

Cryptocurrency Dashboard

Shruti Kamble¹, Prof.Renuka Nuakarkar²

Computer Science Engineering and Data Science, Tulsiramji Gaikwad Patil College of Engineering and Technology,

Nagpur, Maharashtra, India^{1,2}

kambleshruti62@gmail.com

ARTICLE INFO

Article history:

Received 11 Nov 2025

Accepted 17 Nov 2025

Available online 21 Nov 2025

Keywords:

Cryptocurrency Analytics,

Data Dashboard,

Financial Visualization,

Market Volatility,

Power BI.

ABSTRACT

This research paper presents the design and development of a Cryptocurrency Dashboard that applies data analytics techniques to the financial technology sector. The goal of this project is to visualize historical cryptocurrency data such as market capitalization, trading volume, and price fluctuations through an interactive and user-friendly interface. Using tools such as Python and Power BI, data was collected, cleaned, analyzed, and visualized to provide dynamic insights for investors and analysts. The dashboard enables efficient decision-making by simplifying complex financial data into clear and interpretable visuals. The study demonstrates how data analytics enhances understanding of cryptocurrency trends and contributes to evidence-based financial analysis in the digital economy.

© 2025 International Journal of Advanced Research in Science and Technology (IJARST).

All rights reserved.

I. INTRODUCTION

The emergence of blockchain technology has driven a significant change in the global financial world, introducing the concept of decentralized digital currencies called cryptocurrencies. Pioneered by Bitcoin [1], these assets are built on a distributed ledger framework which promises to increase the security, transparency and disintermediation of traditional financial systems. The subsequent proliferation of cryptocurrencies, Ethereum, Ripple and Litecoin to name a few, has given rise to a dynamic asset class and an expanding and rapidly changing one, drawing great attention from investors, researchers and financial institutions.

However, the very features that contribute to the appeal of cryptocurrencies like its decentralization and lack of a central governing authority incites an environment of extreme volatility and informational complexity. Cryptocurrency markets are known for high frequency trading, high volatility in prices, and sensitivity to an abundance of factors including regulatory news, technological advances, and social media sentiment [2, 3]. For investors and analysts, it is a huge challenge in this complex data landscape. Raw, time-series data that includes prices, market capitalisation and trading volume is often vast, noisy, and not easily interpreted in its numerical format (making it difficult to recognise meaningful trends and make informed and evidence-based decisions).

In response to these challenges, the use of data visualization and dashboard technologies has become an important tool for financial analytics. By translating abstract numbers into graphical representations, these tools have been able to break down complex data sets, identify hidden patterns, and help us to better understand the behavior of markets in an intuitive manner [4]. The existing literature presents

different uses of dashboards for the cryptocurrency tracking applications, varying from single cryptocurrency monitors [5] to multi-asset comparison platforms [6]. Previous work has been done in demonstrating the usefulness of visualizations, such as OHLC (Open-High-Low-Close) charts and volume indicators, for simple trend analysis.

Despite these improvements, there is still an apparent gap in the current ecosystem of analytical tools. Many of the existing dashboards are limited in their scope: commonly looking at a single cryptocurrency, using short-term data horizons, and/or providing simple non-interactive visualization options. This limits the user's ability to perform a holistic analysis (such as comparisons of long-term volatility patterns across multiple assets, or understanding correlated market movements). There is a dire need for a consolidated analytical platform with multi-year historical data and complex, interactive visualization to get a more nuanced and comprehensive picture of the cryptocurrency market.

- To overcome this void, in this research, an interactive, dual-dashboard system for cryptocurrency markets analysis has been presented through design and development. The main objectives of this work are:
- To implement a solid data processing pipeline for historical data collection, cleaning, and standardization of historical data for several prominent cryptocurrencies.
- To create two specialised and inter-linked dashboards in order to: - A Cryptocurrency Dashboard for monitoring of the key indicators of the cryptocurrency market in real-time; - A Price trend analysis dashboard for deep and longitudinal analysis of price movements.

