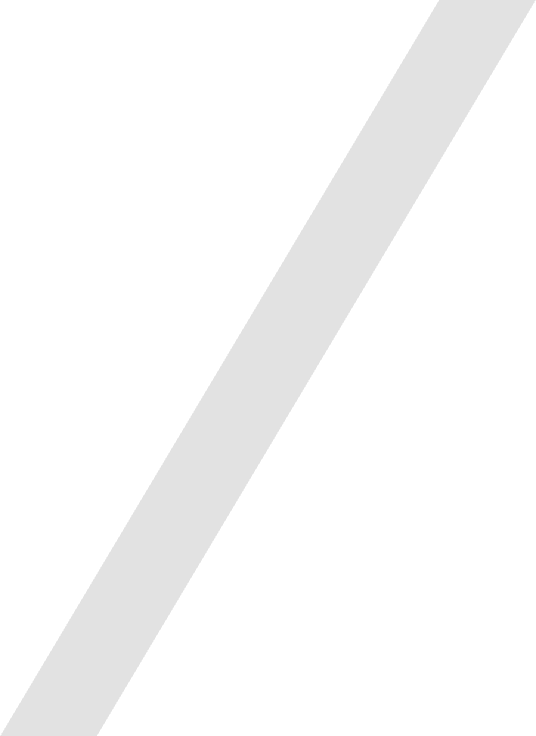
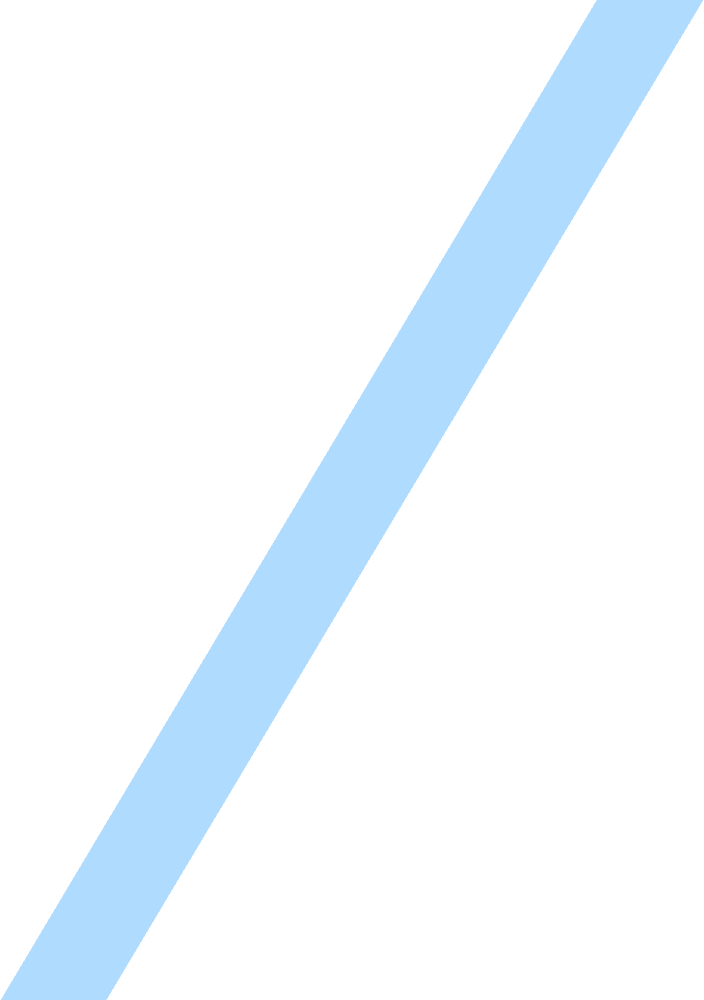
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| TECHNICAL REPORT |

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| Electrical & Computer Engineering & Computer Science (ECECS)  Team-10 Final Report |

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| SEMESTER-2 |  |



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| **Executive Summary**  * The "Exploring the Bitcoin Cryptocurrency Market" Data Camp Project is a comprehensive exploration into the dynamics of the Bitcoin market. Through a data-driven approach, this project delves deep into historical price analysis, market capitalization trends, and trading volumes associated with Bitcoin. Utilizing advanced data analysis tools and techniques, the project aims to uncover correlations between Bitcoin's performance and external factors. By visual representations, the project reveals insights into Bitcoin's volatility and its interplay with traditional financial markets. This study not only facilitates an understanding of market patterns and potential risks but also highlights opportunities within the ever-evolving cryptocurrency landscape. Learners will acquire valuable skills in data analysis and gain a nuanced comprehension of Bitcoin's market behavior, empowering them to make informed decisions in the realm of digital assets.   person at a table writing in a notebook with people around | | |
|  | | |
| Team Members:   * KARTHIK VINNAKOTA * SAI KRISHNA GUDIPATI * JAYA KRISHNA CHINTAGINJALA * AYYAPA TATA | Questions?  Contact: kvinn2@unh.newhaven.edu  atata3@unh.newhaven.edu  jchin6@unh.newhaven.edu  sgudi9@unh.newhaven.edu |  |

