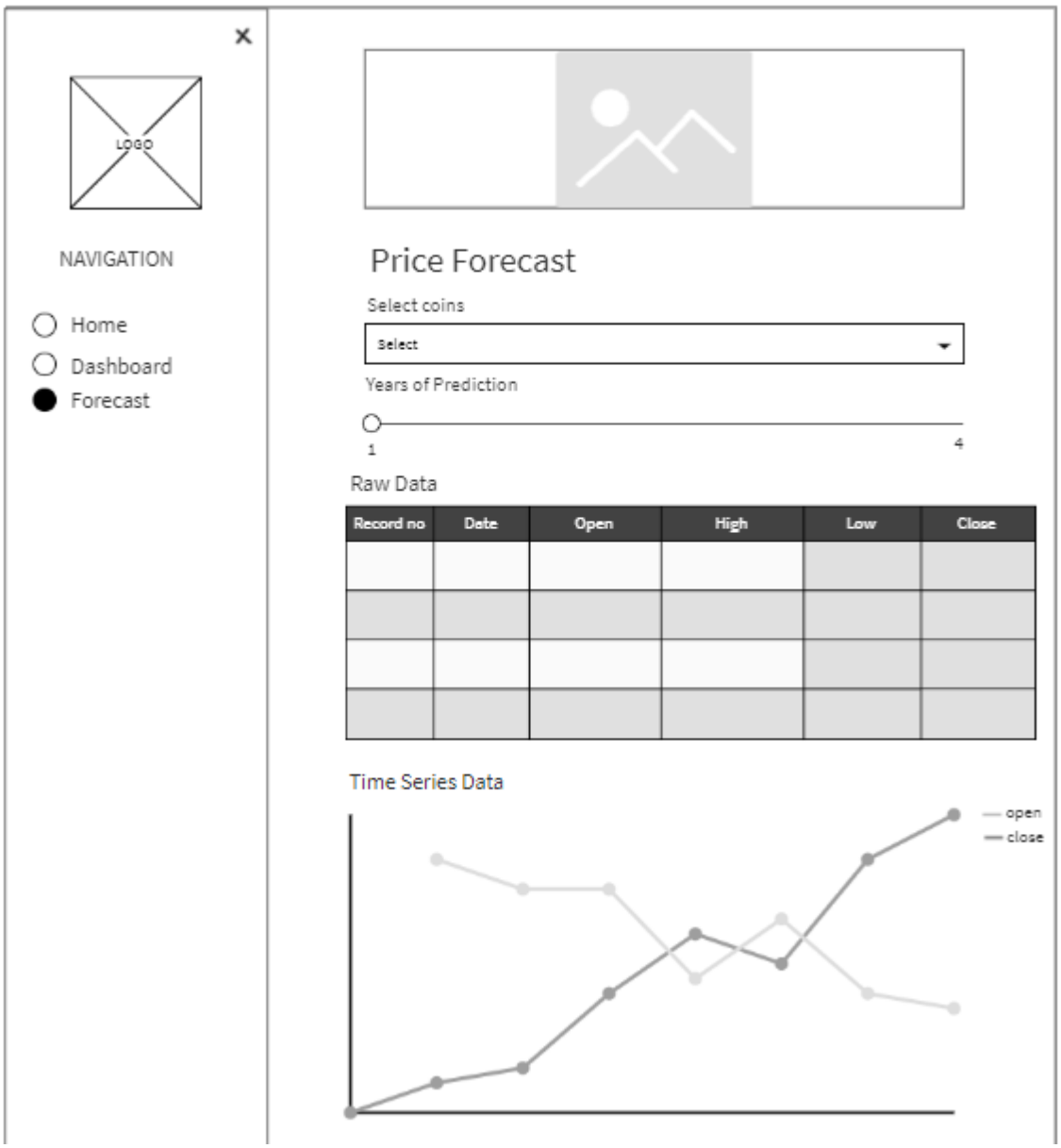


Fig 2.3.1 Wireframe of Coin Compass Forecast Screen

