



Project Proposal: Crypto Market

Course: Scientific Data Visualization

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GitHub Repository Link:

https://github.com/LakshmiVandanaNunna/DataVisualization_CryptoCurrency

Contents

Names	Page.No
Project Name & Description:	3
Goal and Objectives	11
Motivation	11
Significance	11
Milestones	11
Objectives	12
Features	12
Domain	13
Data Abstraction	14
Types	14
Attributes	15
Task Abstraction	17
Implementation using tools	18
Preliminary Results for Analysis	19
Project Management	28
References	29

PROJECT NAME & DESCRIPTION

Crypto Market: In this project, we are going to clean, preprocess the latest cryptocurrency data from the market and build various visualizations. The central idea of these visualizations is to render intricate details from the data which are otherwise overlooked. This helps the user to truly understand the market trends and pick the currencies that could get him the best returns on his investment.



Chapter1 - Life:

Who: Crypto investors, Market enthusiasts, Monitoring authorities?

What: There are multiple crashes in the crypto market. For instance [1], there was major bitcoin crashes throughout the last decade.

When: Bitcoin crashes occurred recurrently in the years 2011, 2012, 2013, 2017, 2020 and 2021 with loss percentages at 99%, 56%, 83%, 84%, 50% and 53% respectively.

Where: This currency has only a digital presence and has impacted investors throughout the globe. There is no government authority or monetary control over this.

Why: Inflated bubbles were created around bitcoin due to misinterpretation of data and misjudgment of the market.

How: Bubbles [2] build up in the market because of bloated propaganda on a specific currency. In greed/temptation, most investors try to put in all they have and support this false idea. This creates a ripple effect and pulls in more investors. Finally, when reality sets in and they see that the profits are not as expected, investors start selling their coins aggressively which leads to a major depression in the market price.

Chapter2 - Data:

Who: The data collection contains information about the numerous cryptocurrencies utilized in the Market? The data samples were obtained in the year 2020. The data was cleansed, and outliers were deleted. The data with the major contribution are "BITCOIN, WRAPPED BITCOIN". "RADIX, THETA FUEL" are some of the minor contributions. There are 100 types of Cryptocurrency in the used dataset.

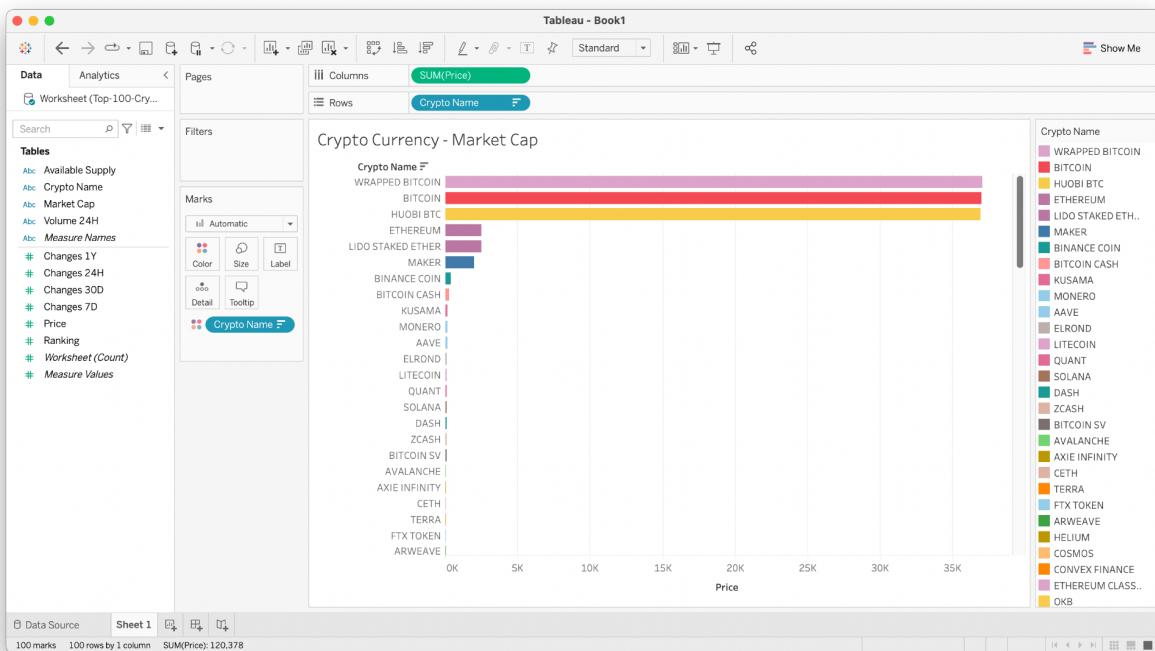


Figure 1. Cryptocurrency - Market Cap - Highest

The data set which uses the major portion of the market is based on the cryptos such as Wrapped Bitcoin, Bitcoin, Huobi BTC, Ethereum.

