TRIBHUWAN UNIVERSITY
INSTITUTE OF ENGINEERING
PULCHOWK CAMPUS
DEPARTMENT OF
ELECTRONICS AND COMPUTER ENGINEERING

A
MINOR PROJECT REPORT
ON
CRYPTO PROPHECY

A PROJECT REPORT SUBMITTED TO THE DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING IN FULFILLMENT OF THE REQUIREMENTS FOR THE PRACTICAL COURSE ON MINOR PROJECT [EX654]

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LETTER OF APPROVAL

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DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

The undersigned certify that they have read, and recommended to the Institute of Engineering for acceptance, a project report entitled **"Crypto Prophecy"** submitted by **Lincoln Basnet, Prakriti Timalsena, Rahul Shrestha and Sandesh Thapa** in partial fulfillment of the requirements for the Bachelor's degree in Electronics, Communication, And Information Engineering.

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ABSTRACT

Cryptocurrencies have gained significant attention in recent years due to their potential for high returns on investment. However, the volatility of these markets makes it challenging for investors to make informed decisions. In this project, we propose to use machine learning techniques to predict the future prices of cryptocurrencies. We will gather historical data on a variety of cryptocurrencies and use this data to train machine learning models. These models will be able to predict the future prices of the cryptocurrencies with a high degree of accuracy, which can be used by investors to make informed decisions about when to buy and sell. In addition, we will also investigate the use of machine learning to identify sentiments and trends in the cryptocurrency market that can be used for trading strategies. Overall, this project aims to demonstrate the power and potential of machine learning in the cryptocurrency market and provide a valuable tool for investors.

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1 INTRODUCTION

1.1 Background

At the moment, the growing popularity of cryptocurrencies is evident in every country. Many have embarked on success while a remarkable number of people have failed. Due to poor judgement and lack of knowledge, people are doomed. People who are observant or who simply with their experience and knowledge notice the fall or growth in cryptocurrency can actually achieve success. Before investing in crypto, it is necessary to look at the overall economic condition of the country, industry and business policies, etc. in advance. The country's economy, business practices, government policies, etc. can affect the return on investment. Investors need to be aware of the government's plans and strategies for economic growth and the impact it will have on the company's industry. Risk, return and analysis are the three major elements of cryptocurrency that every investor should understand before making a decision. Hence randomness can be quite cumbersome, tedious and is more prone to failure.

Our app is designed to help people who have the zest to invest in cryptocurrency but lack knowledge about it. CoinBase and Binance API is fed into the app which analyses ,calculates and compares the appropriate crypto to be finally displayed to the user who can put it on their watchlist. The algorithm shared by the app does tend to share its base somewhat with the AI but that's where the buck stops. The algorithm is vital to modern-day stock trading. Such has been the nature that different algorithm trading and investing modules have been developed over time. Algorithms analyse the happenings around cryptocurrency and identify any liquid opportunities to help make better and intelligent decisions when it comes to investing. It provides resources to make instant and accurate decisions all the time whilst reducing the possibility of human errors.

1.2 Motivation

There are several motivations for using machine learning for crypto trading. One of the main motivations is to improve the accuracy and efficiency of trading decisions. By analysing large amounts of data and making predictions about the price or movement of cryptocurrencies, machine learning algorithms can help traders make more informed decisions about when to buy or sell. Another motivation is to reduce the risk of human error in trading decisions. By automating the analysis of market trends and identifying buying and selling opportunities, machine learning can help reduce the risk of human error or bias in trading decisions. Additionally, the use of machine learning can enhance the transparency and accountability of the trading process by providing clear documentation of the models and algorithms used in the project. Furthermore, machine learning can help improve the overall profitability of a crypto trading portfolio by identifying profitable trades and minimising losses. Finally, machine learning can help traders stay up-to-date with market developments and make informed decisions about which cryptocurrencies to buy or sell as the market evolves.

1.3 Problem statement

Unlike traditional paper currency which can be printed as per market needs, Cryptocurrency has a limited supply. This is in order to ensure that printer inflation does not occur and the currency does not get devalued. However, due to the limited supply of cryptocurrency and with 80% cryptocurrencies already mined by mid-July 2018, it is anticipated that the remaining of the 21 million worth of cryptocurrencies will take a large amount of time to mine and in order to perform such large computations, relative infrastructure will also be required with the possibility of a low return in the future. With a general acceptance and price prediction of cryptocurrency since the last few years, other cryptocurrencies or digital currencies as we call them have also come to reality and become mainstream for price prediction. We will use Machine Learning and Technical Trend Indicator to predict the price hike in the cryptocurrency.

1.4 Objectives

The main objective of a project that uses machine learning for crypto trading is to develop a model or algorithm that can accurately predict the price or movement of cryptocurrencies based on historical data and market conditions. This can help improve the efficiency and accuracy of trading decisions by automating the analysis of market trends and identifying buying and selling opportunities. Additionally, the use of machine learning can reduce the risk of human error or bias in trading decisions, as the algorithms are able to analyse data and make predictions without the influence of emotions or subjective opinions. This can help improve the overall profitability of a crypto trading portfolio by identifying profitable trades and minimising losses. Finally, clear documentation of the machine learning models and algorithms used in the project can enhance the transparency and accountability of the trading process.