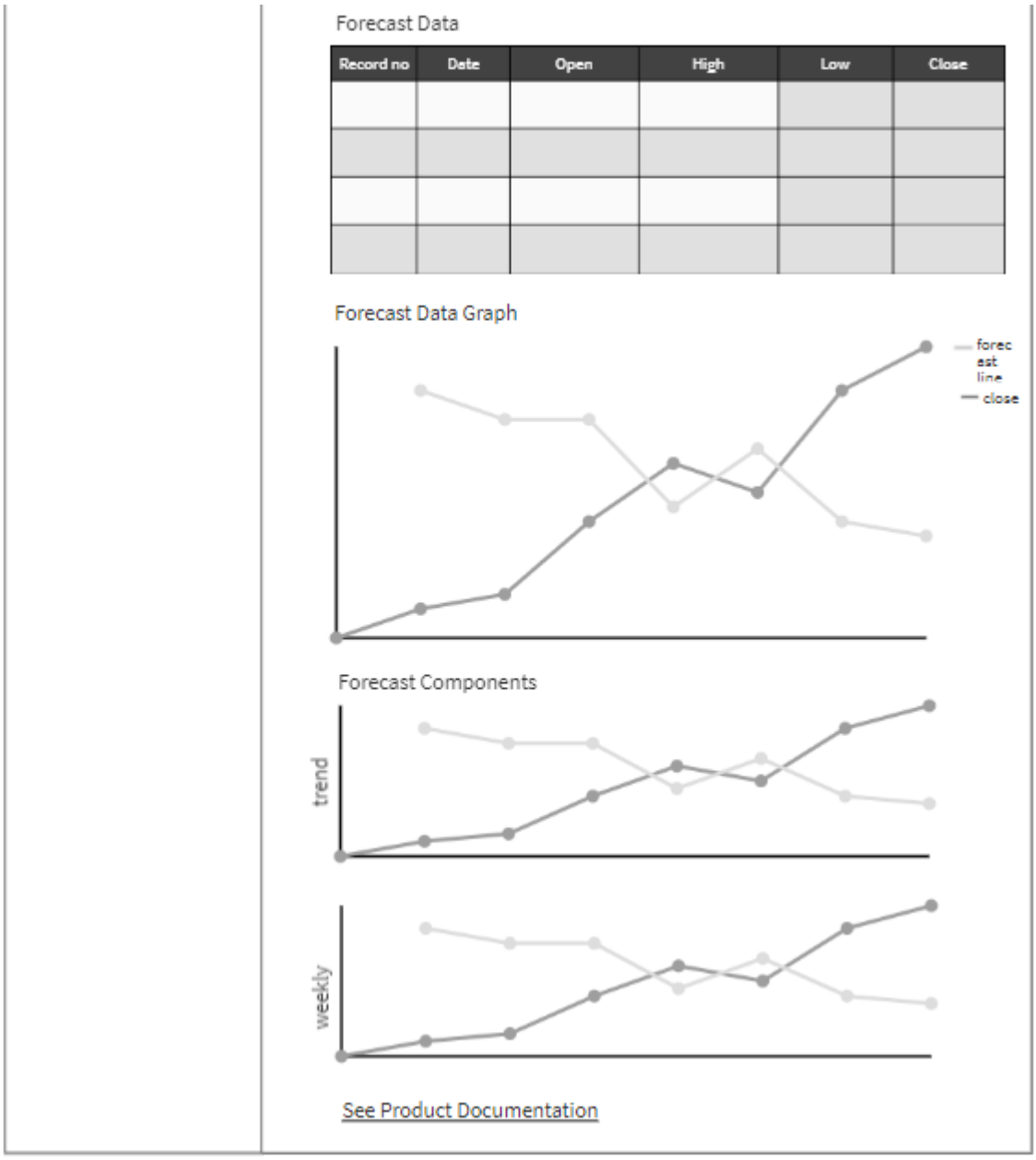
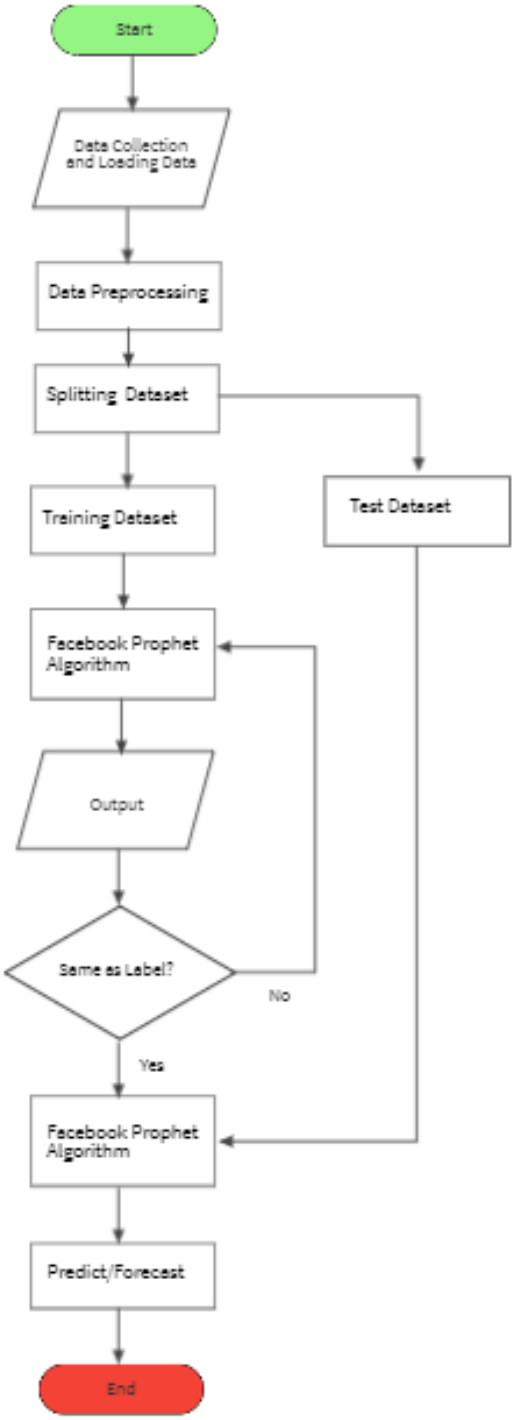