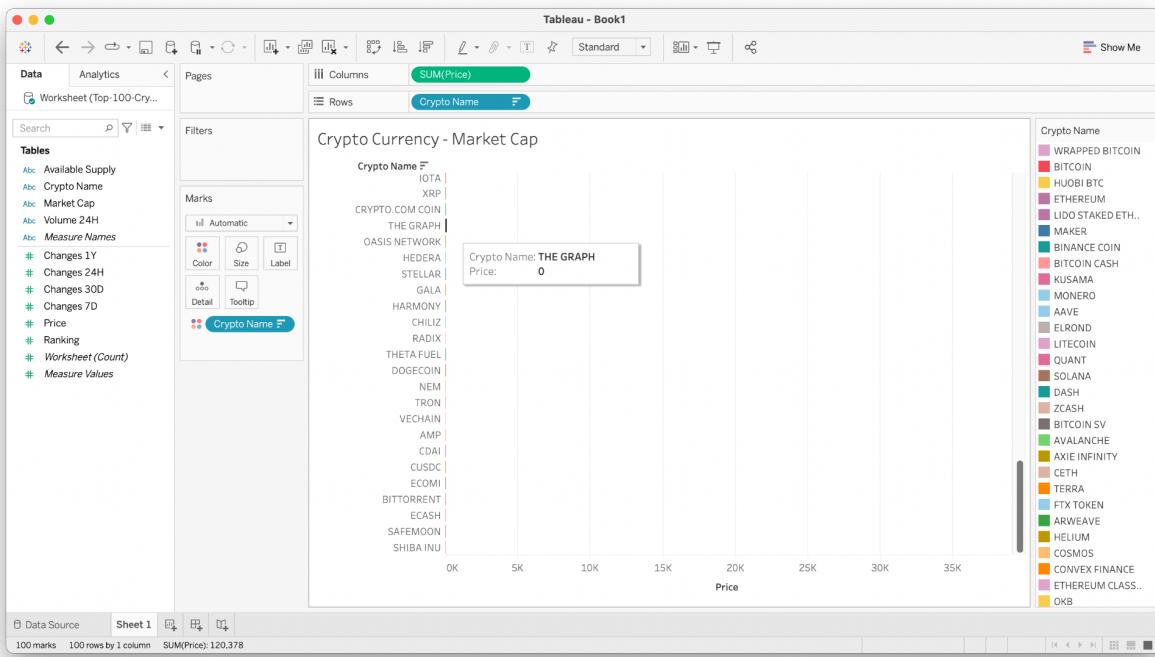


Figure 2: Cryptocurrency - Market Cap - Lowest

Figure 2 displays the lowest market cap in the dataset. The few lowest datasets are SHIBA INU, SAFEMOOON, ECASH.

What: The values of the data can be visualized using the change in the time as it's a time series-based dataset such as (1 hour, 7 days, 30 days, 1 year). The market cap represents the total value.

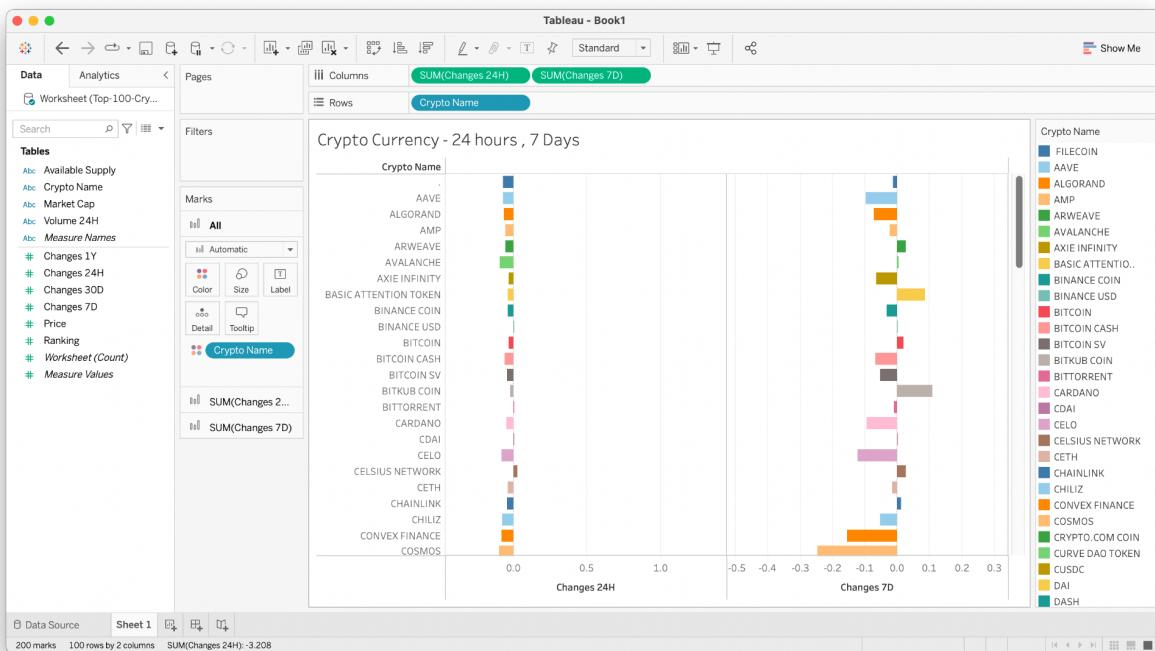


Figure 3. Cryptocurrency variation (24 hours, 7 days)

When: The data set is recently updated since it's based on cryptocurrency the daily information is taken to predict the value. The data collected is based on real-time.

Dataset: The data set is taken from the Kaggle.

URL:

<https://www.kaggle.com/majyhain/top-100-cryptocurrency-2022?select=Top+100+Cryptocurrency+2022.csv>

Dataset information: The dataset contains 100 unique cryptocurrency data with volume, market cap, prices, changes in 24 hours, 7 days, 30 days, 1 year, and available supply.

Where: The entire data is based on the global scale not targeting any specific region. We can observe the region-specific interest for a specific cryptocurrency, for example when we take “Bitcoin” as the Cryptocurrency we could visualize the data based on the USA region with the states displaying which state is having more affinity to the Bitcoin cryptocurrency.

