CRYPTOCURRENCY RECOMMENDATION BOT

MR.PIYACHON RUSUWANNAKUL
MR. RYOICHI KAIHATSU
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A PROJECT REPORT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE BACHELOR OF ENGINEERING IN COMPUTER ENGINEERING

FACULTY OF ENGINEERING & INTERNATIONAL COLLEGE
MAHIDOL UNIVERSITY

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Computer Engineering Project
entitled

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Thesis
entitled
CRYPTOCURRENCY RECOMMENDATION BOT

was submitted to the Faculty of Engineering & International College,
Mahidiol University
for the degree of Bachelor of Engineering (Computer Engineering)
on
July 15, 2023

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ACKNOWLEDGEMENT

First and foremost, we would like to express our special thanks and sincere of gratitude to our advisor and co-advisors, Asst. Prof. XXX XXXX, Asst. Prof. YYY YYYY, Asst. Prof. ZZZ ZZZZ, who insight, advise and knowledge us a lot in finalizing this project within the limited time frame.

Beside our advisors, we would like to thank to the committees, Asst. Prof. XXX XXXX, Asst. Prof. YYY YYYY, and Asst. Prof. ZZZ ZZZZ, for their insightful comment and encouragement. Also, the questions which encourage us to rethink and research more about some factors which we missed. Therefore, this project would not be completed without comments, questions, and support from our committees.

Finally, we would like to special thanks to our university, Mahidol University International College, and Faculty of Engineering, Mahidol University, which provided us a lot of resources to study, financial means for researching this project.

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CRYPTOCURRENCY RECOMMENDATION BOT

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DATE OF GRADUATION	July 15, 2023

ABSTRACT

An abstract should provide a concise summary of your entire thesis. It should report significant elements of your thesis including background or introduction in brief, objectives, statistical data, key finding, and conclusions. Mathematical formulas, diagrams, and other illustrativematerials are not recommended for inclusion. A strong abstract should be self-contained; without abbreviations, footnotes, references. Outside readers typically view the abstract before deciding to read the thesis, so it should be well written, logical, and a complete reflection on you work.

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KEYWORDS : LaTeX / Thesis

11 Pages

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CHAPTER 1
INTRODUCTION

1.1 Backgroud and motivation

The cryptocurrency is one of largest investment market that grows rapidly and it is considered to be one of the biggest digital assets and tools to make money. Many investors are interested in investing and developing tools that can maximize their profit out of the cryptocurrency market. One of the problems arising in the cryptocurrency market, is that the investors/traders could not maximize the profit due to the volatility and could not accurately predict whether the price will increase or not. Therefore, they could not accurately predict the price of individual cryptocurrency. Since the traders and investors could not accurately predict the price by their own judgment, this project proposes the tools that can provides accuracy and precision that can automated automatically with risk-management scheme. Every investors will have different risk level that willing to take. By doing so, this project aimed to develop a novel pattern recognition that will help investors to gain profits according to their risk management by using facebook prophet, and random forest regression.

1.2 Objectives

1.2.1 Developed an Application Programming Interface (API) that will connect to KUcoin exchange website and help the investor predict the price pattern at specific time and date by taking advantage of pattern recognition of the cryptocurrency price.

1.2.2 To develop a pattern recognition algorithm for predicting price pattern at specific time and date by using machine learning techniques

To learn the price pattern from historical cryptocurrency price data from 2013 until present.

The outcome of the pattern recognition will be use to set Take Profit target and Stop

Loss target. It will involves the risk factor that will be used to determine how much risk that the investor are willing to take take and the Take profit and Stop Loss target will be customized to each individual investors.

target and Stop Loss target. It will involves the risk factor that will be

1.2.3 To developed fully automated trading bot that work 24 hours

This automated trading bot will be an API that will connected to KUcoin exchange website, which is one of the famous cryptocurrency trading website, and it will work automatically whether the investors' computer are shut down or turn on. The trading bot also has user-friendly interface including questionnaires assessing the risk that investors willing to take.

1.2.4 To developed a website-based trading bot

The web-based trading bot will have Front-end design that will covers up needed questionnaires that will uses for trading bots and the website is user-friendly that easy to use.