Fig 2.3.2 Wireframe of Coin Compass Forecast Screen Continued

Chapter Three

SOFTWARE IMPLEMENTATION

3.1 Flowchart



3.2 Some Software/ Tools Used

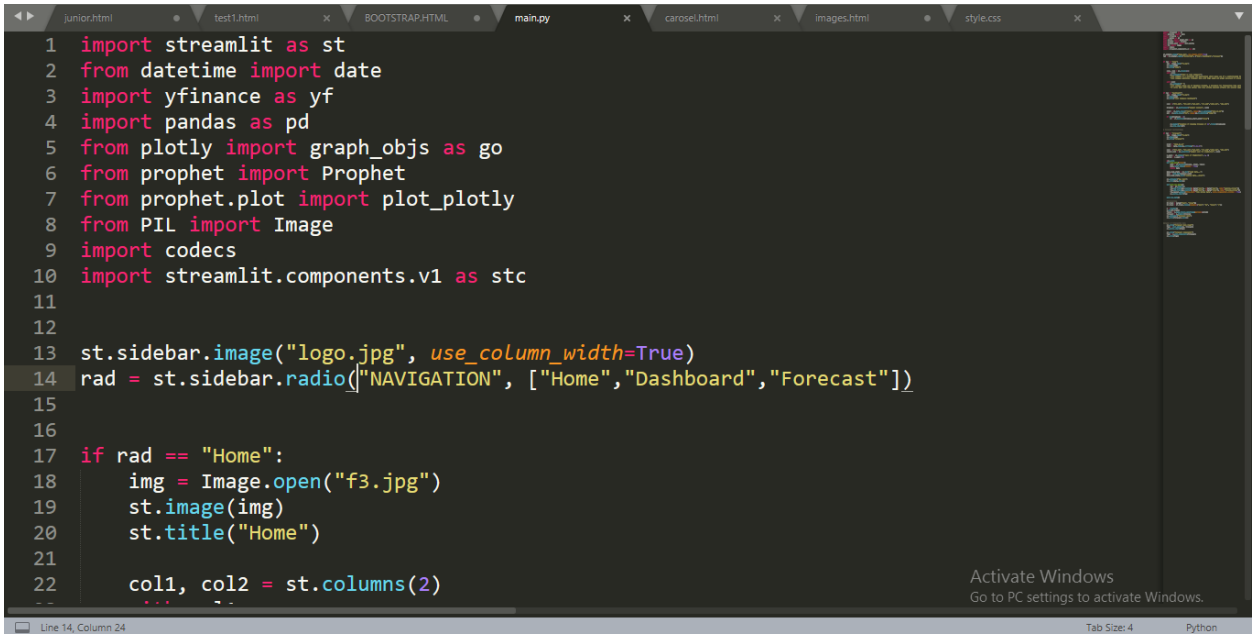
The Software and tools used for the completion of this project are:

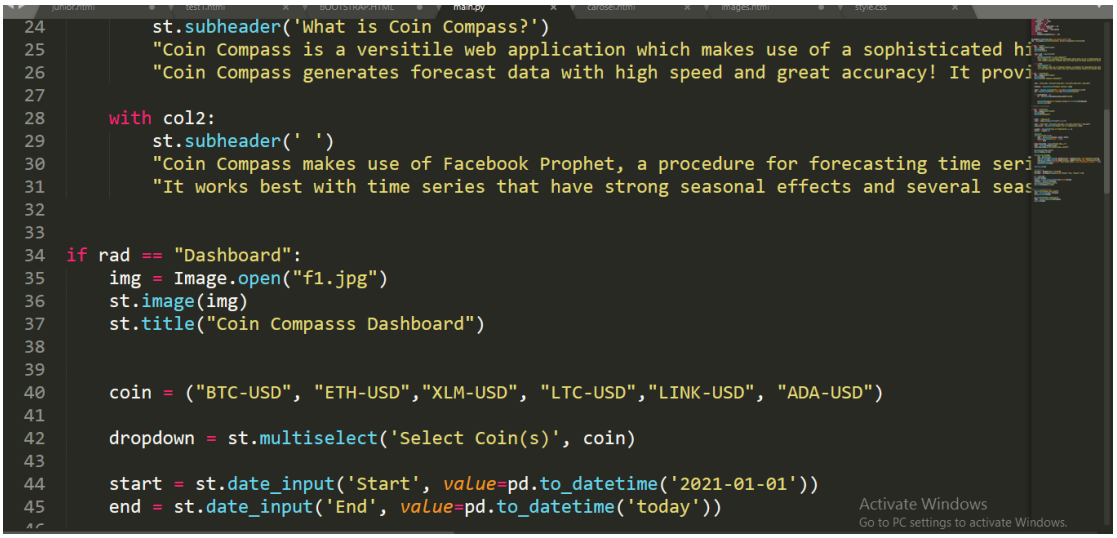
1. Jupyter Notekook IDE from Anaconda
2. Command Prompt from Anaconda
3. Sublime Text
4. MockFlow
5. CorelDraw X8