URL: <https://trends.google.com/trends/explore?geo=US-TX-623&q=%2Fm%2F05p0rrx>



Figure 4: Bitcoin - Global Interest

Figure 4 illustrates the Global interest in Bitcoin Cryptocurrency in the overall trend. We could see some specific regions are in “Grey” which represents their no interest in Bitcoin crypto in those specific regions.

Interest by subregion [?](#)

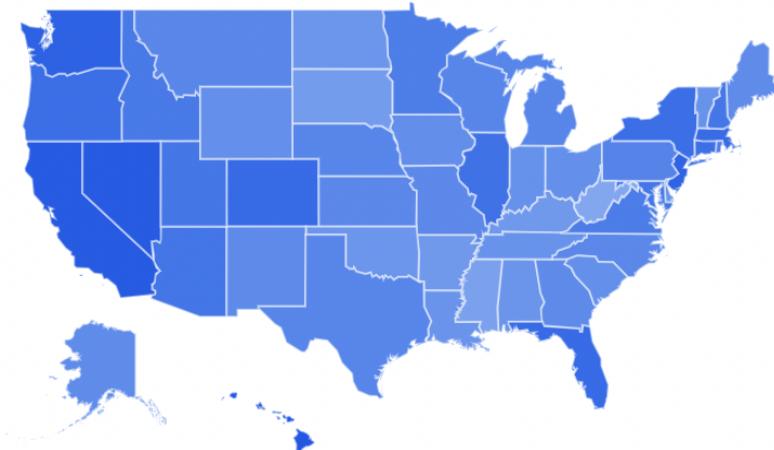


Figure 5: Bitcoin - USA Region

Figure 5, The Bitcoin Cryptocurrency interest to the users based on the specific states under the USA. The darker blue represents there are users with more interest to invest in Bitcoin Cryptocurrency.

Interest by metro [?](#)

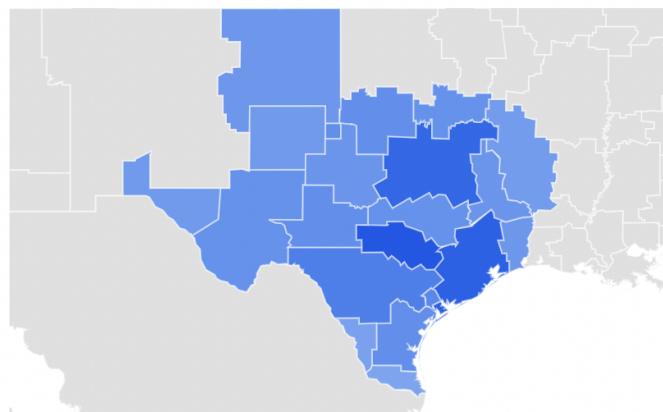


Figure 6: Bitcoin - USA - Texas Region

The Map visualization is based on the specific state. In Figure 6, we are looking into the number of users who are more interested in Bitcoin Cryptocurrency. We could see the Austin Texas region as having more interest when compared with other regions in Texas state.

Why: The data were collected to make an analysis of the market and predict the price of the cryptocurrency so that the end-user could go ahead and invest.

How: When we add dimension the visualization is easier for the user to analyze

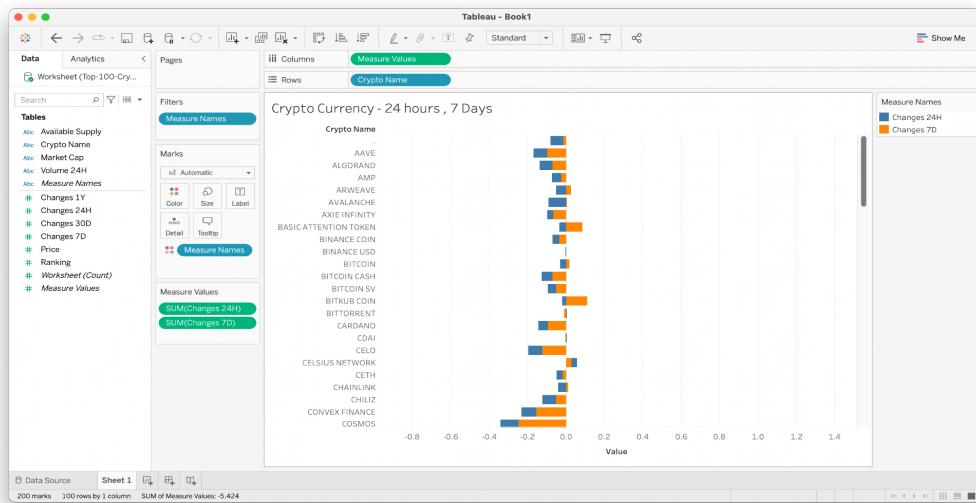


Figure 4. Cryptocurrency - Added Dimensions

The above Figure 2 illustrates the visualization when the additional dimension is added, the representation makes the user understand the data in a more specific manner.

Chapter3 - Users:

Who: Though we are targeting the entire crypto investing community? Our major focus is on amateurs who are completely new to the market. This is because they are predominantly the most vulnerable community who can be exploited if not given proper information and insight.

What: The application consists of multiple visualizations of the market data that provide the user with insights into all the cryptocurrencies.

When: Majorly, we recommend the user to closely follow the visualizations, before making any investment in the market. One could also browse through them daily to follow market trends. This in turn helps one to create a future investment plan.

