> Applications of Artificial Intelligence
>
> EAI 6010, CRN 70749
>
> Professor Vladimir Shapiro
>
> Module 1: Assignment Week 1 - Intro to AI Applications
>
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Cryptocurrency Price History Analysis

(Bitcoin & Litecoin Cryptocurrency Data)

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Introduction

This tutorial, inspired by the obsolete by now post on https://notebooks.ai, we're going to pull Bitcoin cryptocurrency prices from a public API and download them as Excel files. I need to import two libraries first: *requests* (to pull data from the web) and *pandas* to process it. May require `pip install requests`

The time series analysis is a process of analyzing the chronologically ordered data which is at equal or unequal intervals. This basically leads to the forecasting of predicting the future value of a time series data. [1]

The data from Cryptowatch is imported in order to perform analysis of the Bitcoin (BTC) and the Litecoin (LTC) cryptocurrency data. The data for the last 100 days is extracted for both the Bitcoin and Litecoin cryptocurrency data in order to perform the time series analysis.

Analysis

In order to perform the Cryptocurrency price analysis for the Bitcoin and Litecoin data, the required libraries are first imported and data from Cryptowatch is extracted. Cryptowatch is a

charting and trading terminal for the cryptocurrency markets which provides an interface to scan prices, analyze market movements, and make trades on every exchange. [2]

The cryptocurrency data after the year 2018 is extracted from Cryptowatch which has columns such as 'CloseTime', 'OpenPrice', 'HighPrice', 'LowPrice', 'ClosePrice', 'Volume', and 'NA'. At first, the data for last 100 days for the Bitcoin cryptocurrency is pulled for the analysis. The historic data that is pulled from the database for the last 100 days after 2018 is visualized further for time series analysis and the data is exported to Excel.

Importing the libraries

In [2]:
```
import requests
import pandas as pd

from statsmodels import api as sm
import matplotlib.pyplot as plt


from bokeh.plotting import figure, output_file, show
from bokeh.io import output_notebook
```

I have a predefined function that simplifies the process of importing data from Cryptowatch (for reference, check their docs).

In [3]:
```
def get_historic_price(symbol, exchange='bitfinex', after='2018-09-01'):
    url = 'https://api.cryptowat.ch/markets/{exchange}/{symbol}usd/ohlc'.format(
        symbol=symbol, exchange=exchange)
    resp = requests.get(url, params={
        'periods': '3600',
        'after': str(int(pd.Timestamp(after).timestamp()))
    })
    resp.raise_for_status()
    data = resp.json()
    df = pd.DataFrame(data['result']['3600'], columns=[
        'CloseTime', 'OpenPrice', 'HighPrice', 'LowPrice', 'ClosePrice', 'Volume', 'NA
    ])
    df['CloseTime'] = pd.to_datetime(df['CloseTime'], unit='s')
    df.set_index('CloseTime', inplace=True)
    return df
```

I will now pull data from Bitcoin, the most popular cryptocurrencies, for the last 100 days:

In [4]:
```
last_100days = (pd.Timestamp.now() - pd.offsets.Day(100))
last_100days
```

Out[4]:
```
Timestamp('2022-07-27 01:48:46.727207')
```

Bitcoin Cryptocurrency Data Analysis

.head() method, showing the start 5 rows of Bitcoin data

In [5]:
```
btc = get_historic_price('btc', 'bitstamp', after=last_100days)
btc.head()
```

Out[5]:

CloseTime	OpenPrice	HighPrice	LowPrice	ClosePrice	Volume	NA
2022-07-27 02:00:00	21215.98	21242.73	21151.91	21157.02	17.082028	362368.246837
2022-07-27 03:00:00	21166.54	21208.13	21093.25	21197.66	24.714590	522519.374018
2022-07-27 04:00:00	21190.84	21206.08	21047.70	21063.55	11.829801	249698.463153
2022-07-27 05:00:00	21085.48	21138.86	21060.59	21109.20	18.539941	391268.349201
2022-07-27 06:00:00	21120.29	21274.00	21101.56	21255.22	44.323182	940800.715879

.tail() method, showing the last 5 rows of Bitcoin data

In [6]:
```
btc = get_historic_price('btc', 'bitstamp', after=last_100days)
btc.tail()
```

Out[6]:

CloseTime	OpenPrice	HighPrice	LowPrice	ClosePrice	Volume	NA
2022-11-03 22:00:00	20238.0	20266.0	20235.0	20258.0	25.261889	5.116448e+05
2022-11-03 23:00:00	20260.0	20269.0	20166.0	20196.0	31.042000	6.273224e+05
2022-11-04 00:00:00	20195.0	20221.0	20164.0	20209.0	29.488969	5.958768e+05
2022-11-04 01:00:00	20209.0	20318.0	20184.0	20285.0	81.278971	1.646635e+06
2022-11-04 02:00:00	20285.0	20315.0	20246.0	20275.0	29.254126	5.932257e+05