3.3 Programming Languages Used for this project:

1. Python 3
2. Streamlit
3. HTML
4. CSS

3.4 Some Screenshots of codes





```
        st.subheader('What is Coin Compass?')
        "Coin Compass is a versitile web application which makes use of a sophisticated hi
        "Coin Compass generates forecast data with high speed and great accuracy! It provi

    with col2:
        st.subheader(' ')
        "Coin Compass makes use of Facebook Prophet, a procedure for forecasting time seri
        "It works best with time series that have strong seasonal effects and several seas


if rad == "Dashboard":
    img = Image.open("f1.jpg")
    st.image(img)
    st.title("Coin Compasss Dashboard")


    coin = ("BTC-USD", "ETH-USD","XLM-USD", "LTC-USD","LINK-USD", "ADA-USD")

    dropdown = st.multiselect('Select Coin(s)', coin)

    start = st.date_input('Start', value=pd.to_datetime('2021-01-01'))
    end = st.date_input('End', value=pd.to_datetime('today'))
```

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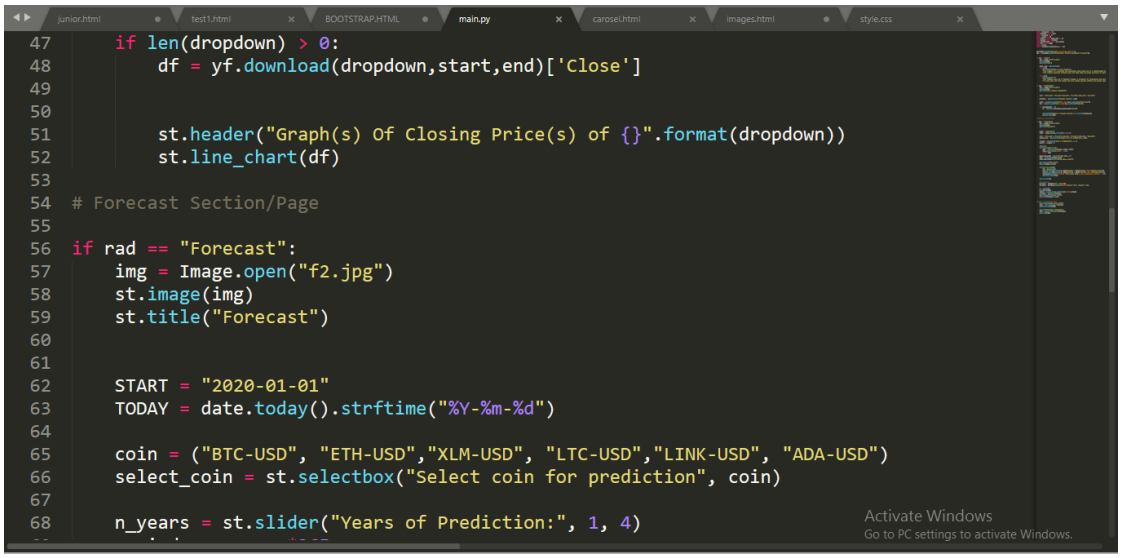

```
    if len(dropdown) > 0:
        df = yf.download(dropdown,start,end)['Close']


        st.header("Graph(s) Of Closing Price(s) of {}".format(dropdown))
        st.line_chart(df)

# Forecast Section/Page

if rad == "Forecast":
    img = Image.open("f2.jpg")
    st.image(img)
    st.title("Forecast")


    START = "2020-01-01"
    TODAY = date.today().strftime("%Y-%m-%d")

    coin = ("BTC-USD", "ETH-USD","XLM-USD", "LTC-USD","LINK-USD", "ADA-USD")
    select_coin = st.selectbox("Select coin for prediction", coin)

    n_years = st.slider("Years of Prediction:", 1, 4)
```

Activate Windows
Go to PC settings to activate Windows.

```
st.write(data.tail())

def plot_raw_data():
    fig = go.Figure()
    fig.add_trace(go.Scatter(x=data['Date'], y=data['Open'], name='opening_prices'))
    fig.add_trace(go.Scatter(x=data['Date'], y=data['Close'], name='closing_prices'))
    fig.layout.update(title_text="Time Series Data", xaxis_rangeslider_visible = True)
    st.plotly_chart(fig)

plot_raw_data()

#Forecasting
df_train = data[['Date', 'Close']]
df_train = df_train.rename(columns={"Date": "ds", "Close": "y"})

m = Prophet()
m.fit(df_train)
future = m.make_future_dataframe(periods=period)
forecast = m.predict(future)
st.subheader('Forecast Data')
st.write(forecast.tail())
```