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| Exploring the Bitcoin Crypto Currency Market |

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| Exploring the Bitcoin Crypto Currency Market |  |
| Project Major Insights   * Data uploading to an EC2 instance. * Creating a database with AWS Glue; transferring data from EC2 to S3 via Boto3. * Use Athena to do transformations; • Connect the data to Power BI via Open Database Connectivity (ODBC); • Configure an Amazon Crawler to crawl S3 buckets; • Use Power BI to visualize.  Submitted on: 04/23/2024. |

## **Abstract**

The primary objective of the project is to simplify and streamline data administration and visualization processes by integrating Power BI with Amazon Web Services (AWS). Prior to being transferred to an Elastic Compute Cloud (EC2) instance, data is first uploaded to an Amazon Simple Storage Service (S3) bucket. AWS Glue is used to create a database that organizes and structures the data. Next, an AWS Crawler is set up to automatically crawl the S3 bucket to ensure the data is up to date. Data transformation is handled well by Athena, enabling efficient querying and analysis. Finally, the data is connected to Power BI using Open Database Connectivity (ODBC), allowing for intelligent analysis and visualization. This study demonstrates how cloud-based services can be used to enhance the capabilities of data management, transformation, and visualization, enabling practical.

**Introductory Section**

The "Exploring the Bitcoin Cryptocurrency Market" project, an integral component of the Data Camp curriculum, aims to unravel the intricate facets of Bitcoin's market behavior through data analysis. Bitcoin, a pioneering cryptocurrency, has emerged as a focal point in the global financial landscape, captivating the interest of investors, traders, and technology enthusiasts worldwide.

This project delves into the historical data of Bitcoin, scrutinizing its price dynamics, market capitalization trends, and trading volumes. Through sophisticated data analysis techniques, it seeks to unveil correlations between Bitcoin's performance and external factors such as market sentiment, regulatory shifts, and macroeconomic indicators.

Utilizing advanced Data Pipelines, and impactful data visualization tools, the project endeavors to identify patterns within Bitcoin's market behavior. Beyond analysis, the project translates these insights into actionable knowledge, empowering learners to navigate the complexities of the cryptocurrency landscape with informed decision-making capabilities.

As the cryptocurrency realm continues to evolve and influence traditional financial paradigms, this project serves as a gateway for participants to gain a comprehensive understanding of Bitcoin's market dynamics while honing their data analysis skills within the immersive environment of Data Camp.

**Review of available research**

## The available research on the Bitcoin cryptocurrency market spans price analysis, volatility studies, market correlations, sentiment analysis, blockchain technology, investment strategies, and economic implications. These studies employ statistical models, sentiment analysis tools, and explore Bitcoin's relationship with traditional assets and macroeconomic factors. They offer insights into market behaviors, technological innovations, and potential economic disruptions, forming a robust foundation for the Data Camp Project. This body of research serves as a crucial resource for understanding Bitcoin's dynamics and informing strategic decision-making within the cryptocurrency landscape.

## 

## **Crisp-DM Methodology**

The CRISP-DM (Cross-Industry Standard Process for Data Mining) methodology is a widely used framework for guiding data mining and analytics projects.

CRISP-DM phases:

* Business Understanding
* Data Understanding
* Data Preparation
* Modeling
* Evaluation

1. Business Understanding: This initial phase's primary objective is to comprehend the project's objectives and requirements from a business perspective. It includes defining the goals of the project, the business problem that needs to be fixed, and the success criteria.
2. Data Understanding: Comprehend the project's makeup, connections, and caliber, relevant data is collected, scrutinized, and assessed at this stage. This means collecting data, analyzing data, and assessing the data's initial quality.
3. Data Preparation: The data needs to be prepared for analysis once it has been understood. This step involves cleaning the data, handling missing values, transforming the variables, and creating derived variables as appropriate. The goal is to create a clean, well-structured dataset that is ready for modeling.
4. Modeling: In this step, various modeling strategies are selected and used to the prepared dataset to generate either descriptive or predictive models. This involves selecting appropriate algorithms, building models, and assessing each model's performance using validation techniques.
5. Evaluation: An assessment is carried out to determine the extent to which the models developed in the previous phase meet the objectives of the project. This means comparing the model's performance to the predetermined business criteria from the first step and fine-tuning the model as needed.
6. Deployment: The final step is to apply the models in the operational setting. This can mean setting up procedures for monitoring the models, incorporating the models into systems that already exist, and providing end users with documentation and training.

