

Fall 2023
Bitcoin Analysis Project

Final Project Report

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IST 462: Scripting for Data Analysis

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Abstract:

The rapid evolution of digital currency, particularly Bitcoin, has become a focal point of interest and discussion within our increasingly digitalized society. This data science project aims to comprehensively analyze the trends in Bitcoin prices over the period of 10/25 to 12/3. The dynamic and volatile nature of Bitcoin, as influenced by the economic market, always requires a thorough investigation into the factors contributing to its price fluctuations. Our analysis delves into the intricate details of Bitcoin's behavior by examining a dataset spanning 39 days. The dataset encompasses various parameters, including datetime, current price, day high, day low, open, volume, VWAP (Volume Weighted Average Price), bid, ask, side, open_24, and percent_change_24. By meticulously scrutinizing these variables, we aim to uncover patterns and gain insights into the underlying drivers of sudden spikes and dips in Bitcoin's value. Furthermore, our investigation incorporates correlation analyses to discern relationships between different features. This approach facilitates a comprehensive understanding of the interaction between various factors and their impact on Bitcoin prices. We utilize statistical tools and data visualization techniques in Python to present an overall picture of the market dynamics during the specified timeframe. Our findings indicate an upward trend in Bitcoin prices, prompting a deeper exploration into the reasons behind this trend. The crypto market, paralleled to traditional currencies, is subject to influences of scarcity, portability, and durability. By understanding the intricacies of these factors, we aim to shed light on the broader economic and technological landscape shaping Bitcoin's trajectory.

This abstract provides a brief overview of our project's objectives, methodologies, and initial findings. The subsequent sections of this report will delve into the detailed analyses, uncovering insights into the cryptocurrency market and the driving forces behind Bitcoin's price movements.

Defining the Data Science Problem Statement:

The primary objective of this data science project is to formulate a problem statement that guides our investigation into the trends of Bitcoin prices from October 25th to December 3rd.

To comprehensively analyze and interpret the trends in Bitcoin prices over a 39-day period, identifying the causes of sudden spikes and dips, and exploring the factors contributing to the observed upward trend. The analysis aims to provide insights into the acceptance of Bitcoin in the digital era and its rapid responsiveness to economic market dynamics.

Key Objectives:

- Identify recurring patterns and trends in Bitcoin prices over the specified timeframe
- Investigate the causes behind sudden spikes and dips in Bitcoin's value, exploring both internal and external influences
- Analyze how major events such as regulatory changes, market adoption, political influence, and economic crises impact Bitcoin's price
- Understand the broader economic and technological landscape influencing Bitcoin's trajectory
- Examine indicators of Bitcoin's acceptance in the digital-aged society
- Utilize correlation analyses to reveal relationships between different parameters and their impact on Bitcoin prices


























































By addressing these objectives, our analysis aims to provide actionable insights for investors, policymakers, and enthusiasts interested in understanding the dynamics of Bitcoin within the evolving landscape of digital finance.

Project Scope:

In order to effectively address the defined problem statement and achieve the outlined objectives, we establish a clear project scope that defines the boundaries and methodologies employed in our analysis of Bitcoin price trends. The project scope encompasses key components of our approach, including data collection, preprocessing, analysis techniques, and the interpretative framework.

Data Collection:

We decided to make use of PythonAnywhere as a collector of data for us. PythonAnywhere is an online platform that provides a cloud-based environment for developing, running, and hosting Python applications. It's designed to make it easy for individuals to write, test, and deploy Python code without the need for complicated or long configuration. Though Lisa and I have already configured Python environments in our past, we wanted to utilize PythonAnywhere for their cloud services to collect data. The service in particular that we wanted to use was their python interpreter for writing the script that we would use to call the Bitstamp Bitcoin API. Secondly, we wanted to use PythonAnywhere's scheduled task features so that we could run the python script every single minute and get the price of Bitcoin and other related stats at that same frequency.