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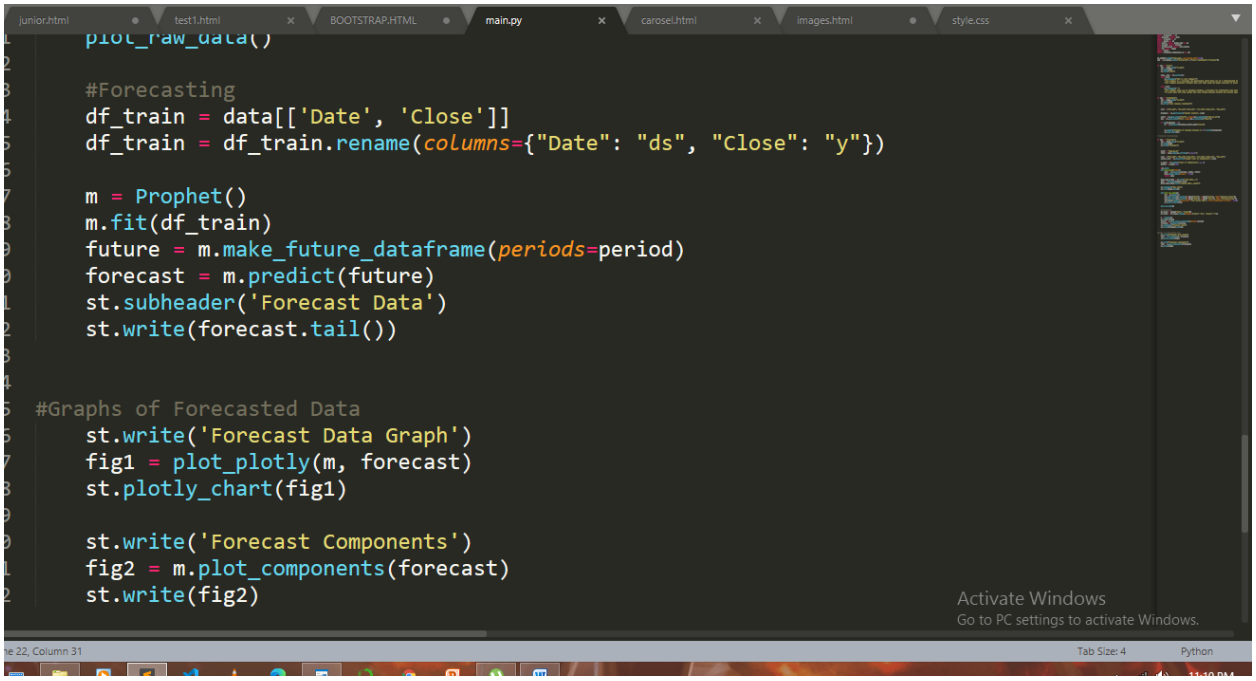
Go to PC settings to activate Windows.



```
plot_raw_data()

#Forecasting
df_train = data[['Date', 'Close']]
df_train = df_train.rename(columns={"Date": "ds", "Close": "y"})

m = Prophet()
m.fit(df_train)
future = m.make_future_dataframe(periods=period)
forecast = m.predict(future)
st.subheader('Forecast Data')
st.write(forecast.tail())


#Graphs of Forecasted Data
    st.write('Forecast Data Graph')
    fig1 = plot_plotly(m, forecast)
    st.plotly_chart(fig1)

    st.write('Forecast Components')
    fig2 = m.plot_components(forecast)
    st.write(fig2)
```

Activate Windows
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Chapter Four

SOFTWARE TESTING AND MAINTENANCE

4.1 Testing

Testing refers to crosschecking the product against the expected requirements of the system to remove bugs and errors and make sure the system is doing what it was meant to do.

4.2. Unit and Integration Testing

At this point, each component of the web applications was tested separately to ensure it works correctly by itself(Unit Testing). After that the components were assemble together with continuous testing to ensure that it works correctly (Integration Testing). Errors emerging at these stages were easily handled

4.3 System Testing

This stage followed after integration testing and focused on the functional and non-functional aspects of the product. Here, performance, operator and user's smooth interaction with system nd software documentation were considered and focused on

4.4 Functional Testing

At this stage, the system was cross checked to ensure that it met all its functional requirements such as the system being able to allow users choose the time frame for prediction and that allow for multiple coins to be selected for comparison.

4.5 Performance Testing

Here, Coin Compass was run on different web browsers to check for irregularities, the speed of the platform was checked , the performance of the machine learning model was checked and the responsiveness of the web application was also checked.