Where: The user can access the visualization on a webpage.

Why: The visualizations are useful to the user since he could have better insight into market data and make good judgments while making investments in cryptocurrency. This helps the user to avoid market bubbles and pitfalls.

How: The user can note down the best and worst trending currencies by browsing through the visualizations. Then, he/she could work through a filtered list of choices on which the investment seems to have a fair chance. Finally, the user could invest based on the finalized list and budget.

GOALS & OBJECTIVES

Motivation:

Cryptocurrency has overtaken a major market share in the last decade. The volatile nature of cryptocurrencies skyrocketed the profits of numerous investors. On the other hand, many people faced severe financial losses by misjudging a currency that was leading to a major crash. These kinds of downfalls can hit hard and leave an amateur investor with traumatic experiences. By providing better visualizations of the market data, we could help this user population to have a better insight into the data. This encourages new investors to judge the market with more confidence. To top it all, the market would flourish in a much more stabilized manner with more people making judicious investments, since they have a better understanding of the data.

Significance:

Our project would create user-friendly, multi-faceted visualizations of the crypto market data. This helps the user to understand historical and latest crypto market trends enabling him to make better investment choices. The interactive web pages would provide a conducive environment for the user.

Milestones:

- Data cleaning and preprocessing
- Designing the webpage

- Designing appropriate visualizations for underlying crypto data
- Integrate the visualizations into the web page

Objectives:

- ★ Identify the best Visualization that is suitable for representing the fluctuations that would happen on prices of the cryptocurrencies.
- ★ Create a webpage that would act as a user dashboard.
- ★ Make visualizations for the top five cryptocurrencies that are trending in the market.
- ★ Make the visualizations interactive.

Features:

A web page that renders the price patterns of all the trending cryptocurrencies.

A web page that specifically focuses on visualizing a cryptocurrency of the user's choice.

Color-coded graphical design with user-friendly and readable legends.

Appropriate labeling of crypto time series visualizations.

INCREMENT 1

DOMAIN

Cryptocurrency is an advanced digital currency that is expanding its ubiquity as a mode of trade step by step. The numerous new digital currencies have been acquainted as an option with Bitcoin. The fundamental targets of these cryptocurrency forms were to conquer a couple of the blemishes in Bitcoin. The use of these cryptocurrencies happens through the assistance of PC networks on the grounds that these cryptocurrencies have no actual structure and need a network to act as a medium of exchange.

Cryptocurrency is a digital currency that requires no actual structure, The Cryptocurrency depends on blockchain innovation used to make it secure by utilizing cryptography. Kind of cash wallet in which cash exchanges could be performed. Since it's an advanced wallet it is safe.

The fundamental rationale of the acquaintance of bitcoin was eliminating the central authority from the currency which was the principal issue happening in the current world where a central power or bank decides on the worth of the money that we acquire. This was accomplished by the Bitcoin with the assistance of a chain network named Blockchain which is a decentralized developing rundown of records stored in the form of blocks that are gotten utilizing cryptography. These blocks are connected which each other by hashing and the rotation of one record or block can't be performed without the alternation of the other which takes out the issue of expansion of unauthenticated exchanges or records to the blockchain.

An individual can hold a bitcoin or other cryptocurrency with the assistance of a digital wallet since the bitcoin is a non-actual resource. The wallet comprises two sets of keys named private and public keys. The proprietor of the digital wallet can utilize these to send and get bitcoins for the wide range of various clients of the blockchain network i.e., the client can utilize the private key to sign an exchange or send a bitcoin to different clients and utilize the public key to get the digital money from the others. The most common way of sending and getting digital currencies has an enormous tole on the tole on the framework that is associated with the blockchain network due to how much hashing they need to perform to verify that the exchanges that are being done

in the organization which is balanced with remuneration of the making of new bitcoins. In any case, this course of counterbalancing the expense that occurs in verifying the exchanges with the production of new digital money isn't workable for every single bitcoin that is available out there which is the reason state-run administrations have restricted the use of large numbers of these cryptocurrency forms of money in their countries.

DATA ABSTRACTION

The fundamental goal of the project is to gather all the cryptocurrency data and visualize the contents. Since we are utilizing the time-series information, we are executing the perception-based web-based outline. The channels are utilized to show the variety of information particular to the time chosen by the client.

Cryptocurrency is colossal information and gathering the live data from the server takes time, so we are utilizing API calls to simplify the work. The API utilized "<https://api.coingecko.com/programming interface/v3>" to gather the live data of Cryptocurrency on the lookout. Since the information is gathered powerfully the perception of the information keeps it changing considering the time imagined.

The API calls recover 26 sorts of information in which we are utilizing just 8 information contents that are expected to show the perception. Most of the items are id, image, name, current price, high_24h, and low_24h. There are many kinds of cryptocurrency that are utilized in the market. We are thinking about just 20 monetary standards to show on the landing page.

TYPES

A data type is nothing but the type of visualizations. Process of data that can be seen in the form of graphical representation using types like chart, line chart, bar chart, scatter plot, and many more.

Here in our project for increment 1, we are using a Line chart for the visualization. As we are using cryptocurrency data and the values are read in the timeline. To evaluate this timeline data as visualization we use a line chart.



Fig.:1- Line chart

The above figure visualization represents the line chart. It varies according to the timeline. We are evaluating the time, in 24 hours, how the cryptocurrency rate is fluctuating. On the X-axis we have given the date/time and on the Y-axis the currency rate is given. So, we can visualize the line chart and check the daily report of the coin rate.