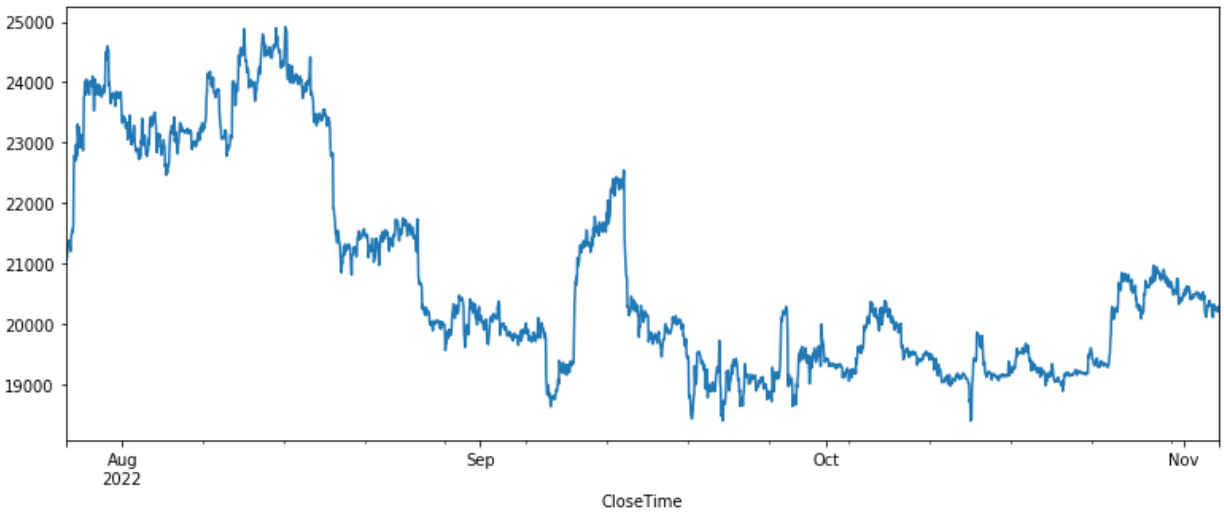
The dataframe for the Bitcoin cryptocurrency data has parameters such as Open Price, High Price, Low Price, Close Price, and Volume for the respective Close Time of the Bitcoin data.

Visualization:

Close Price Analysis

In [17]:
```
btc['ClosePrice'].plot(figsize=(13, 5))
```

Out[17]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x7fe359627150>
```



Dynamic plots with Bokeh

Installing `pip install bokeh`

In [8]:
```
output_notebook()

p1 = figure(x_axis_type="datetime", title="Crypto Prices")
p1.plot_height=400
p1.grid.grid_line_alpha=0.3
p1.xaxis.axis_label = 'Date'
p1.yaxis.axis_label = 'Price $'
p1.line(btc.index, btc['ClosePrice'], color='#f2a900', legend_label='Bitcoin')
p1.legend.location = "top_left"