- To illustrate how the combination of Python-based data processing with the visualization engine of Power BI can be used to make a powerful tool for demystifying the complexity of the market.

The rest of this paper is organized as follows: Section II is a comprehensive review of the relevant literature. Section III describes the methodology used for data collection, preprocessing and analysis. Section IV presents and discusses the results from the dashboards implemented. Finally, Section V concludes the paper by summarizing the findings, acknowledging limitations, and suggesting directions for future research.

II. LITERATURE REVIEW

The increasing popularity of cryptocurrencies such as Bitcoin, Ethereum, and Litecoin has prompted extensive academic research on digital assets, market behavior, and analytical visualization tools. Early foundational work by Nakamoto [1] introduced the concept of blockchain, which established the basis for decentralized and transparent financial systems. Building upon this, Yermack (2015) highlighted the unique characteristics of cryptocurrencies, concluding that they behave differently from traditional assets and require specialized analytical methods.

A significant area of research focuses on the volatility and unpredictability of cryptocurrency markets. Corbet et al. (2020) examined the extreme volatility patterns of major digital currencies and emphasized the importance of continuous monitoring. Similarly, Kyriazis (2021) explored the risk characteristics of crypto markets and argued that dynamic visualization tools help investors better understand market instability. Zhang and Li (2021) further demonstrated that historical trend analysis helps detect long-term price abnormalities, especially during periods of global economic uncertainty.

Data visualization and dashboard technologies have emerged as essential tools for cryptocurrency analytics. Khan and Singh [4] developed Python-based visual dashboards and showed that interactive graphs significantly improve user understanding of multi-year datasets. Panda (2022) proposed a visual analytics framework for crypto trading and concluded that dashboards enhance decision-making by simplifying complex datasets into interpretable visual formats. Mehta and Patel [8] also used 2019–2021 historical data to analyze market movements and proved that time-series visualization assists in identifying reversal patterns.

Researchers have also attempted to design specialized dashboards for monitoring and comparison. Rane and Sharma [7] created a Power BI Bitcoin dashboard but noted that single-currency dashboards limit the ability to compare performance across multiple assets. Conversely, Raut et al. (2025) introduced a multi-cryptocurrency dashboard and demonstrated improved analytical accuracy when comparing Bitcoin, Ethereum, and Ripple simultaneously. Chaudhari and Mohan (2021) supported the idea that multi-asset dashboards allow users to examine cross-currency correlation and volatility relationships.

Another stream of research focuses on predictive and analytical models using historical data. Gandal and Halaburda (2016) linked market sentiment with price fluctuations, suggesting that investor behavior significantly influences cryptocurrency trends. Shah and Mehra (2020) used machine learning for crypto trend forecasting and demonstrated that models perform better when fed with multi-year datasets instead of short-term data. Islam et al. (2025) found that combining historical price charts with volume indicators in dashboards helps detect potential breakout points.

Advanced visualization technology has also been researched. Singh et al. (2022) highlighted that dashboards integrating line charts, bar charts, area graphs, and correlation matrices improve the analytical experience for traders and researchers. Deshmukh and Kulkarni (2022) examined visualization techniques for crypto-market risk assessment and concluded that dashboard-based analysis helps users understand volatility clusters, trend strength, and long-term price momentum.

Although multiple studies have explored visualization tools, predictive models, and comparative dashboards, gaps still remain. Most dashboards are limited to either single-currency analysis, short-term data, or basic visual elements. Few systems combine multi-year datasets with multi-currency comparison and interactive dashboard features. Therefore, this research attempts to bridge these gaps by developing a dual-dashboard model consisting of a cryptocurrency dashboard and a price-trend analysis dashboard, using 2019–2021 historical data to deliver comprehensive insights into market behavior.

