International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 5 May 2022, pp: 2648-2652 www.ijaem.net ISSN: 2395-5252

A study on Cryptocurrency web based application with Data Analysis using Python

Manasi Kaur[1], Dr. Avinash Gupta[2], Preeti Singh[3], Alka Singh[4]
[1,5,6] *Student, Department of Computer Science, Babu Banarasi Das Engineering College (AKTU), Lucknow, India*
[2,4] *Assistant Professor, Department of Computer Science, Babu Banarasi Das Engineering College (AKTU), Lucknow, India*
[3] *Professor & Head, Department of Computer Science, Babu Banarasi Das Engineering College (AKTU), Lucknow, India*

Submitted: 20-05-2022 Revised: 28-05-2022 Accepted: 30-05-2022

ABSTRACT: This paper focuses on the web applications used to showcase the trends in the cryptocurrency prices which eases the work of traders to make an investment in the respective crypto coins. The web app taken for reference here is built using the process of data analysis with python language. Multiple suitable python libraries that have been undertaken during the data visualization is also a perspective that is considered here.

KEYWORDS: Cryptocurrency, Web applications, Mobile applications, Data Analysis, Data Visualization

I. INTRODUCTION

The era of information and technology has undoubtedly provided many golden opportunities in several aspects and led to the increase in the dependency of the virtual world due to which a lot of daily life activities have been merged online. These online techniques and methodologies adopted are quite feasible and flexible to work with increased effectiveness. There are many fields which have benefited from these online connections among which is the financial sector as well. An exponential growth in the online users had plunged the virtual word concepts which in turn had set up a business phenomenon named. Cryptocurrency to facilitate the activities like buying, selling and trading in the financial aspects.[1] It represents objects that are valuable and intangible which are used in different electronic applications and networks such as social networking or even social games. Technically, cryptocurrency can be described as, "a tradable asset or digital form of money, built on block chain technology that only exists online." It uses encryption to authenticate and protect transactions, hence its name." Looking specifically at the purpose of cryptocurrencies for making payments, the aim is to illustrate that in the current state, what are the killer apps for cryptocurrencies, and the more fundamental issues cryptocurrencies must address.[2] However, Bitcoin cannot replace traditional payment techniques; banks should look at this technology as a potential way to transfer ownership of value in the longer term.

In recent years, cryptocurrencies have paved their way to many different systems to facilitate things that are a lot related from a financial perspective. A hike in the use of cryptocurrencies has drawn the attention of the whole world which made the researchers keener about it. The assets that are decentralized or currencies or even tokens have garnered attention from academics and practitioners in nearly every scholarly discipline. Cryptocurrencies and related areas of interest, have huge business, economic, legal, environmental or regulatory implications which indeed led to the need of analyzing data since there was a multitude of trading happening regularly.

Data analysis is basically a process of inspecting, cleaning, transforming and modeling data with the goal of discovering useful information, informing conclusions and supporting decision-making. It begins with processing the raw data initially and then making an informed decision from it which is the main motive of data analysis. This scenario is well suited with the business aspects like financial sector and so on.

Several mobile applications, web applications have also evolved for the traders of cryptocurrencies so they can look up to the trends

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or fluctuations in the prices of coins in which they are interested to invest in. This is represented using the technique of data visualization which is the end step of data analysis. After analysis, the data needs to be represented in a manner in which even the non-technical people or the common people can easily understand it and hence, data visualization comes into the view. Technically, it can be described as, "a graphical representation of important and relevant data through the use of graphics such as charts or plots."

This particular research paper is concerned with the data analysis process used in the building of a simple web application with the given data set of cryptocurrencies that are taken from a well known source.

II. APPLICATIONS USED FOR CRYPTOCURRENCY

Several web applications and mobile applications have been developed for the cryptocurrency traders to facilitate buying and selling of crypto coins.

To elaborate it, web applications are basically application software that run on a computer system with active internet connection unlike the system softwares that runs locally on a computer. These then are accessed by a user. On the other hand, mobile applications are application software that run on the mobile or android devices with active internet connection and are then accessed by the user.

Native mobile apps are built using specific languages and Integrated Development Environments, abbreviated as IDE that all depends on the platform. Apple devices apps are built with the help of Objective-C or Swift, and the Xcode IDE. Android apps use Java language and are commonly built using the Android Studio. Apple and Google have their own development tools, interface elements and SDK which developers can use to build mobile apps.

Web apps are built using JavaScript, CSS, HTML, and Python. Unlike mobile apps, there is no standard SDK for building web apps.