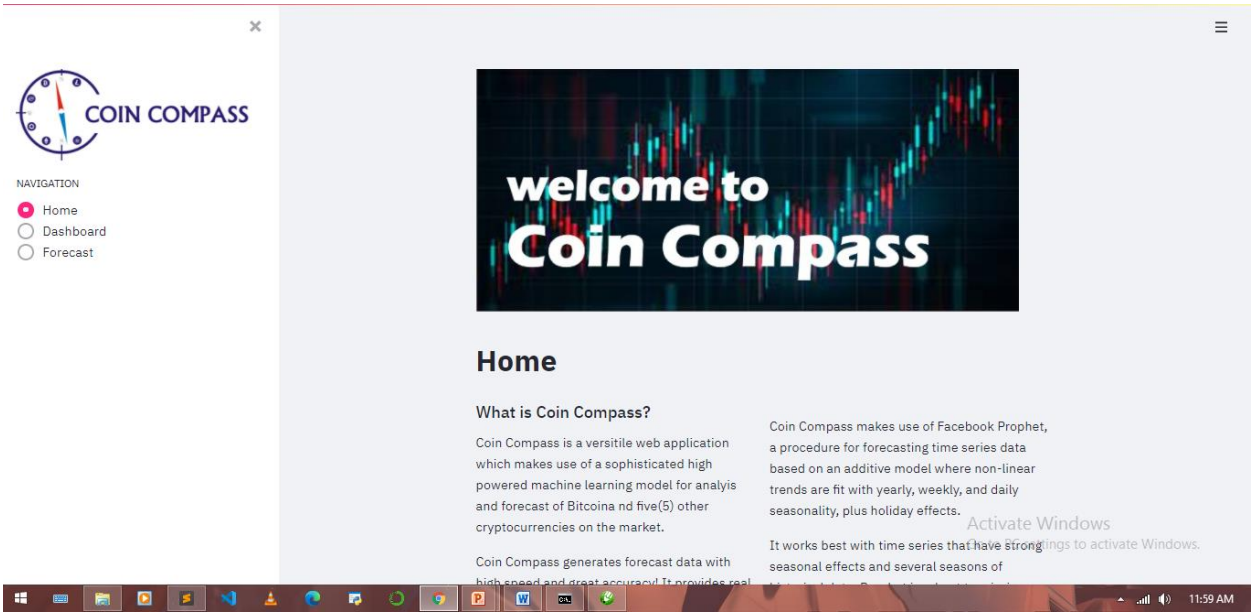
4.6 Maintenance

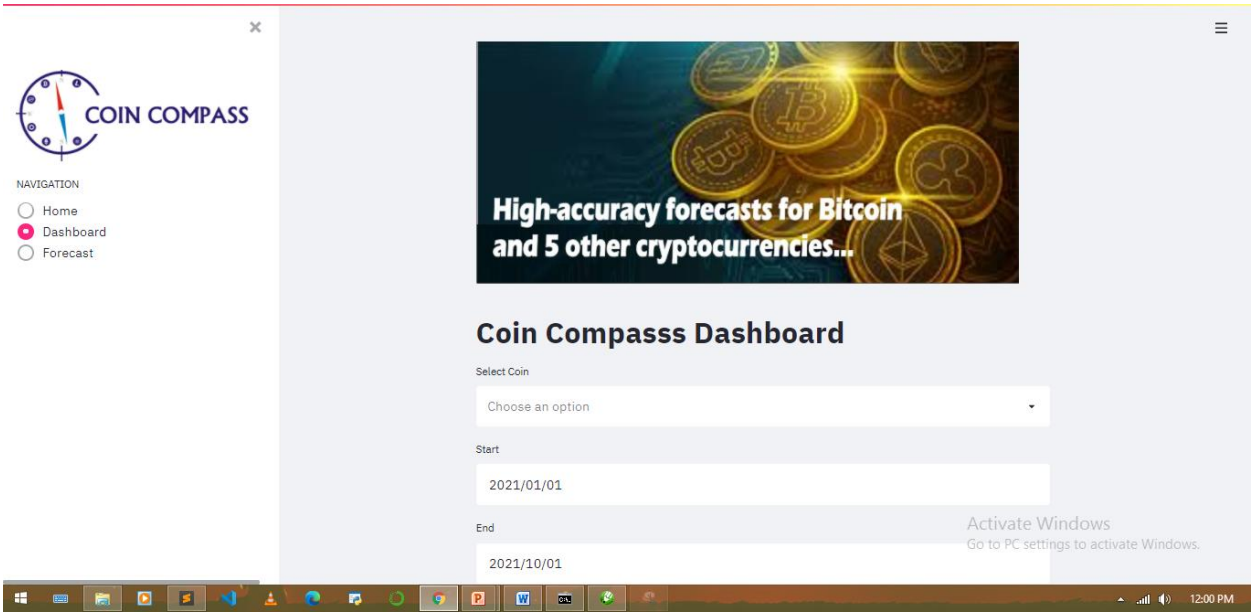
Comments, indentations and good documentation was used during product development so as to make maintenance of system easier. Also, all languages and used for development are quite popular and very recent (up to date). These measures were considered so as to make it easier to maintain the system in the future.