ATTRIBUTES

Attributes are the value description which has the shapes, or the color, and they can be also measured or logged. It occupies mostly the columns in the data table. Here in this, we are using the API dataset, so the below images show the attributes used.

ATTRIBUTE	DATA TYPE
id	string
symbol	string
name	string
image	string
current_price	number

market_cap	number
market_cap_rank	number
fully_diluted_valuation	number
total_volume	number
high_24h	number
low_24h	number
price_change_24h	number
price_change_percentage_24h	number
market_cap_change_24h	number
market_cap_change_percentage_24h:	number
circulating_supply	number
total_supply	number
max_supply	number
ath	number
ath_change_percentage	number
ath_date	number
atl	number
atl_change_percentage	number
atl_date	number
times	number

currency	string
percentage	number
last_updated	string

The above shows the attributes. Here we are using mostly the integer, string as the data types. To explain in detail the attributes.

Id: It shows the Id of the person who is logged in or the user id.

Symbol: It represents the coin symbol either the bitcoin or the Ethereum coin. It represents the coin symbol.

Name: It shows the name of the coin holder on the web page.

High_24: It describes the currency rate in 24 hours which is high.

Low_24: It tells that if the currency rate is decreased then the chart goes low. It provides the data on the low currency rate over the period of 24 hours.

In this way, we have a date, time, percentage, market_price, and total_supply which are related to doing the analysis of the cryptocurrency rate.

TASK ABSTRACTION

Task abstraction is an important step in making a visualization that is performed after the data abstraction is done on the data coming from the API. The main target of data abstraction was to identify what kind of data will be used to draw the visualizations which is in fact a very important thing to do by any person who wants to draw a visualization from any kind of data. Because identifying the type of data that will be going to be used in the visualization helps in supporting the actions on that data very easily to get the desired target.

When drawing visualizations while the data abstraction is used to identify what is going to be the data for the visualization, the task abstraction is used to identify why we need that visualization i.e., simply identifying the tasks that we are going to perform on the visualization. In task abstraction, many actions can be performed on the abstracted data to get the desired target such

as simple action like analyze which can be further divided into two types one is that in the analyzing process we consume the data to draw the visualization to discover, neatly present it or simply using the data to make visualizations for fun and the other one is to produce the data that is we annotate the visualizations that we make from the data, record those visualizations or finally derive new kind of data from the existing data. The actions performed can also be of different types like locating or querying the data. All the actions performed mentioned above are either done on all the data or on attributes of the data which will be based on the target of the visualization which can be to identify the trends from the data, outliers in the data or just identifying the features that are present in the data.

As we finally got to know what task abstraction is and its importance, we will now discuss the task abstraction that we are going to perform in this project which is a cryptocurrency dashboard. So, the main action that we are going to perform, is to analyze the data that is coming from the url of the API and the target of the task abstraction on the data from the api is going to be to make a simple line chart from it so that one can identify the trend of the current value of the cryptocurrency that the user has selected on the dashboard. Another important target of the dashboard is going to be to make the line chart get dynamically updated from time to time by recursively calling the data from the api url.

IMPLEMENTATION USING TOOLS

The first tool that we used in the project implementation is pycharm which is a modern-day IDE mainly used in python code development and consists of many in build libraries of python. The second tool that we used is the Github which is a online software development website which is used by many developers in the world to store, track and collaborate on the projects that they are developing.

The technologies that we used in this project are the HTML which is a mark-up language used to create static web pages that act as a backbone for any project. The next technology is the CSS which is a style sheet language used to style the web pages that are created using html, or any other programming language. Another styling technology that we used is the React JS which is a front-end javascript library used to develop the user interfaces for the projects. Last but not the least, the final technology which we used is the d3 library of the javascript language which is

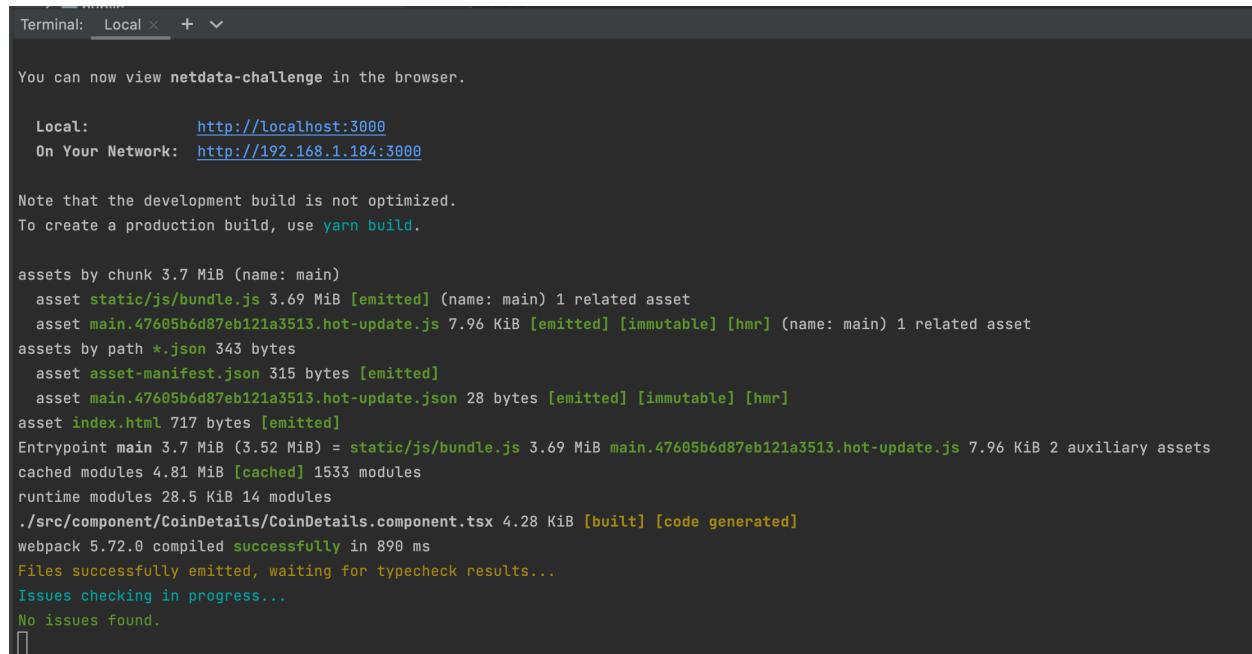
core technology of our project because it is used to draw the visualizations from the data coming from the api.