As this paper is mainly focused on the web application used to compare the cryptocurrency prices, we move ahead with a few best examples of web applications/websites for cryptocurrency:

1. crypto.com
2. coinbase.com
3. binance.com
4. kraken.com
5. coindesk.com
6. coinmarket.com
7. investvoyager.com
8. gemini.com

III. DATA ANALYSIS APPROACH

As discussed in the previous sections, data analysis is described as the process of transforming raw data into the information that is particularly used for decision making and present the visualization. Since the data is growing very fast in today's world.[3] And it is not so easy to process the data manually, data analysis and visualization programs come into the scenario for better deeper understanding. The programming language Python, with its easy-to- follow syntax, offers an amazingly powerful open- source alternative to traditional techniques and applications.

The cryptocurrency dataset was the first requirement without which the process could not move ahead and hence it was collected from the relevant web source. After the data had been collected, it had to move to the next step , that is, importing it which was done with the help of the library CCXT abbreviated as CryptoCurrency Exchange Trading Library and e- commerce with support for many bitcoin/ether/altcoin exchange markets and merchant APIs. It supports both public and private APIs.

The functioning call by means of structured and time series data formulates the need of using Pandas. It is the most important and useful library used here which is provided with high-speed, stretchy and with signified organized data premeditated for the above said. It is a software library which is built for the Python programming language used for data manipulation and analysis making the process easier and flexible. The dataset that was imported now needed to be converted in to a dataframe before the statistical process begins and hence converted into a dataframe with the help of 'pandas.dataframe' which is two-dimensional, size mutable, potentially heterogeneous tabular data consisting of rows and columns.

Beginning with the statistics part, mean, median, sum, average and minimum options are considered which was done easily with help of python. Visualizations on the other hand were taken care of by the libraries matplotlib and plotly. Under matplotlib, the module pyplot was extensively used. To elaborate, Matplolib is a plotting library used for Python programming language and has its numerical mathematics extension NumPy.It provides an object-oriented API for embedding plots into applications using

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graphical user interface or abbreviated as GUI toolkits and Plotly provides online analytics,graphs and statistics tools for individuals as well as scientific graphing libraries along with the 'plotly.express' which is its module.

The visualizations that are represented here are as follows:

1. Bar Graph
2. Scatter Plot
3. Line Chart
4. Candlestick Chart

Using statistics and further analysis, the prices of the cryptocurrency can be shown according to daily, weekly, monthly and yearly selections by the user using. Resampling function is used for this purpose. Also the datetime library had been uploaded for extracting the dates and plotting them in graphs.

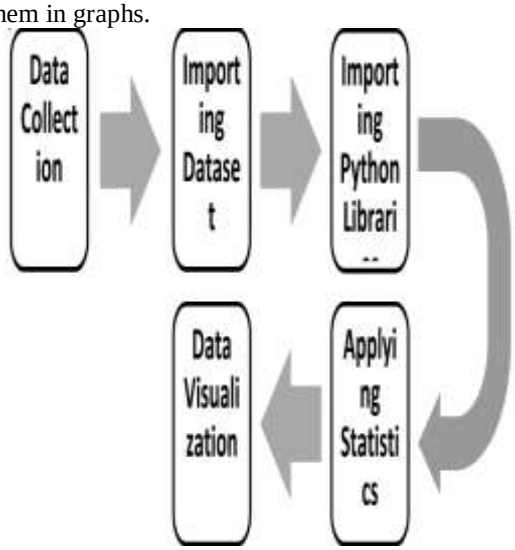

Figure 1. Data Analysis Flowchart

IV. WEB DEVELOPMENT FOR USER INTERFACE

Only the data analysis process is not sufficient. Particularly, we need to provide a medium of interaction for the user. The internet and web have together a significant and profound impact on today's world.[5]Hence, a web app is considered here. Particularly, HTML and CSS are used here. The framework used here is Flask.

The visuals now had to be linked with the web page. Before that, the point of consideration is that anyone cannot get access to the outcome of the web app. Hence, a login page had to be built. This login page should contain a user id/email id, password, submit button, error message pop up, successful login pop up, and the most important point is validations for email id/user id and password. Validations in the sense that if email id is considered, then it should contain an '@', 'domain' and so on and similar need related validations for password as well.

The login page does not allow any user to login randomly as there is a need to do the registration before. This registration page consists of details like email id, name, new password and a confirm password field. Here then comes the need of the database to connect with the web app. For the database purpose, SQLAlchemy is used. It is a python SQL toolkit and Object Relational Mapper which gives the developer all the power and flexibility of SQL. It facilitates the communication between Python programs and the database. Mostly, this library is used as an Object Relational Mapper (ORM) tool that translates Python classes to tables on relational databases and automatically converts function calls to SQL statements.