Chapter Five

FINAL PRODUCT AND CONCLUSION

5.1 Final Application Screenshots






COIN COMPASS
NAVIGATION
Home
Dashboard
Forecast
Coin Compasss Dashboard
Select Coin(s)
BTC-USD
XLM-USD
ETH-USD
Start
2021/01/01
End
2021/10/01
Graph(s) Of Closing Price(s) of ['BTC-USD', 'XLM-USD', 'ETH-USD']
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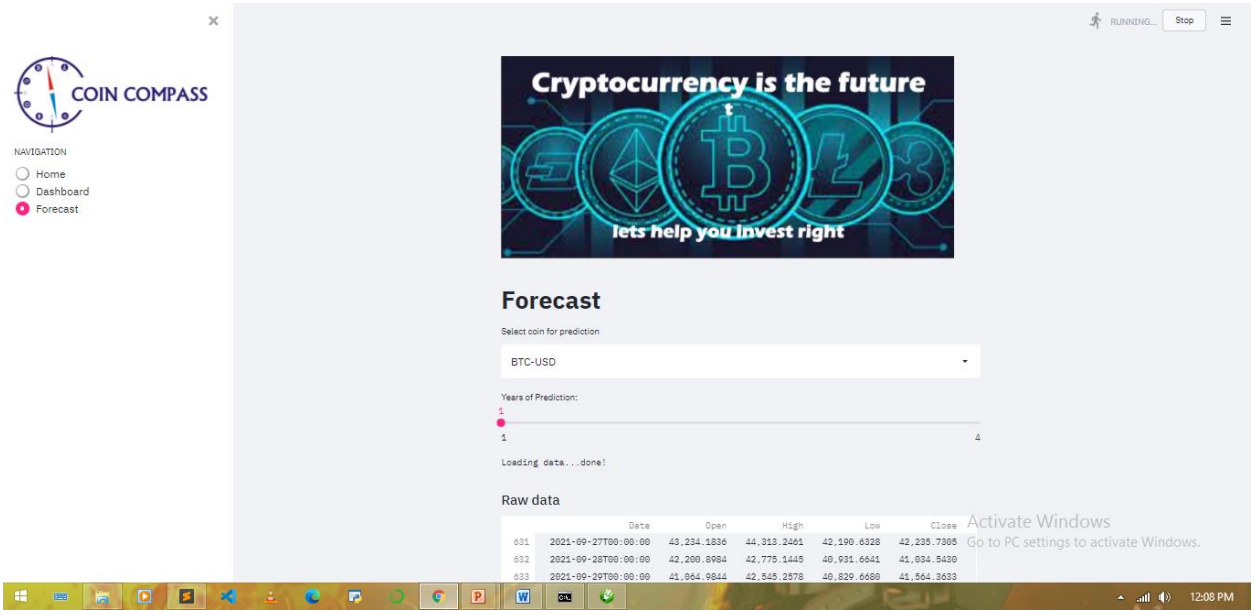
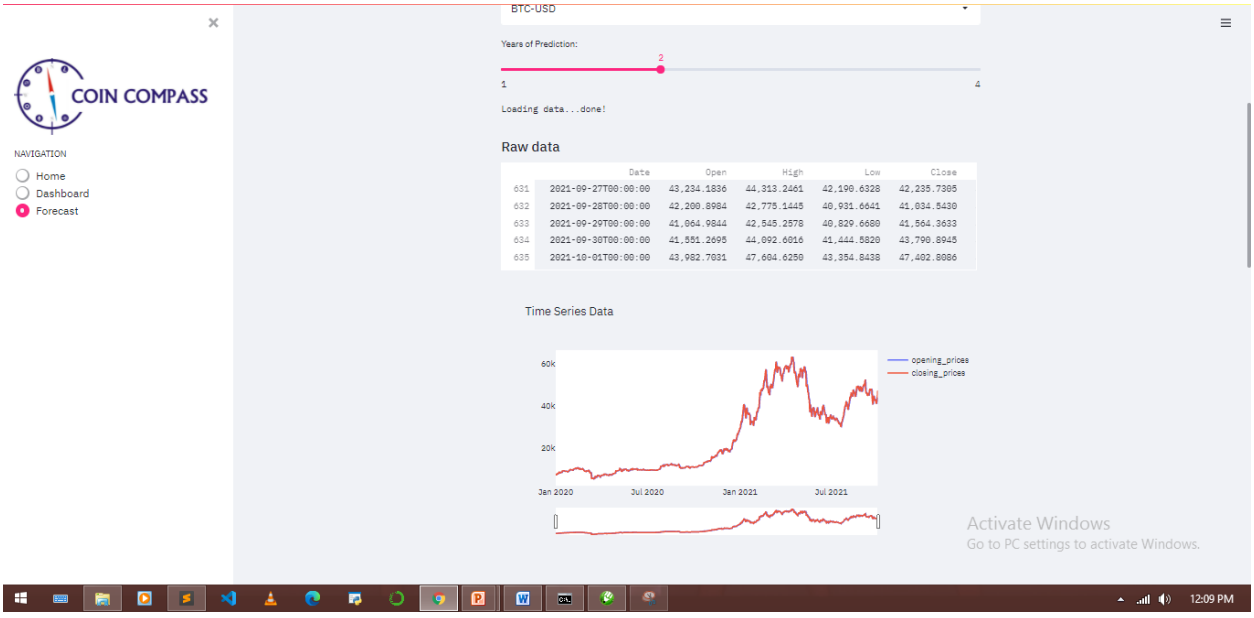
12:07 PM


COIN COMPASS
NAVIGATION
Home
Dashboard
Forecast
RUNNING...
Stop
Cryptocurrency is the future
lets help you invest right
Forecast
Select coin for prediction
BTC-USD
Years of Prediction:
Loading data...done!
Raw data
Activate Windows
Go to PC settings to activate Windows.
12:08 PM