Frequency	Time	Command	Description	Expiry	Actions	
Hourly	00 mins past	/home/tokenpaidtrial/trial_pa_data.py		never	   	
Hourly	01 mins past	/home/tokenpaidtrial/trial_pa_data.py		never	   	
Hourly	02 mins past	/home/tokenpaidtrial/trial_pa_data.py		never	   	
Hourly	03 mins past	/home/tokenpaidtrial/trial_pa_data.py		never	   	
Hourly	04 mins past	/home/tokenpaidtrial/trial_pa_data.py		never	   	
Hourly	05 mins past	/home/tokenpaidtrial/trial_pa_data.py		never	   	
Hourly	06 mins past	/home/tokenpaidtrial/trial_pa_data.py		never	   	
Hourly	07 mins past	/home/tokenpaidtrial/trial_pa_data.py		never	   	
Hourly	08 mins past	/home/tokenpaidtrial/trial_pa_data.py		never	   	
Hourly	09 mins past	/home/tokenpaidtrial/trial_pa_data.py		never	   	
Hourly	10 mins past	/home/tokenpaidtrial/trial_pa_data.py		never	   	
Hourly	11 mins past	/home/tokenpaidtrial/trial_pa_data.py		never	   	
Hourly	12 mins past	/home/tokenpaidtrial/trial_pa_data.py		never	   	
Hourly	13 mins past	/home/tokenpaidtrial/trial_pa_data.py		never	   	

Thirdly we wanted to use the file store feature in order to save the large sum of data that we collected.

Data Summarization (Explain the Dataset and its Attributes):

The data is very very interesting. Every single minute, we are collecting the current price of bitcoin, the day high, the day low, the open price, the volume, the vwap, and other unrelated stats like the bid, ask, side, open 24, and 24 hr percent change. This resulted in us having

Data Handling:

So what we ended up doing with this data was a bit of cleaning. We started collecting data on October 24th and ended collecting on December 5th. So naturally, if we wanted to have every column of data every single minute, we had to delete all days that had December 4th since these days would have incomplete data. The same goes October 24th. These were the days we stopped and started collecting data and so we removed them to have full full data. We also checked to assure ourselves that there were no duplicate rows and that there were no N/A values.

Variable Creation (Define the Project Structure/Layout):

The project consisted of us looking to create an interactive that would provide interesting statistics about the day that a user would select. Essentially, we created a dropdown inviting the user to select a day that they would like to see statistics on, from October 25th to December 3rd. Then, the user would be able to see a few statistics about their chosen day such as the average price of bitcoin for that day, the lowest price and the time of it, and the highest price and time of that. They would also be able to see how much an investment of \$1-\$1000 would have made them based on the price of bitcoin on the day of the presentation.



Welcome to our interactive script for recent crypto statistics!

To begin, please select a date for which you'd like to see stats.

