

Cryptocurrency Data Analysis Project

Using Python, MySQL, and Power BI

1. Project Title

Crypto Price Trend & Market Analysis Using Python, MySQL, and Power BI

2. Project Overview

This project focuses on analyzing historical cryptocurrency market data to understand **price trends, volatility, trading volume, and performance comparison** among different cryptocurrencies.

The project follows a **complete data analytics lifecycle**:

- Data collection
- Data cleaning and analysis using **Python**
- Data storage and querying using **MySQL**
- Interactive visualization and insights using **Power BI**

The goal is to transform raw crypto price data into **meaningful business insights** that help understand market behavior.

3. Objectives of the Project

- Analyze historical price trends of cryptocurrencies
 - Identify **top-performing and underperforming coins**
 - Study **market volatility and daily price changes**
 - Compare cryptocurrencies based on **price, volume, and returns**
 - Build an **interactive dashboard** for decision-making
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4. Dataset Description

- Dataset contains **365 days of historical crypto data**
- Includes multiple cryptocurrencies (e.g., Bitcoin, Ethereum, etc.)
- Data fields:
 - Date
 - Cryptocurrency Name / Symbol
 - Open Price

- Close Price
- High Price
- Low Price
- Trading Volume
- Market Capitalization (if available)

Data Source: Public cryptocurrency market data (CSV/Excel format)

5. Tools & Technologies Used

Tool	Purpose
Python	Data cleaning, preprocessing, EDA
Pandas & NumPy	Data manipulation
Matplotlib / Seaborn	Data visualization
MySQL	Data storage & SQL analysis
Power BI	Dashboard & reporting
Excel	Raw data format

6. Project Architecture (Workflow)

Raw Crypto Data (Excel/CSV)

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Python (Data Cleaning & EDA)

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MySQL Database (Structured Storage)

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SQL Queries (Trend & Performance Analysis)

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Power BI Dashboard (Visualization & Insights)

7. Data Cleaning & Preprocessing (Python)

Performed using Python libraries:

- Removed missing and duplicate values

- Converted date columns into proper datetime format
 - Handled inconsistent price values
 - Created new calculated columns:
 - Daily Price Change
 - Percentage Change
 - Moving Averages
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8. Exploratory Data Analysis (EDA)

Key analysis performed:

- Price movement over time
- Volume trends analysis
- Volatility comparison between cryptocurrencies
- Correlation between price and trading volume
- Identification of high-growth periods

Visualizations used:

- Line charts
 - Bar charts
 - Distribution plots
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9. Database Design (MySQL)

- Created structured tables for crypto data
- Imported cleaned data from Python into MySQL
- Ensured proper data types for numerical and date fields

Example Analysis Using SQL:

- Average closing price per cryptocurrency
 - Highest and lowest price analysis
 - Monthly and yearly trend analysis
 - Volume-based ranking of cryptocurrencies
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10. SQL Analysis

Some key SQL insights:

- Top cryptocurrencies by average price
 - Most volatile coins based on price fluctuations
 - Daily and monthly price trend calculations
 - Ranking cryptocurrencies using window functions
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11. Power BI Dashboard

An **interactive dashboard** was built to present insights visually.

Dashboard Features:

- Price trend over time (Line chart)
 - Volume comparison across cryptocurrencies
 - Top gainers and losers
 - Filters:
 - Cryptocurrency name
 - Date range
 - KPI cards:
 - Average price
 - Total volume
 - Highest price
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12. Key Insights & Findings

- Bitcoin and Ethereum show relatively **stable long-term growth**
 - Some altcoins show **high volatility with sharp spikes**
 - Trading volume strongly influences price movements
 - Market behavior changes significantly during high-volume periods
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13. Business Use Case

This analysis can help:

- Investors make informed trading decisions
- Analysts understand crypto market trends
- Businesses evaluate risk and volatility
- Portfolio managers compare asset performance

14. Challenges Faced

- Handling missing and inconsistent crypto data
- High volatility causing extreme values
- Optimizing SQL queries for large datasets
- Designing meaningful dashboard visuals

15. Conclusion

This project demonstrates a **complete data analytics pipeline**, integrating Python, SQL, and Power BI to analyze real-world cryptocurrency data. It showcases skills in **data cleaning, analysis, database management, and visualization**, making it a strong portfolio project for data analyst roles.

16. Future Enhancements

- Add real-time API-based crypto data
- Include technical indicators (RSI, MACD)
- Perform price prediction using machine learning
- Automate ETL pipeline