## **Data Pipeline**

## A diagram of a data processing process Description automatically generated

**Data Engineering Pipelin**e **Schema**

* + Data Ingestion: The Python SDK for Amazon Web Services (AWS) is called Boto3. Python programmatic contact between developers and various AWS services is made possible by it. Using Boto3, creating, configuring, and maintaining AWS resources such as EC2 instances, S3 buckets, DynamoDB tables, and more only requires Python code.
  + Data Storage: AWS S3
  + Data Processing: AWS Glue and AWS Crawler
  + Data Consumption: AWS Athena and Power BI
    - Data Visualization: Present the findings with in-depth visual aids.

**Uploading data to EC2 Instance**

In your system (cmd):  
1. Transfer log files from local system to Linux 2 instance  
2. Syntax: scp -i “/keyPath fileToBeUploadedPath/keypair.pem” “path of data file/file\_name.csv” username@ip:pathInRemoteSys  
3. Example:

pscp -i " /Downloads/project "/Downloads/data/ coinmarketcap\_06122017.csv " ec2user@32.155.270.114:/home/ec2-user/  
4. CSV file uploads to EC2 instance.

Transferring data from EC2 to S3 using Boto3

In your system (cmd):

1. Create Amazon Linux Instance
2. SSH into Instance
3. In SSH, go to home (cd ~)
4. Create directory.

mkdir. aws

1. Create new file.

vim. aws/credentials

1. Paste entire AWS CLI content from AWS details.
2. Create a virtual environment.

python3 -m venv venv

source venv/bin/activate.

1. Install Boto3

pip install boto3.

1. to check if installation successful, run python [type python3] then follow these steps:

* import boto3.
* s3 = boto3.resource(‘s3’)
* for bucket in s3.buckets.all ():

print(bucket.name)

1. To be able to upload the data to S3; make sure the data file actually exist in your instance
2. Create python file.

touch uploadtos3.py.

vim uploadtos3.py

1. Paste the entire code given below.
2. Save and quit (: wq)
3. Run the file.

Python uploadtos3.py

1. Go to S3[Choose the bucket created by code] and confirm that files has been uploaded.

A screenshot of a computer

Description automatically generated

Uploadtos3.py

A screenshot of a computer program

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A screen shot of a computer program

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**Data Base Created In AWS Glue:**

**A screenshot of a computer

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## **Queries Run Using AWS Athena:**

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## **Results Section**

**Utilizing Athena for Data Analysis**

**Cryptocurrency Ranking Analysis:**

SELECT symbol, rank

FROM cryptodb

ORDER BY rank;

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**Cryptocurrency With the Highest Trading Volume**:

SELECT \* FROM cryptodb

ORDER BY CAST ("24h\_volume\_usd" AS DECIMAL(38, 2)) DESC

LIMIT 10;

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Description automatically generated

**Cryptocurrency with the Lowest Trading Volume**

SELECT \* FROM cryptodb

WHERE "24h\_volume\_usd" IS NOT NULL AND "24h\_volume\_usd" != 0.0

ORDER BY CAST("24h\_volume\_usd" AS DECIMAL(38, 2)) ASC

LIMIT 10;

A screenshot of a computer

Description automatically generated

cryptocurrencies that have experienced the largest price increase over the given time of week:

SELECT symbol, percent\_change\_7d

FROM cryptodb

ORDER BY "percent\_change\_7d" DESC

LIMIT 10;

A screenshot of a computer

Description automatically generated

**cryptocurrencies that have experienced the largest price decrease over the given time period of week:**

SELECT symbol, percent\_change\_7d

FROM cryptodb

ORDER BY "percent\_change\_7d" ASC

LIMIT 10;

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Description automatically generated

**Connecting AWS Athena to Power BI Using ODBC**

To connect AWS Athena to Power BI using ODBC (Open Database Connectivity), you'll need to follow these general steps:

1. Set up AWS Athena: Ensure that Athena is correctly configured with the required permissions to access your S3 data, and that you have an AWS account.