Date

Run Interact

For your selected date of 11/19/23,

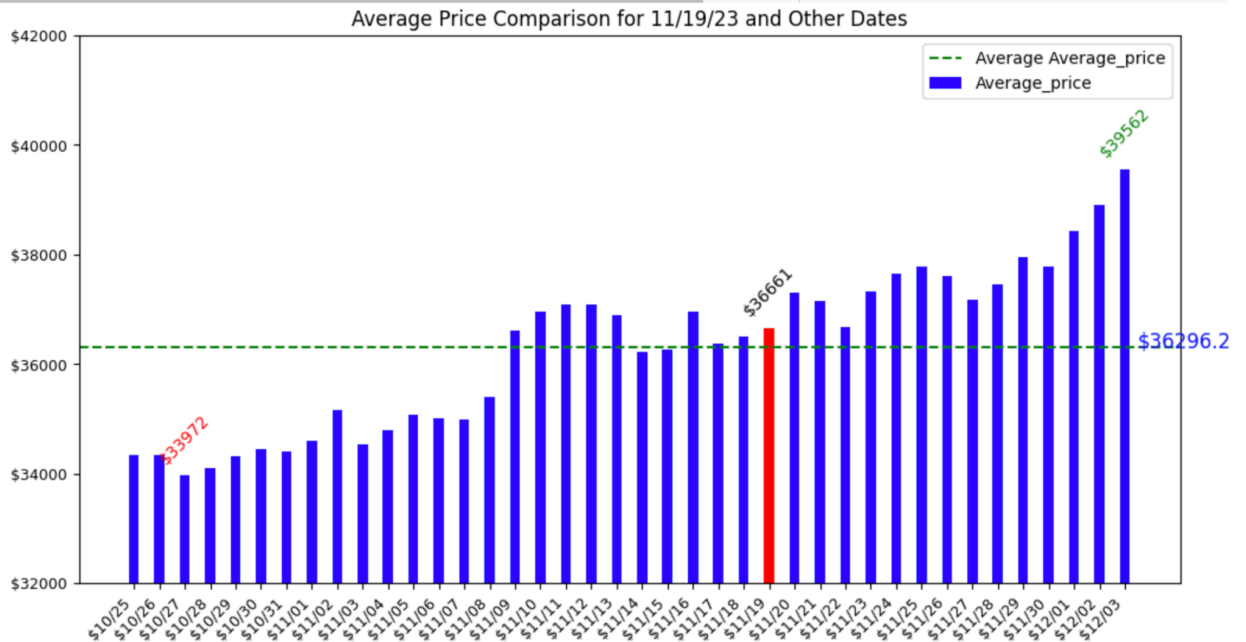
The average price of Bitcoin was: \$36661.5
The highest price of Bitcoin was: \$37520.0
The time of the highest price was: 23:43:08
The lowest price of Bitcoin was: \$36420.0
The time of the lowest price was: 01:33:18

If you would have invested:

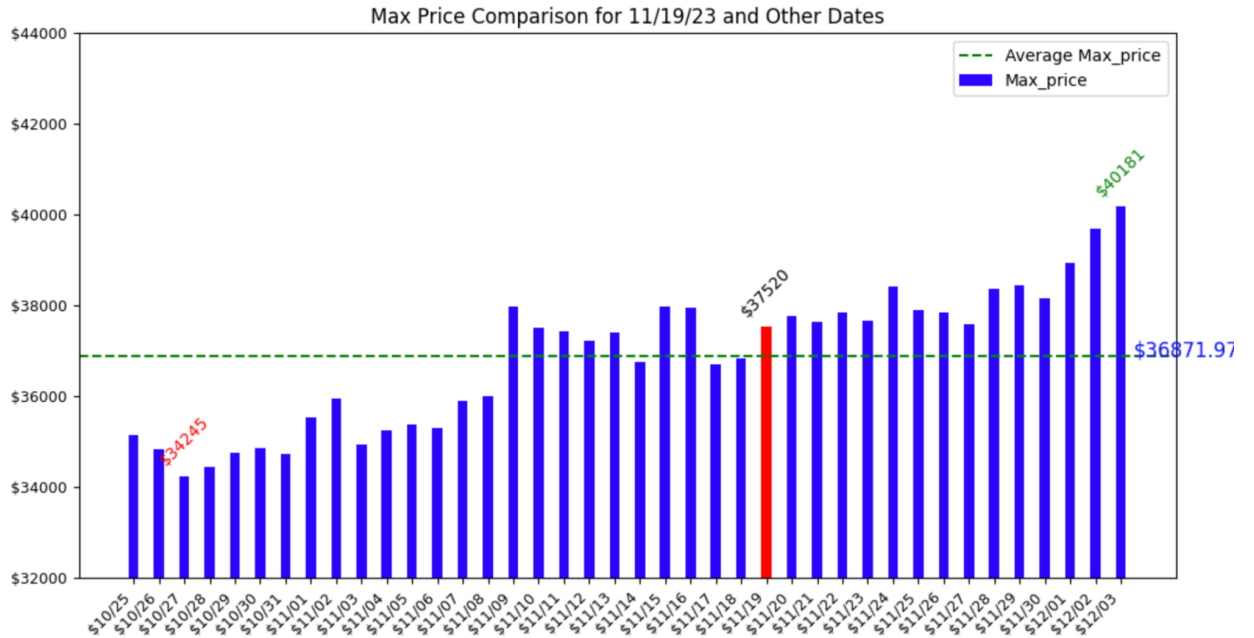
Price

Your invest would be worth: 1.17

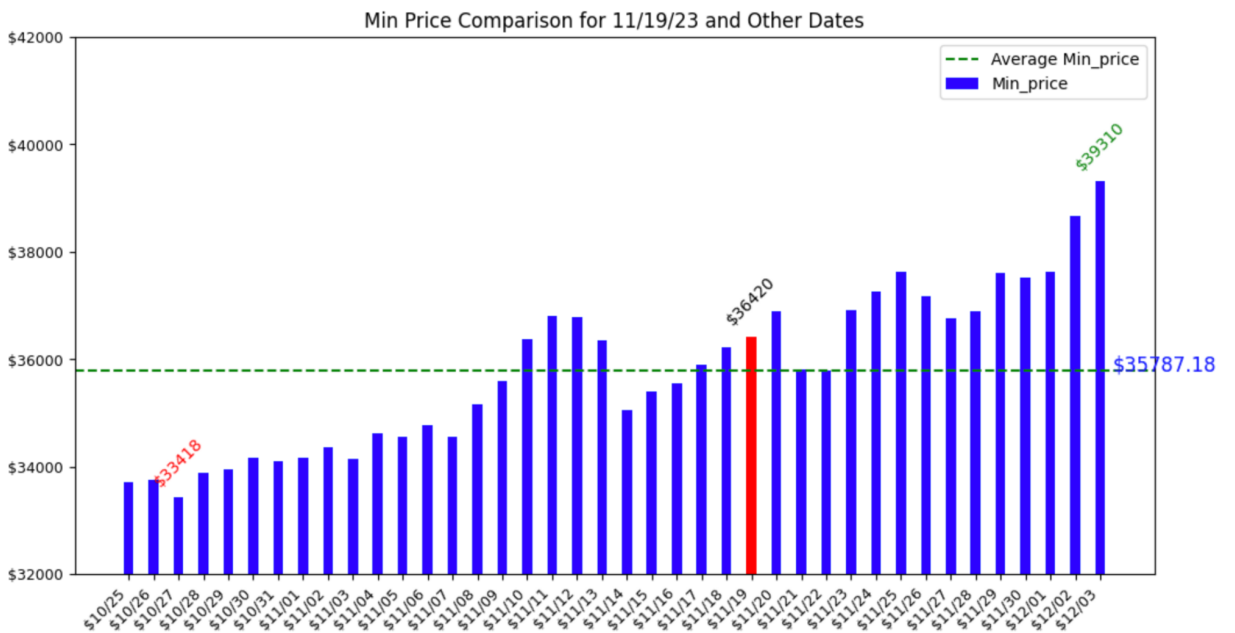
However, following along, there were more stats that one would be able to see regarding their selected date compared to the other days on this list.



This graph indicates in red, where the selected date lies in comparison to the other days on this list regarding average price.



One would also be able to see a comparison based on the max price on the day.