PRELIMINARY RESULTS FOR ANALYSIS

We have performed the API calls and the data is retrieved from the server. We are displaying the high, low, Current price and variation in the main dashboard. Once we click on the tile the elaborated information of the crypto currency is displayed. The data is visualized in line plot as the data used is time series data. We could modify the visualization based on the specific filters displayed in the webpage. The high, low values of each crypto currency is visualized till date. The overall high could also be observed.

Logs:

We are running the program on a local host as a website using ReactJS. We could see the running logs.



The terminal window shows the build logs for a ReactJS application. It starts with a message telling the user they can now view the application in the browser. It provides two URLs: 'Local' (http://localhost:3000) and 'On Your Network' (http://192.168.1.184:3000). It notes that the development build is not optimized and suggests using 'yarn build' for a production build. The logs then detail the asset compilation process, showing files like static/js/bundle.js, main.47605b6d87eb121a3513.hot-update.js, and index.html. It shows the entrypoint main, cached modules, runtime modules, and the webpack compilation process. Finally, it reports that no issues were found.

```
Terminal: Local + ▾

You can now view netdata-challenge in the browser.

  Local: http://localhost:3000
  On Your Network: http://192.168.1.184:3000

Note that the development build is not optimized.
To create a production build, use yarn build.

assets by chunk 3.7 MiB (name: main)
  asset static/js/bundle.js 3.69 MiB [emitted] (name: main) 1 related asset
  asset main.47605b6d87eb121a3513.hot-update.js 7.96 KiB [emitted] [immutable] [hmr] (name: main) 1 related asset
assets by path *.json 343 bytes
  asset asset-manifest.json 315 bytes [emitted]
  asset main.47605b6d87eb121a3513.hot-update.json 28 bytes [emitted] [immutable] [hmr]
asset index.html 717 bytes [emitted]
Entrypoint main 3.7 MiB (3.52 MiB) = static/js/bundle.js 3.69 MiB main.47605b6d87eb121a3513.hot-update.js 7.96 KiB 2 auxiliary assets
cached modules 4.81 MiB [cached] 1533 modules
runtime modules 28.5 KiB 14 modules
./src/component/CoinDetails/CoinDetails.component.tsx 4.28 KiB [built] [code generated]
webpack 5.72.0 compiled successfully in 890 ms
Files successfully emitted, waiting for typecheck results...
Issues checking in progress...
No issues found.
[]
```

Fig.2 : Logs

Filters:

The visualization data is displayed using filters where the user can dynamically select and view. We are using 8 different time frames. Each data takes the current date as a point and displays data based on the filter time frame.



Fig.3 : Filter selection

The Filter selection shows the user to select the time frame for the visualization for better understanding.

Visualization using filters:



Fig. 4: visualization for 1 day

We could observe the data, which is displayed on Fig. 4: shows last 24 hr data with all the price variation. we could see the time and date posted in the graph to visualize the data.