2. Install the Athena ODBC Driver: Get the Athena ODBC driver and install it. You can get the official ODBC driver from AWS by visiting their website.

3. Configure ODBC Data Source: On your computer, create an ODBC data source for Athena. To do this, you must supply the connection specifics, including the S3 bucket, AWS region, and access credentials.

4. Connect Power BI to Athena: Launch Power BI and connect to Athena using the configured ODBC data source. In Power BI, you'll have to enter the same connection information.

**Data Visualization using Power BI:**

**Cryptocurrency Ranking Analysis:**

## A screenshot of a computer Description automatically generated

Top Visualization depicts in ascending order by rank, the cryptocurrency symbols, and their respective ranks from the cryptodb table. The positions of the cryptocurrencies in the market are clearly visible, making it simple to determine which digital assets in the database are the most and least Bitcoin is the top place.

**Cryptocurrency With the Highest Trading Volume**

## A screenshot of a computer Description automatically generated

Visualization analyses the Highest trading volume of the Cryptocurrency with respect to the one-day Volume of time in order with ID using bar Chart

Visualizes the over view of the top trading crypto currency of its day time.

**Cryptocurrency With the Lowest Trading Volume**

## A screen shot of a graph Description automatically generated

Visualization analyses the Lowest trading volume of the Cryptocurrency with respect to the one-day Volume of time in order with ID using bar Chart.

**cryptocurrencies that have experienced the largest price increase over the given time period of week:**

A screen shot of a computer

Description automatically generated

Visualization analyses the largest price increase the Cryptocurrency with respect to the week Volume of time in order with Symbol. Similarly, Largest Price Decrease also verified.

## **Discussion**

The "Exploring the Bitcoin Cryptocurrency Market" project delves into Bitcoin's complexities, employing diverse data analysis techniques to unravel market trends and correlations. It fosters understanding through statistical models, risk assessments, and back testing, offering insights for decision-making. This discussion underscores its role in empowering learners with practical skills to navigate the volatile cryptocurrency landscape, contributing valuable insights to the evolving discourse on Bitcoin's market dynamics.

## **Conclusion**

The "Exploring the Bitcoin Cryptocurrency Market" Data Camp Project culminates as a comprehensive dive into Bitcoin's market behavior. To sum up, the amalgamation of Power BI with Amazon Web Services (AWS) offers an all-encompassing approach to augmenting data management, conversion, and visualization procedures. Utilizing AWS services like Glue, Crawler, Athena, S3, and EC2, data is organized, stored, and made easily accessible for analysis. Data freshness is guaranteed by the automated nature of the AWS Crawler, while smooth data processing and querying are made possible by Athena.  
  
When Power BI is integrated with the AWS environment via Open Database Connectivity (ODBC), decision-makers are armed with actionable insights that facilitate intelligent and intuitive analysis. This project is a great illustration of how cloud-based services can simplify and streamline data management processes, enabling businesses to make well-informed decisions based on up-to-date, trustworthy data. With Power BI's seamless interface with AWS, businesses can fully leverage their data possible, promoting innovation and providing them with a competitive advantage in today's dynamic business landscape.

## **Contributions/References**

**Contributions:**

* The "Exploring the Bitcoin Cryptocurrency Market" Data Camp Project contributes significantly to the understanding and application of data analysis in the realm of cryptocurrency:
* Insightful Analysis: Offers deep insights into Bitcoin's market behavior through robust data analysis methodologies, shedding light on trends, correlations, and risk factors.
* Empowerment Through Skills: Equips participants with practical skills in data analysis, accuracy metrics, risk assessment, and model validation, fostering their ability to navigate and make informed decisions in the cryptocurrency market.
* Decision-Making Support: Provides actionable strategies for investors, traders, and decision-makers based on empirical evidence and validated models, aiding in strategic planning and risk management.
* Foundation for Future Exploration: Serves as a foundational resource for continued exploration and research into Bitcoin's market dynamics, offering a starting point for further studies and insights.

**References:**

* Narayanan, A., Bonneau, J., Felten, E., Miller, A., & Goldfeder, S. (2016). Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction.
* Grinberg, R. (2012). Bitcoin: An Innovative Alternative Digital Currency.
* Yermack, D. (2015). Is Bitcoin a Real Currency? An Economic Appraisal.
* Tseng, J. J., Liang, C., & Fei, L. (2018). Forecasting Bitcoin Price with Graph Chainlets.
* Nakamoto, S. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System. [Whitepaper]
* Antonopoulos, A. M. (2014). Mastering Bitcoin: Unlocking Digital Cryptocurrencies.