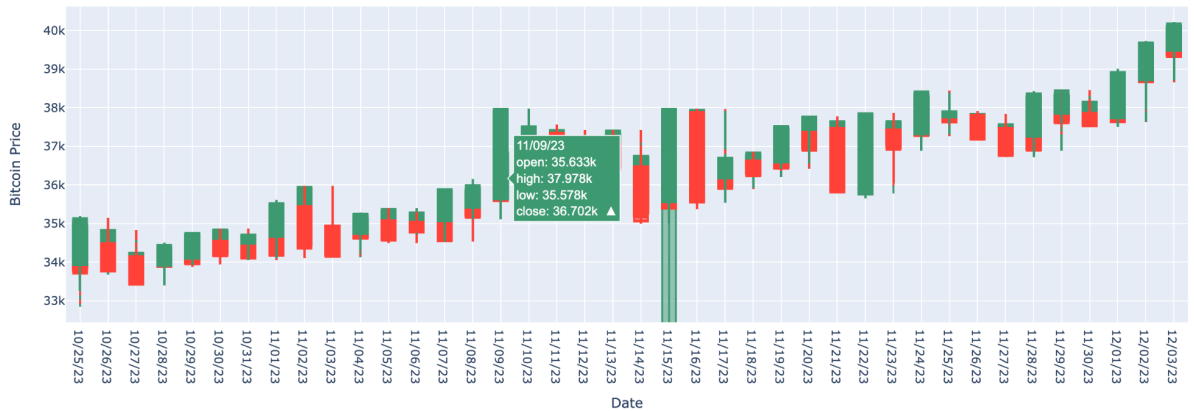


One would be able to see the comparison on min price.

This project was especially interesting as for anyone interested in crypto currency, These have been critical weeks and many currencies have seen an upward trend such as what is seen here.

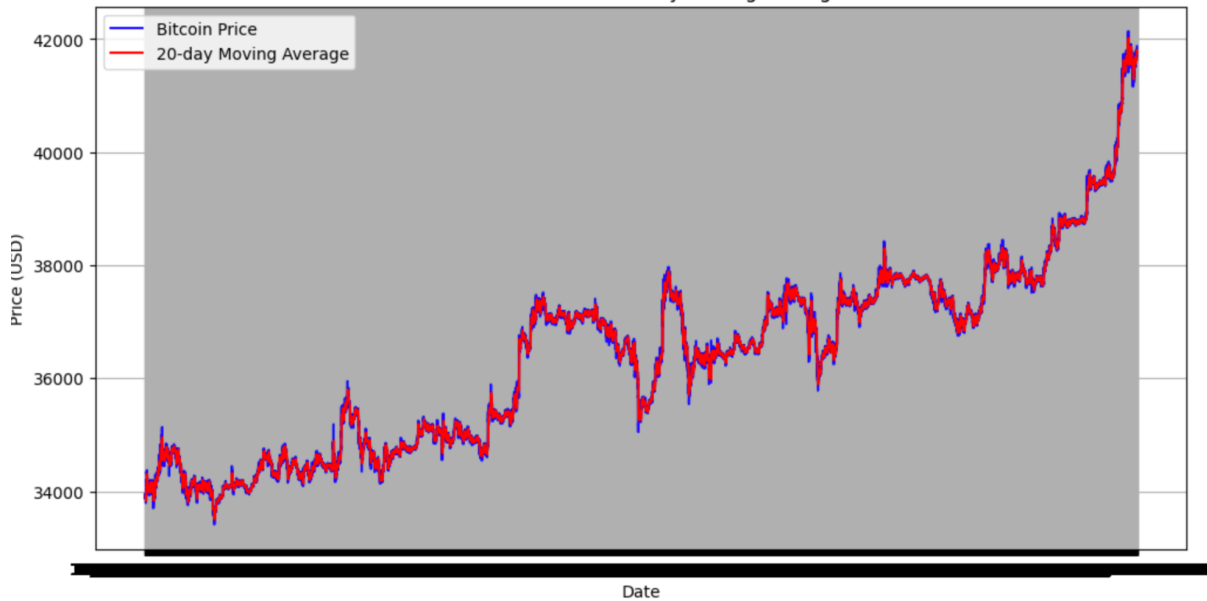
We also made sure to find outliers in this data.

Bitcoin Price from 10/24-12/03



The green displays an increase in price. The box is the quartile of price range in terms of increase/decrease in price. The long lower shadow indicates that a price was dropped during that period but buyers pushed it up before closing price was set.

Bitcoin Price with 20-day Moving Average



Clear upward trend from analyzing the moving average over the course of 20 days; aligns with curves.