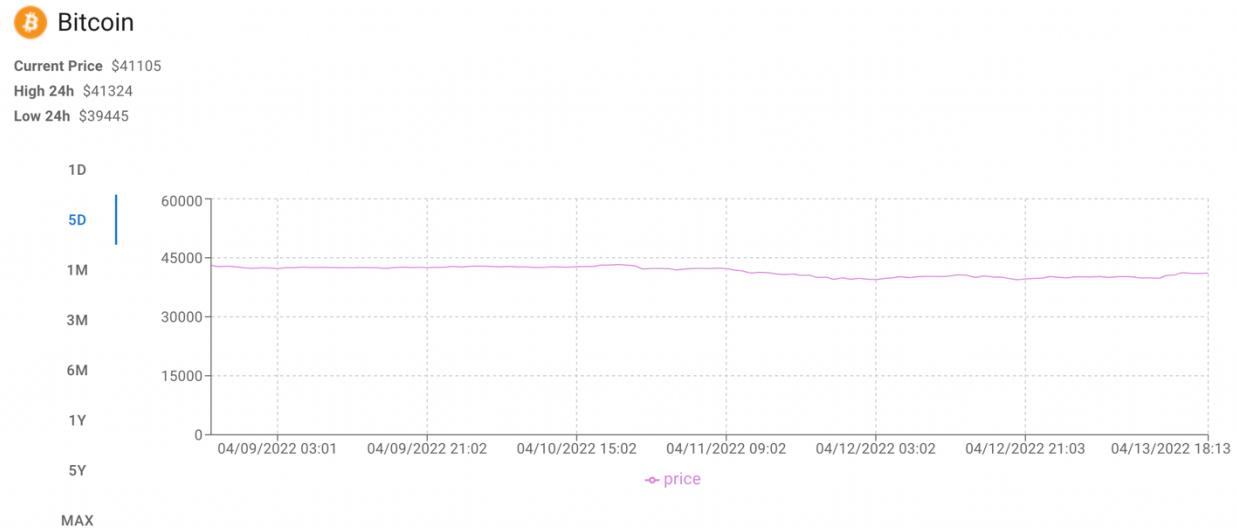


Fig. 5: visualization for 5 days

The data of Bitcoin is visualized for the last 5 days. The data visualized in Fig.5: shows there is a price variation, The price of the coin has fallen down when compared to the value before 5 days. The 5 D filter represents the data from the current day to the past 5 days. The API call which collects the information gets the current day -5 and those data are fetched and visualized.



Fig. 6: visualization for 1 Month

The Fig.:6 represents the visualization of Bitcoin of prices fluctuating in the past 1 month. we could observe the graph is in the form of a hill as in the initial days the price of the coin was less and then the price of the coin increased and reduced gradually. The peak of the coin was 20th of march 2022. This shows if the user had purchased the coin and sold it at the mid month he would have got good returns if the user hasn't sold then there would be no profit or no loss.



Fig. 7: visualization for 3 Months

The variation of price of bitcoin for the past 3 Months could be viewed in the Fig.7: .The price variation of the coin depends on the market scenarios. The highest fluctuations are in repeated cycles such as 1st month, 3rd month , 5th month. This shows this coin is a type of cyclic. which could get good returns if the user is constantly purchasing.



Fig. 8: visualization for 6 Months

The Fig. 8: shows the visualization of Bitcoin of the past 6 months. The price variation shows the price drop in the cryptocurrency from 60000 to 40000. The price drop shows the type of coin doesn't provide better profits but the loss in the long term. The lowest price was below 40000.



Fig. 9: visualization for 1 year

The type of Crypto currency Bitcoin is taken to visualize the data for the past 1 year. We could observe the currency fluctuations. The lowest price was about 35000 and the peak price was about 7000. which shows the price keeps so volatile and might bring any user loss if they are not watching the inflations or deflations of prices on a regular basis.

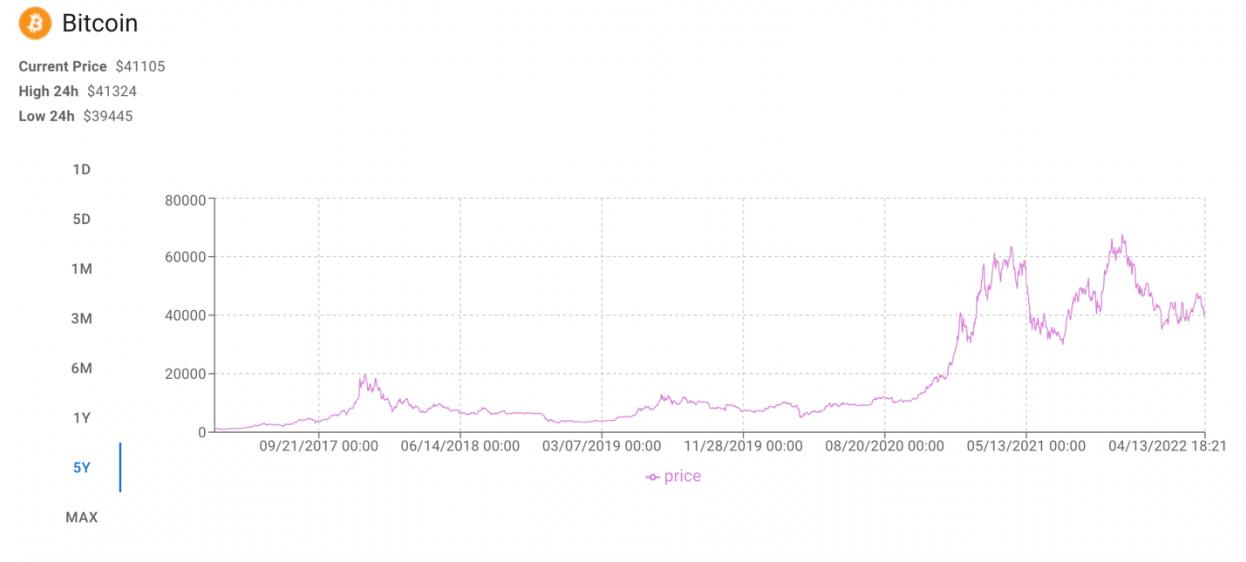


Fig. 10: visualization for 5 years

The Fig.:10 represents the crypto currency price data for the past 5 years. The visualized graph shows the recent years the price change has been enormous. The price of bitcoin was very low when compared to the current price. If the user has invested in the crypto coin 5 years back there would be good returns right now.