1.3 Scopes

1.3.1 The scopes of this project will work only with Kucoin exchange website and the trading bot will work with selected cryptocurrency.

1.3.2 Trading bot API that can uses API to connect our trading bot to KUcoin exchanges website.

1.3.3 Pattern Recognition that can learn cryptocurrency price from oldest to present

1.3.4 User friendly website ith purpose of collecting investors information about risk management

1.4 Expected Results

The expected results of the project is aimed at automating the trading bot with decision making from pattern recognition using machine learning as follows:

1. Fully automated trading

(a) *Able to make an order to BUY or SELL*

(b) *Able to set Take Profit (TP) and Stop Loss (SL) to prevent any further loss and take desire profit according to pattern recognition.*

(c) *The responsive website can be connected with bot API use for risk management to help bots with decision making.*

2. learn the price pattern from historical data.
   (a) Uses pattern recognition to help predicting the price pattern.
3. Responsive website
   (a) The developed website can ask about risk management information from investors.

1.5 Timeline

Table 1.1 Final Project Timeline

Plan	Timeline											
	2023									2024		
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1: Meet with ajarn mingmanus for project title	■											
2: Build API for bots		■										
3:Collect historical data in Cryptocurrency			■	■								
4: Analyze/ filter data collected					■							
5: Build Machine learning model						■	■	■	■			
6: Tests with the data collected									■	■		
7: Improve the accuracy of the training model										■	■	
8: Document and Presentation												■

CHAPTER 2
LITERATURE REVIEW

This chapter provides literature reviews for Machine Learning (ML) models, and Application Programming Interfaces (API). In ML, there were various models that can be used but in this senior project, only some will be chosen. In ML, the time series model will be chosen since the project aimed to predicted from price volatile time to time. Another important time series ML model is Facebook Prophet which can provided high accuracy and speed. When it comes to decision making, random forest regression when the price of cryptocurrency is stable and create some patterns. Cryptocurrency markets have gained significant attention in recent years due to their potential for high returns and volatility. As a result, there has been a growing interest in developing prediction models and websites to forecast the prices of various cryptocurrencies. This literature review aims to explore the existing research and approaches used in the development of crypto prediction websites. It examines different prediction techniques, data sources, evaluation metrics, and challenges encountered in this field. By analyzing the current state of the literature, this review provides insights into the strengths and limitations of existing models and suggests potential areas for future research.[5]

2.1 Prediction technique

Several prediction techniques have been utilized in crypto price prediction models. These include machine learning algorithms and time series. Machine learning techniques, such as random forests, and time series, have shown promising results in capturing complex patterns and relationships in cryptocurrency price data. However, each technique has its strengths and limitations, and the choice of the appropriate method depends on factors such as dataset characteristics and prediction goals.[3]

2.2 Data Sources

Integrating the Kucoin API as a data source for crypto price prediction websites offers access to real-time and historical data on cryptocurrency prices, trading volumes, and market dynamics. Leveraging the Kucoin API's diverse data endpoints can enhance the accuracy and reliability of prediction models, facilitating informed decision-making for crypto traders and investors. By utilizing this powerful data source, developers can create robust prediction websites that cater to the demands of users in the fast-paced and ever-evolving cryptocurrency market.[2]

2.3 Evaluatuion

Cross-validation is a widely used evaluation technique for Random Forest Regression models. By partitioning the dataset into training and validation subsets, it allows for robust performance assessment, generalization ability evaluation, and optimal hyperparameter tuning. By employing cross-validation, researchers and practitioners can gain a comprehensive understanding of the accuracy and reliability of Random Forest Regression models, enabling better decision-making in various prediction tasks. Time series evaluation is vital for assessing the accuracy of a crypto prediction model. By splitting the data, training the model, generating predictions, and comparing them with actual values using metrics like MAE, MSE, RMSE, MAPE, and directional accuracy, we can determine the model's performance. Iterative improvement can enhance accuracy. Considering challenges like market volatility and data quality is crucial. Time series evaluation ensures the development of reliable crypto prediction websites for informed decision-making.[1]

2.4 Challenges

Developing accurate crypto prediction models faces several challenges. Developing a crypto prediction website comes with several challenges and limitations. Some notable factors to consider include:

2.4.1 M

arket Volatility: Cryptocurrency markets are highly volatile and susceptible to sudden price fluctuations, making accurate predictions challenging.