Findings:

Our data analysis revealed a fascinating upward trend in Bitcoin prices, prompting further investigation into its underlying causes. We employed a multi-faceted approach, leveraging price movements, correlation analysis,

and in-depth research. Through this comprehensive examination, we identified several key factors influencing the observed trend, including:

- Global economic sentiment: The positive performance of major stock markets during the study period likely contributed to a rise in investor confidence in Bitcoin, leading to increased demand and price hikes.
- Technological advancements: Growing adoption of blockchain technology and integration with established financial institutions fostered a sense of legitimacy for Bitcoin, attracting new investors and propelling the upward trend.
- News and media coverage: Positive media portrayal and increased public awareness of Bitcoin's potential as a store of value further fueled the bullish sentiment and contributed to the upward trajectory.

Discussion and Conclusion (Summarize the Project Outcomes):

In the course of our data science exploration we tackled a thorough investigation of Bitcoin's trends, scrutinizing a 39-day dataset spanning from October 25th to December 3rd. Our overarching goal was to unravel the complexities of Bitcoin's price movements, discerning patterns, investigating causative factors, and interpreting the market dynamics influencing its trajectory.

Pattern Recognition:

Our initial analyses revealed interesting patterns in Bitcoin prices. Noteworthy was the discernible upward trend, capturing our attention and prompting a deeper investigation into its origins. Through exploratory data analysis, we explained nuanced fluctuations and trends, providing a foundation for following questions for further questioning as bitcoin prices progress in the future.

Causative Factors Investigation:

Delving into the factors driving Bitcoin's value, we identified a confluence of internal and external influences. Feature importance analysis highlighted key contributors within our dataset, while external events, regulatory shifts, and global economic conditions emerged as key aspects affect Bitcoin's trajectory. The mesh of these factors emphasize the nature of cryptocurrency valuation. Events, including

positive technical indicators (RSI), regulatory shifts, and macroeconomic conditions (i.e. Inflation), Bitcoin halving anticipation, surfaced as major determinants shaping the cryptocurrency landscape. The unveiling of new technologies, regulatory developments affecting market accessibility, and shifts in the global economic climate emerged as catalysts for notable fluctuations in Bitcoin prices. Focusing on the Bitcoin halving anticipation, we believe it was a great factor in the surge. Bitcoin halvings occur approximately every four years and reduce the number of new Bitcoins being created by half. This event has historically led to price increases as investors anticipate a reduction in supply. In the world of Bitcoin, there is a limited supply of 21 million Bitcoins that will ever be created. Every four years, there is a "Bitcoin halving," which means that the number of new Bitcoins being created is cut in half. This event has historically led to price increases as investors anticipate a reduction in supply.

When people talk about "Bitcoin halving," they mean that investors are getting excited about the next halving event, which is scheduled for mid-2024. They believe that as the supply of new Bitcoins decreases, the price of existing Bitcoins will increase. This anticipation can drive up the price of Bitcoin even before the halving actually happens.

Market Dynamics Exploration:

Our analysis delves into metrics indicative of Bitcoin's acceptance in the digital-aged society. We explored the symbiotic relationship between technological advancements and Bitcoin trends, recognizing the currency's role as both a financial asset and a measure of technological progress.

Importance of Results:

The results derived from our comprehensive analysis of Bitcoin's trends hold profound significance within the dynamic landscape of digital finance. As we delve into the importance of our findings, it becomes evident that the insights garnered extend beyond mere numeric revelations—they offer a compass for navigating the complexities of cryptocurrency markets and provide valuable guidance for various stakeholders.

Future Improvements:

Despite the depth of our analyses, it's crucial to acknowledge certain limitations. The cryptocurrency market is inherently volatile, influenced by sentiments and events that may defy predictive models. Future investigations could incorporate sentiment analysis and external data sources to enhance the predictive power of our models.

References:

The Daily Record." The Daily Record, 4 Dec. 2023,
<https://thedailyrecord.com/2023/12/04/whats-behind-bitcoins-recent-price-surge/>.