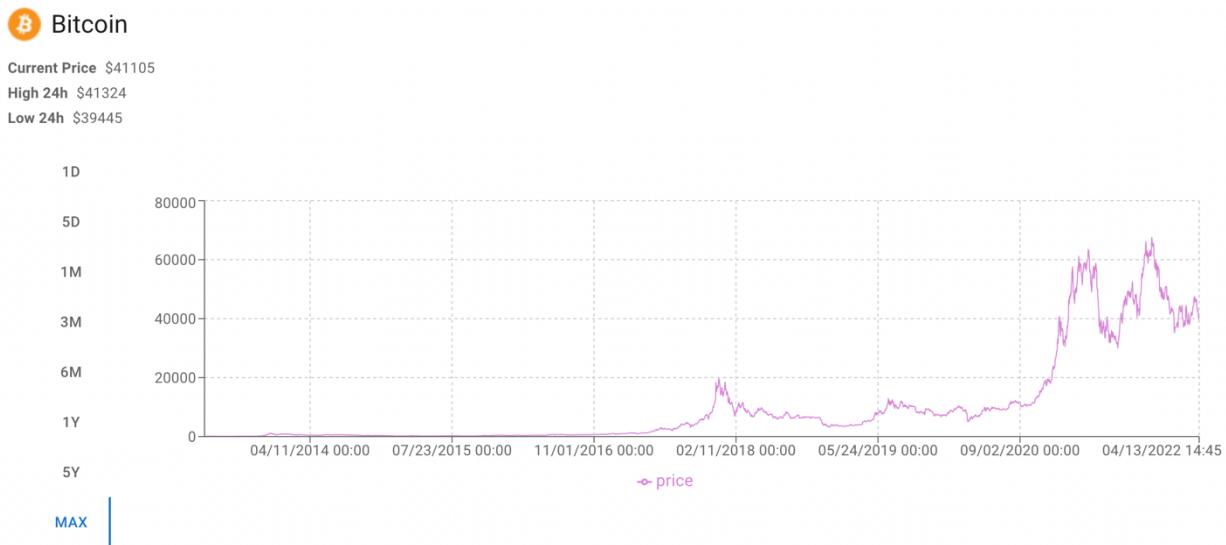


Fig. 11: visualization for Max – Complete data

The MAX term means the complete data information of the type of crypto currency selected by the user to view the visualization. The price of the selected cryptocurrency “Bitcoin” price was

near to 0 when the initial launch of the Bitcoin crypto currency but now the price value of the same Bitcoin has rocketed to about 45000 as the current price. The highest peak is about 70000 which is so good when compared to the initial price value.

Crypto price overview:

Current Price \$41105

High 24h \$41324

Low 24h \$39445

Fig.12 : price display module

The Crypto price overview shows the price of the selected crypto. The API is used to collect the information of the crypto currency selected and displays the highest , lowest and the current price. which helps the user to analyze whether the currency should be purchased or sold at the moment.

Dashboard:



Fig.13 : visualization for Max – Complete data

The Fig. : displays the Dashboard in the Home page. The types of coins would be displayed and if the user selects the type of cryptocurrency the data of the currency is collected from the API call and the response data is visualized to make sure the user understands the visual representation.

Navigate home page:

GO BACK

Fig.14 : Back Menu

Cryptocurrency Dashboard

Fig.15 : Page Title

The Navigation menu used in the page are displayed in Fig.: . Both the options direct to the main home page after showing the visualization of the data. The secondary page has a lot of data visualized based on the collected data from the API.

PROJECT MANAGEMENT

IMPLEMENTATION STATUS REPORT:

Work completed

- **Description**

The main goal of this project is to visualize cryptocurrency. We are collecting cryptocurrency information using API. By using that information we are visualizing the data. Since Cryptocurrency is a time based information we have completed implementing Line charts. We had added filters in the chart as the user could change the options of timeframe and visualize the data. We are not performing any preprocessing. The data is collected dynamically from the API call. The visualizations are created and then posted in the webpage so that the user can observe the changes.

- **Responsibility (task, Person)**

NAME	TASK
Lakshmi Vandana Nunna	API calls (Gets the crypto currency coin details), Interfaces (interaction with charts, filters)
Sreeja Bellamkonda	Introduction, Coin chart (Coin chart - explains the visualization of line chart with all the axis, size of the visualization), Coin List (Coin list - Explains the data in the 2nd page, such as symbol, crypto currency coin name, hover the visualized data- which shows the exact point of data when the mouse is hovered in the graph)
Galla Chaitanya	datarow,loading indicator, pages ,enums, - 1 person (Title page - background, style, The page loading information takes place displays the circular progress, dashboard url ,Page styles, types of currency , languages, Each coin when selected shows the directed page.
Nitin Dunday Mohan	Coin Details(user filters , Navigation ,Coin details in the secondary page),Conclusion.

- **Contributions (members)**

NAME	CONTRIBUTIONS	
	REPORT	IMPLEMENTATION
Lakshmi Vandana Nunna	Goals & Objectives, Implementation using tools	API, Interfaces
Sreeja Bellamkonda	Domain, Data Abstraction	Coin chart, Coin list
Galla Chaitanya	Task Abstraction, Implementation using tools	Datarow,Loading indicator, Pages ,Enums
Nitin Dunday Mohan	Preliminary results of analysis, Project Management	Coin Details

Work to be completed

- **Description**

For the increment 2 we are going to cover the visualization using the D3.js and adding the different visualizations. Further we are going to modify and develop the web page by adding some features and the components with more visualizations.

- **Responsibility (task, Person)**

NAME	TASK
Lakshmi Vandana Nunna	Creates tab options in the webpage, Contributes D3 Visualization.
Sreeja Bellamkonda	Contribute to create more visualization using d3.
Galla Chaitanya	Contribute to create more visualization using d3.
Nitin Dunday Mohan	Contribute to create more visualization using d3.

- **Issues/Concerns**

As we are using the timeline data. We are unable to use or show as many visualizations or the charts, plots.

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- <https://i.ya-webdesign.com/images/crypto-coins-png.png>