

HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY

GRADUATION THESIS

CRYPTOCURRENCY DATA ANALYSIS AND VISUALIZATION

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Given the constraints of time and the limited experience of a student, this thesis may have some imperfections. I earnestly hope to receive guidance and feedback from professors to have the opportunity to supplement and enhance my understanding, better serving future practical work.

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ABSTRACT

In my graduation thesis, I focused on analyzing and visualizing momentum data for cryptocurrencies. The problem I addressed was how to understand and effectively leverage the dynamic changes in cryptocurrency data to achieve optimal results in predicting trends and price charts.

Currently, analyzing and predicting trends in crypto data is a significant challenge due to the market's volatility and uncertainty. There are various approaches, from technical analysis to using machine learning prediction models. However, there are still some limitations, such as price instability, unforeseeable market events' impacts, and the complexity of crypto data.

In this thesis, I opted for an approach using quantitative analysis and deep learning method to identify trend models and predict crypto prices. By utilizing suitable tools and algorithms, I designed reliable charts and representations of momentum data, enabling a better understanding of volatility and opportunities in the crypto market.

The outcome of this research provides a novel approach to analyzing and predicting price trends in crypto data. This may assist users in making intelligent investment decisions and achieving better performance in the cryptocurrency market.

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LIST OF ABBREVIATIONS

Abriviation	Full Expression
API	Giao diện lập trình ứng dụng (Application Programming Interface)
EUD	Phát triển ứng dụng người dùng cuối(End-User Development)
GWT	Công cụ lập trình Javascript bằng Java của Google (Google Web Toolkit)
HTML	Ngôn ngữ đánh dấu siêu văn bản (HyperText Markup Language)
IaaS	Dịch vụ hạ tầng

CHAPTER 1. INTRODUCTION

1.1 Motivation

The motivation behind creating my web application stems from the increasing interest and popularity of cryptocurrencies. As the cryptocurrency market continues to grow, there is a demand for accessible and user-friendly platforms to monitor and visualize the momentum factor in cryptocurrency data.

By developing this web application, I aim to provide users with an intuitive and informative tool to track and analyze the momentum factor for different cryptocurrencies. The ability to visualize the momentum data can help investors and enthusiasts gain insights into potential price movements and trends.

The significance of this project lies in its potential to democratize cryptocurrency data analysis. By making momentum factor visualization easily accessible to users, regardless of their technical background, I hope to contribute to a broader understanding of the cryptocurrency market and foster informed decision-making.

Moreover, the web application's adaptability allows for potential use cases beyond the crypto domain. The visualization techniques and tools employed in this project can be extended to other fields where momentum analysis and data visualization are relevant.

In conclusion, my web application's primary objective is to provide a user-friendly platform for visualizing the momentum factor in cryptocurrency data, fostering a better understanding of market trends and contributing to informed decision-making for investors.

1.2 Objectives and scope of the graduation thesis

Under the current market conditions, there is a noticeable absence of any application specifically designed to visualize momentum data for cryptocurrencies. Despite the growing interest and popularity of cryptocurrencies, there is a lack of user-friendly platforms that provide easy access to visualizing and analyzing the momentum factor for various crypto assets.

The absence of such applications highlights the significance and urgency of my graduation thesis. By developing a web application to fill this void, I aim to offer users an intuitive and informative tool for monitoring and understanding the momentum trends in the cryptocurrency market.

The primary objective of my thesis is to bridge this gap and provide investors

and enthusiasts with a dedicated platform that empowers them to make more informed decisions. By democratizing cryptocurrency data analysis and making momentum factor visualization readily accessible, my web application seeks to contribute to a broader understanding of the cryptocurrency market and foster better decision-making for users with varying technical backgrounds.

1.3 Tentative solution

In my project, I have made several decisions to achieve the outlined objectives. Firstly, I chose to gather cryptocurrency data using the Coingecko API as it provides comprehensive and up-to-date information on various cryptocurrencies. This data is then stored on Github, ensuring a secure and easily accessible repository for further analysis.

Secondly, I implemented a momentum factor calculation algorithm to process the collected data. This algorithm allows me to assess the momentum trends and gauge the strength of price movements for different cryptocurrencies over time.

Furthermore, to predict future price movements, I utilized an LSTM (Long Short-Term Memory) model, a type of deep learning architecture well-suited for sequential data like cryptocurrency price history. The LSTM model can learn patterns and dependencies from historical data, enabling it to make informed predictions about future price changes.

The primary contribution of my project is the development of a web application that showcases the momentum factor for various cryptocurrencies. By presenting this factor visually, the application aims to provide users with valuable insights into market trends, supporting them in making well-informed investment decisions.

1.4 Thesis organization

The remaining part of this thesis is organized as follows:

Chapter 2 delves into the comprehensive requirement survey undertaken to discern the fundamental needs and functionalities of the application. This process involved an exploration of user expectations, market trends, and industry benchmarks. By examining these factors, a holistic understanding emerged, guiding the identification and prioritization of essential features for the application. In essence, Chapter 2 serves as a pivotal guidepost that illuminates the path forward by unveiling the intrinsic features vital to the application's success. Through an intricate interplay of research, analysis, and interpretation, the requirement survey instilled clarity and purpose, ensuring that the subsequent development stages were both focused and effective.