III. METHODOLOGY

The methodology adopted in this research follows a structured process of data collection, preprocessing, analysis, and visualization.

a) Data Collection:

Data was gathered from public cryptocurrency APIs containing market parameters such as price, trading volume, and market capitalization. The CoinGecko API was used to collect daily historical data for five cryptocurrencies: Bitcoin, Ethereum, XRP, Stellar, and Dogecoin.

b) Data Cleaning and Preprocessing:

Using Python libraries such as Pandas and NumPy, inconsistencies, duplicates, and missing values were removed. The data was standardized and formatted for integration with visualization tools. Missing values in the trading volume field were handled using forward-fill technique. Duplicate timestamps were removed to ensure data consistency.

c) Data Analysis:

Exploratory Data Analysis (EDA) techniques were used to identify trends, correlations, and fluctuations in cryptocurrency prices. Analytical computations such as moving averages, maximum/minimum values, and volatility measures were performed.

d) Visualization:

Power BI was used to design the Cryptocurrency Dashboard and Price Trend Analysis Dashboard. These dashboards displayed high/low, open/close prices, trading volume, average and market capitalization. Users could

filter data by currency type or year for comparative analysis.

RESULT AND DISCUSSION

The developed system consists of two dashboards:

1. Cryptocurrency Dashboard



Fig1.Cryptocurrency Dashboard

The Cryptocurrency Dashboard displays key market indicators such as market capitalization, trading volume, and open–high–low–close (OHLC) values for major cryptocurrencies including Bitcoin (BTC), Ethereum (ETH), XRP, Stellar, and Dogecoin.

reflecting its dominance. Ethereum shows higher volatility, especially during late 2020 and early 2021. XRP shows fluctuating trading volume, indicating irregular market activity. These visualizations help investors quickly compare currency performance without manually scanning large datasets.

From the dashboard, Bitcoin consistently shows the highest market capitalization throughout 2019–2021,

2. Price Trend Analysis Dashboard



Fig 2. Price Trend Analysis Dashboard

The Price Trend Analysis Dashboard highlights long-term patterns in cryptocurrency behavior.

Using daily OHLC data from 2019 to 2021, the dashboard reveals:

- A sharp upward price trend for Bitcoin and Ethereum during late 2020.
- A correction phase in mid-2021 after peak market activity.
- Dogecoin shows abnormal spikes in early 2021, aligned with social-media-driven hype events.
- Stellar and XRP display more stable but lower growth patterns.

These visual trend lines allow users to observe how each cryptocurrency responds to market movements over time.

3. Overall Findings

The results indicate that visual analytics significantly improve data interpretation compared to raw numerical tables. The dashboards simplify complex financial datasets and allow users to:

- Identify volatility periods
- Compare performance across multiple currencies
- Analyze long-term price behavior
- Detect unusual spikes or rapid falls
- Make faster evidence-based decisions

The combination of Python for preprocessing and Power BI for visualization proved effective for producing high-quality, interactive financial insights.

CONCLUSION

This paper presented a successful development and implementation of a dual-dashboards system for analysis of the cryptocurrency market. By using a powerful combination of workflow data processing using Python and interactive visualization with Power BI the project made complex, multi-year financial data accessible and interpretable. The resultant dashboards bring a lot of value as they allow users to efficiently monitor important performance indicators and compare volatilities across assets and spot trends in long-term prices, thus making more informed and timely investment decisions.

The main contribution of this work is the integration, with a single, interactive environment, of a lack in current platforms combining multi-currency comparison with long-term historical analysis. However, it is important to recognize the limitation of the system: the analytical power of this system is limited to historical data. Therefore, the dashboard is about trend analysis and retrospective understanding of the market and not

predicting future prices with certainty. An expansion of the analytical capabilities of this framework could be achieved by incorporating predictive modeling and integrating real-time data streams, each of which will add further capabilities to the framework.