2.4.2 D

ata Quality: Ensuring the quality, reliability, and timeliness of data is crucial for building robust prediction models.

2.4.3 O

verfitting and Generalization: Models that perform exceptionally well on historical data may fail to generalize to future unseen data due to overfitting. Regularization techniques and careful model selection can mitigate this issue.

2.4.4 E

xternal Factors: Cryptocurrency prices can be influenced by external events such as regulatory changes, news events, and economic factors. Incorporating external factors into the prediction models is a complex task.[4]

2.5 Conclusion

Crypto prediction websites have gained popularity in the context of the volatile cryptocurrency market. This literature review provides an overview of the existing research on crypto price prediction models, including prediction techniques, data sources, evaluation metrics, and challenges. While progress has been made in this field, there are still limitations and areas for improvement. Future research should focus on refining existing models, incorporating additional data sources, and enhancing prediction accuracy to meet the growing demands of crypto investors and traders.

2.6 Referencing

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CHAPTER 3
METHODOLOGY

The Cryptocurrency Trading Prediction project aims to develop a system that predicts future cryptocurrency prices for effective trading decisions. The project encompasses three main fields: API integration for data retrieval, machine learning models for price prediction, and website programming for user interaction. This methodology paragraph outlines the methods and techniques employed in each field and provides an overview of the project's application design.

3.1 API Integration

The API integration involves retrieving cryptocurrency market historical data under Python programming language. The main tools and concepts used in this part include:

3.1.1 Pandas library: Used for data manipulation and creating data frames to organize and analyze the retrieved market data.

3.1.2 Yfinance library: Employed to fetch cryptocurrency data and plot graphs to visualize the market trends and patterns.

3.1.3 KuCoin API: for executing trades programmatically

3.2 Machine Learning Models

The inputs for the machine learning models are the historical cryptocurrency market data obtained from the API integration. The processes involve training the models using the training datasets, which consist of historical price data and relevant features. The outputs are the predicted future cryptocurrency prices. To predict future cryptocurrency prices, various machine learning techniques were employed, including:

3.2.1 Facebook Prophet: A time series forecasting model that captures seasonality and trend changes in the data.

3.2.2 Random Forest Regression: A supervised learning algorithm that builds an ensemble of decision trees to make accurate predictions.

3.2.3 Geometric Brownian Motion: A stochastic model that simulates asset prices over time using random variables and mathematical formulas.

3.3 Website Programming

The website programming component involves implementing user interaction through a website interface. The following technologies were utilized:

3.3.1 JavaScript: Used to add interactivity and dynamic elements to the website.

3.3.2 HTML: Used for structuring the content and layout of the website.

3.3.3 CSS: Employed for styling and customizing the website's appearance.

3.4 Application Design

The selected approach combines data retrieval, machine learning prediction, and website programming to create a comprehensive cryptocurrency trading prediction system. The integrated design includes the following components:

3.4.1 Data Retrieval: Historical cryptocurrency market data is fetched using the API integration, providing the necessary input for the prediction models.

3.4.2 Machine Learning Prediction: The selected machine learning techniques, including Facebook Prophet, random forest regression, and geometric Brownian motion, are applied to train the models and generate future price predictions.

3.4.3 Website Interface: The website programming using JavaScript, HTML, and CSS allows users to interact with the system, view predicted prices, and make informed trading decisions.

3.4.4 Workflow and Process Diagrams: (This part will be attached later on.)

3.4.5 Performance Evaluation: (This part will be attached later on.) Performance evaluation of the prediction models can be conducted using metrics such as R2 (coefficient of determination), MAE (mean absolute error), and MSE (mean squared error).

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[1] J. Bollinger. Using bollinger bands. *Stocks & Commodities*, 10(2):47--51, 1992.

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