Once the user fills up the details with correct validations, it saves it in the database for future reference when the login is initiated by the user.

After login, the visuals have to be shown and hence need to be linked up. The user selects the desired cryptocurrency and the graph according to the division may it be monthly, daily, weekly or yearly. After the desired coin selection with required operation and desired chart, the graph will be represented on the screen and the trends according to the historical data will be shown.

Also if the user is willing to see the top 10 crypto prices, then there is also a Live Prices option. This is facilitated with the help of APIs. An API key is generated for this purpose.This can be free or paid. The difference between the two coins is in the number of refresh or calls the user can make.

Figure 2 : Options

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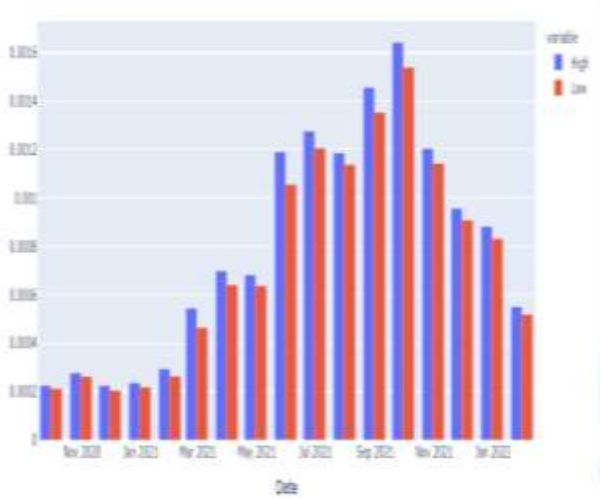

Figure 3. Bar Graph

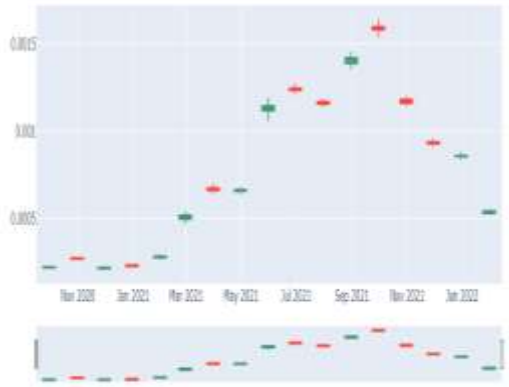

Figure 4. Candlestick Chart

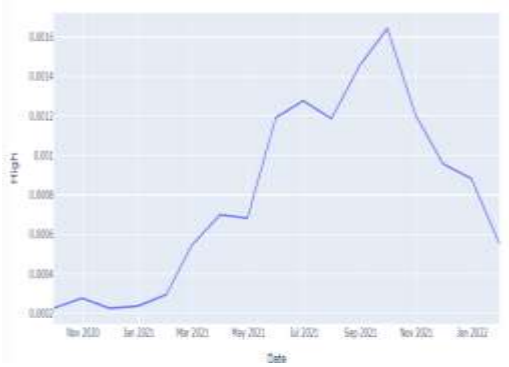

Figure 5. Line Chart

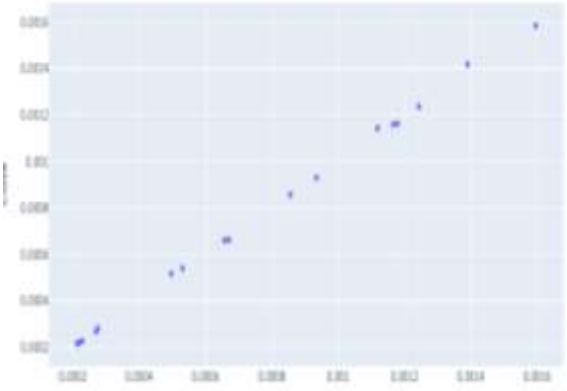

Figure 6. Scatter Plot

V. CONCLUSION

To conclude, here we have described the process of data analysis using various python libraries. Comparative study between various websites reveals a slight difference between the developed web app and existing web applications for the study of cryptocurrency trends. The graphs are easier to understand in the developed web app due to extreme clarity and easy readability. The various provided statistical options provide it with a unique characteristic feature. Basically, the motive of understanding the process of data analysis and the knowledge of developing and styling the web pages was successfully fulfilled. Also, knowing about the basic idea of cryptocurrency was also a matter of concern here. Working with API connection and connecting it with the web page is also understood here. Different types of graphs used in studying cryptocurrencies trends are also made in this app. Hence, a complete package for the data visualization is understood in this paper.

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