show(p1)
```

Exporting to Excel

In [9]:
```
writer = pd.ExcelWriter('Bitcoin_history.xlsx')
btc.to_excel(writer, sheet_name='Bitcoin')
writer.save()
```

Litecoin Cryptocurrency Data Analysis

.head() method, showing the start 5 rows of Litecoin data

In [10]:
```
ltc = get_historic_price('ltc', 'bitstamp', after=last_100days)
ltc.head()
```

Out[10]:

CloseTime	OpenPrice	HighPrice	LowPrice	ClosePrice	Volume	NA
2022-07-27 02:00:00	53.86	53.90	53.50	53.50	251.799673	13532.439062
2022-07-27 03:00:00	53.49	53.64	53.29	53.64	651.730143	34829.880913
2022-07-27 04:00:00	53.56	53.56	53.05	53.09	1006.340696	53673.849853
2022-07-27 05:00:00	53.13	53.39	53.12	53.39	511.979511	27277.405310
2022-07-27 06:00:00	53.36	53.84	53.35	53.74	250.239862	13403.427135

.tail() method, showing the last 5 rows of Litecoin data

In [11]:
```
ltc = get_historic_price('ltc', 'bitstamp', after=last_100days)
ltc.tail()
```

Out[11]:

CloseTime	OpenPrice	HighPrice	LowPrice	ClosePrice	Volume	NA
2022-11-03 22:00:00	62.41	62.44	62.28	62.40	134.424443	8383.313792
2022-11-03 23:00:00	62.35	62.45	61.71	61.84	414.325032	25751.407473
2022-11-04 00:00:00	61.90	62.10	61.65	61.84	412.127916	25480.506520
2022-11-04 01:00:00	61.94	62.54	61.73	62.18	762.588063	47372.512815
2022-11-04 02:00:00	62.25	62.25	61.77	61.86	241.430790	14967.036520

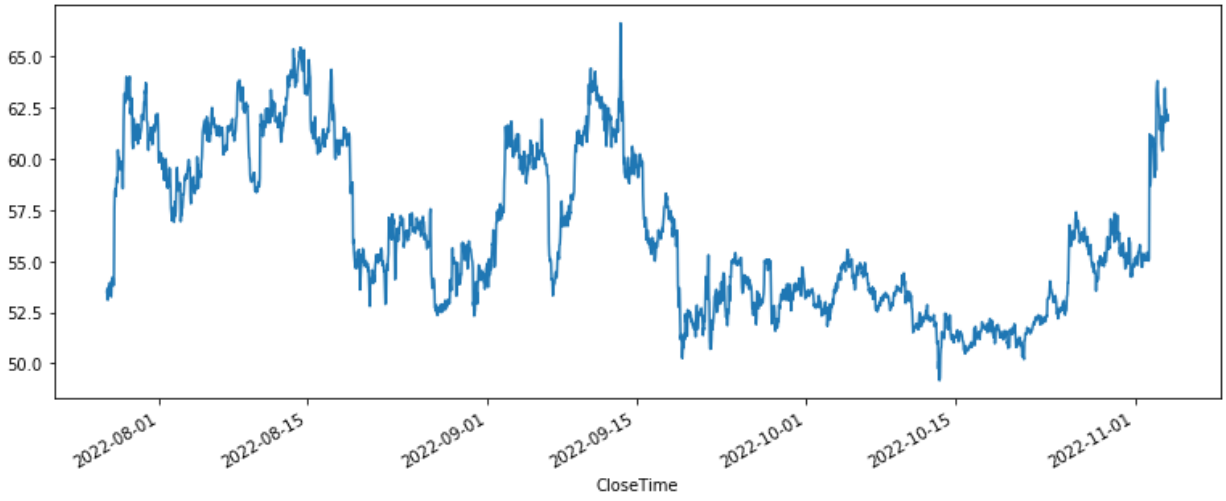
The dataframe for the Bitcoin cryptocurrency data has parameters such as Open Price, High Price, Low Price, Close Price, and Volume for the respective Close Time of the Bitcoin data.

Visualization:

Close Price Analysis

In [18]:
```
ltc['ClosePrice'].plot(figsize=(13, 5))
```

Out[18]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x7fe359585950>
```



Dynamic plots with Bokeh

In [13]:
```
p2 = figure(x_axis_type="datetime", title="Crypto Prices")
p2.plot_height=400
p2.grid.grid_line_alpha=0.3
p2.xaxis.axis_label = 'Date'
p2.yaxis.axis_label = 'Price $'
p2.line(ltc.index, ltc['ClosePrice'], color='#f2a900', legend_label='Litecoin')
p2.legend.location = "top_left"

show(p2)
```

Exporting to Excel

In [14]:
```
writer1 = pd.ExcelWriter('Litecoin_history.xlsx')
ltc.to_excel(writer1, sheet_name='Litecoin')
writer1.save()
```

Conclusion

The task required to extract cryptocurrency data for Bitcoin and Litecoin in order to analyze the price history by extracting the data from Cryptowatch after the year 2018. The data for last 100 days was pulled from Cryptowatch and the data was analyzed to export it to Excel.

The time series analysis helps analyze the historic data in a timely manner that helps understand the closing prices of the stocks. In the this assignment, the goal was to analyze and understand tehe closing prices of the Bitcoin and Litecoin cryptocurrency data.

Lastly, with the help of the time series graphs and visualizations, the data is well explained that guides us through the closing prices of the currency and stocks within the year or month.

References

[1] Time Series Analysis – An Intro to Predicting Crypto Token Performance | Crypto.com. (n.d.). Retrieved November 3, 2022, from https://crypto.com/university/defi-token-time-series-analysis

[2] Cryptowatch. (n.d.). About. Retrieved November 3, 2022, from https://cryptowat.ch/about

[3] Lewis, S. (2020, May 26). Using Bitcoin Data in Python. Towards Data Science. https://towardsdatascience.com/getting-started-with-bitcoin-historical-data-set-with-python-and-pandas-cd31417d1736