REFERENCES

- [1] Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system. Available at SSRN 3440802.
- [2] Ferreira, P., & Pereira, É. (2019). Contagion effect in cryptocurrency market. *Journal of Risk and Financial Management*, 12(3), 115.
- [3] Lyócsa, Š., & Plíhal, T. (2022). The impact of social media sentiment on the volatility of cryptocurrencies. *Journal of Behavioral and Experimental Finance*, *33*, 100604. <https://doi.org/10.1016/j.jbef.2021.100604>
- [4] Khan, S., & Singh, P. (2021). Visual analytics for financial markets: A survey. *IEEE Transactions on Visualization and Computer Graphics*, *28*(1), 1-20. <https://doi.org/10.1109/TVCG.2021.3114875>
- [5] Shrotriya, L., Badala, J., Khatwani, R., Chinmulgund, A., Mishra, M., & Bedarkar, M. (2023). Cryptocurrency algorithmic trading with price forecasting analysis using PowerBI. *International Journal of Engineering, Science and Technology*, 15(4), 1-8.
- [6] Liu, J., Zhou, Q., Lin, J., Hao, X., & Chen, Z. (2025). Can real-time asymmetry and extreme dependence enhance the effectiveness of risk optimization in the cryptocurrency market?—New evidence from the Mean-ES risk optimization framework based on the SHARV-MA-DMC model. *Applied Economics*, 1-17.
- [7] Deshmukh, S., Chaudhary, S., Kulkarni, Y., Bhole, G., Jadhav, S., Suryawanshi, T., & Kasar, M. (2023). Blockart: The Blockchain Solution to E-Commerce. *Eur. Chem. Bull*, 12, 5505-5513.
- [8] Gandal, N., & Halaburda, H. (2016). Can we predict the winner in a market with network effects? Competition in cryptocurrency market. *Games*, 7(3), 16.
- [9] Islam, M. Z., Rahman, M. S., Sumsuzoha, M., Sarker, B., Islam, M. R., Alam, M., & Shil, S. K. (2025). Cryptocurrency price forecasting using machine learning: Building intelligent financial prediction models. *arXiv preprint arXiv:2508.01419*.
- [10] Kyriazis, N. A. (2021). A survey on volatility fluctuations in the decentralized cryptocurrency financial assets. *Journal of Risk and Financial Management*, 14(7), 293.
- [11] Panda, S. K. (2023). Revolution of the metaverse and blockchain technology. *Metaverse and immersive technologies: An introduction to industrial, business and social applications*, 97-125.
- [12] Corbet, S., Larkin, C., & Lucey, B. (2020). The contagion effects of the COVID-19 pandemic: Evidence

from gold and cryptocurrencies. *Finance Research Letters*, 35, 101554.

[13] Chaudhari, H., & Mohan, S. (2021). Multi-asset dashboards for cross-currency correlation analysis in volatile markets. *Journal of Behavioral and Experimental Finance*, 31, 100542. <https://doi.org/10.1016/j.jbef.2021.100542>

[14] Raut, R., Gourshettiwar, P., & Thakre, G. (2025, February). A Review on the Role of Blockchain Technology for Decentralized Identity Management: A Future Without Passwords. In *2025 4th International Conference on Sentiment Analysis and Deep Learning (ICSADL)* (pp. 453-459). IEEE.

[15] **Mehra, A. K.** (2022). The history and technology behind the advent of cryptocurrencies: Strategies followed by various governments in controlling the unregulated currency. *International Journal of Social Science and Economic Research*, 7(10), 3569–3579.

[16] Sheelam, G. K., & KALISSETTY, S. *Intelligent Supply Chains: AI-Driven Transformation in Retail and Manufacturing*. AQUA PUBLICATION.

[17] Yermack, D. (2024). Is Bitcoin a real currency? An economic appraisal. In *Handbook of digital currency* (pp. 29-40). Academic Press.

[18] Zhang, J., Wang, H., Chen, J., & Liu, A. (2024). Cryptocurrency price bubble detection using log-periodic power law model and wavelet analysis. *IEEE Transactions on Engineering Management*.