COIN COMPASS
NAVIGATION
Home
Dashboard
Forecast
BTC-USD
Years of Prediction:
2
1
4
Loading data...done!
Raw data
Date Open High Low Close
631 2021-09-27T00:00:00 43,234.1836 44,313.2461 42,190.6328 42,235.7305
632 2021-09-28T00:00:00 42,200.8984 42,775.1445 40,931.6641 41,034.5430
633 2021-09-29T00:00:00 41,064.9844 42,545.2578 40,829.6680 41,564.3633
634 2021-09-30T00:00:00 41,551.2695 44,092.6016 41,444.5820 43,790.8945
635 2021-10-01T00:00:00 43,982.7031 47,604.6250 43,354.8438 47,402.8086
Time Series Data
60k
40k
20k
Jan 2020
Jul 2020
Jan 2021
Jul 2021
opening_prices
closing_prices
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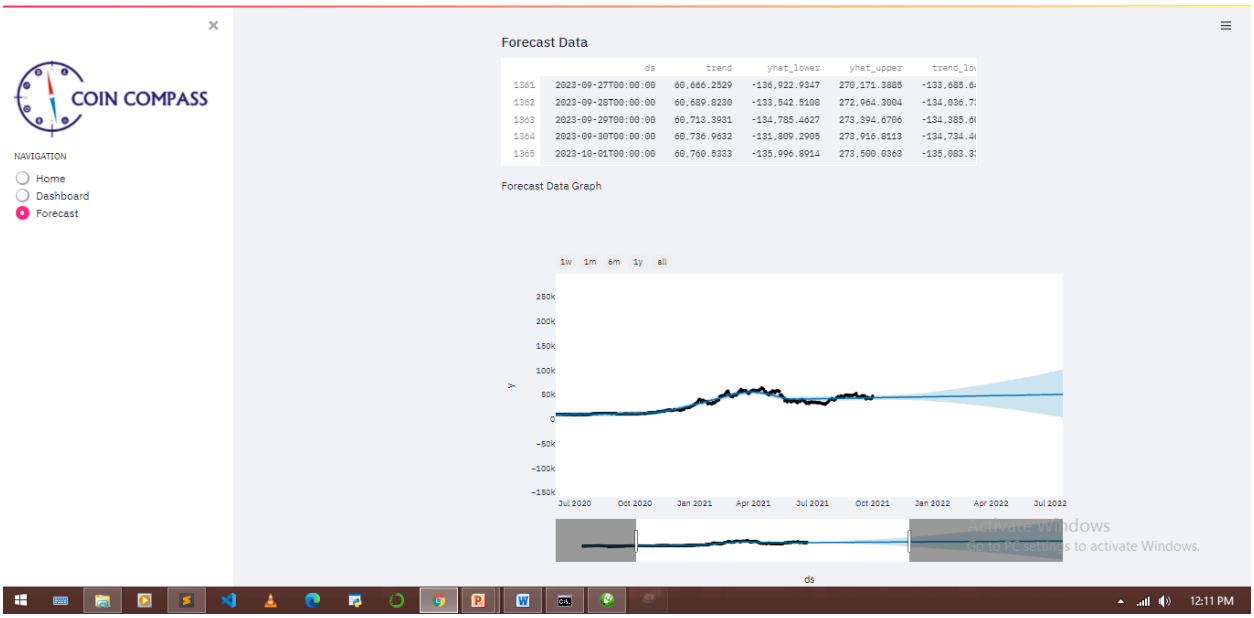
COIN COMPASS
NAVIGATION
Home
Dashboard
Forecast
Forecast Data
ds trend yhat_lower yhat_upper trend_lo
1361 2023-09-27T00:00:00 60,666.2529 -136,922.9347 270,171.3885 -133,685.6
1362 2023-09-28T00:00:00 60,689.8230 -133,542.5108 272,964.3004 -134,036.7
1363 2023-09-29T00:00:00 60,713.3931 -134,785.4627 273,394.6706 -134,385.6
1364 2023-09-30T00:00:00 60,736.9632 -131,809.2965 273,916.8113 -134,734.4
1365 2023-10-01T00:00:00 60,760.5333 -135,996.8914 273,500.0363 -135,083.3
Forecast Data Graph
1w 1m 6m 1y all
250k
200k
150k
100k
50k
0
-50k
-100k
-150k
y
Jul 2020
Oct 2020
Jan 2021
Apr 2021
Jul 2021
Oct 2021
Jan 2022
Apr 2022
Jul 2022
ds
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12:11 PM

5.2 Conclusion

At the end of this project, the crypto currency price prediction application (Coin Compass) was created to meet all its expected requirements. This application can now serve as a tool to make predictions of the possible trend of prices and aid individuals, groups and organizations to make better investment decisions when it comes to crypto currency.

References:

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https://crossbrowsertesting.com/continuous-delivery/web-testing?utm_medium=ppcg&utm_source=aw&utm_term=&utm_content=546049

https://www.browserstack.com/guide/functional-testing

https://facebook.github.io/prophet/

https://docs.streamlit.io/en/stable/

https://www.tutorialspoint.com/programming_methodologies/index.htm#:~:text=Programming%20Methodology%20is%20the%20approach,programming%2C%20also%20called%20modular%20programming.

https://coinsforecast.com/

https://coinpredictor.io/