2 LITERATURE REVIEW

There has been a significant amount of research on the use of machine learning for predicting the prices of cryptocurrencies. One common approach is to use historical price data and various features such as trading volume and social media activity to train machine learning models. These models can then be used to make predictions about the future price of the cryptocurrency.

One study used a long short-term memory (LSTM) neural network to predict the prices of Bitcoin, Ethereum, and Litecoin, and found that the model was able to achieve high accuracy in its predictions (Deng, 2018). Another study applied various machine learning techniques including support vector machines, random forests, and gradient boosting to predict the prices of Bitcoin and found that the random forest model performed the best (Zhou, 2019).

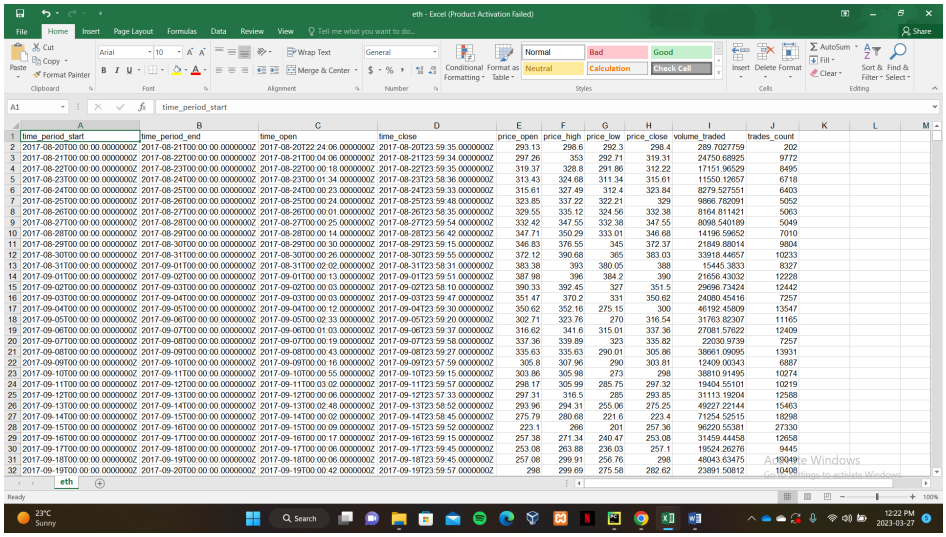
Other studies have focused on using machine learning to identify patterns and trends in the cryptocurrency market that can be used for trading strategies. For example, one study used a combination of natural language processing and machine learning to analyze social media activity and extract sentiments about various cryptocurrencies, and found that this information could be used to predict price movements (Gao, 2018).

Overall, the literature suggests that machine learning can be an effective tool for predicting the prices of cryptocurrencies and identifying patterns in the market. However, it is important to note that the cryptocurrency market is highly volatile and subject to various external factors, which may affect the accuracy of machine learning models.

2.1 Working Principle

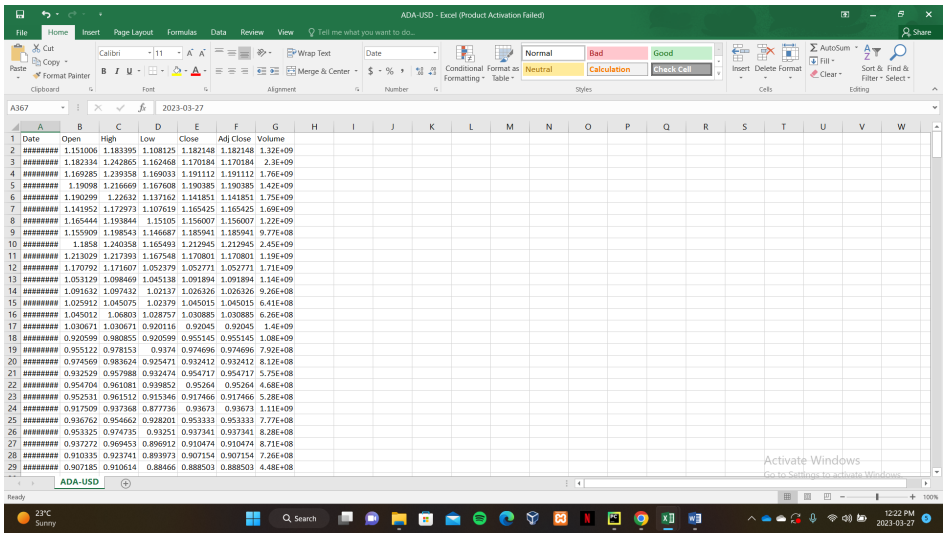
The working principle for a project using machine learning for cryptocurrency prediction can be broken down into several steps:

Data collection: The first step is to gather historical data on the cryptocurrency that you wish to predict. This data may include the price of the cryptocurrency, trading volume, and other features such as social media activity or news articles related to the cryptocurrency.



time_period_start	time_period_end	time_open	time_close	price_open	price_high	price_low	price_close	volume_traded	trades_count
2017-08-20T00:00:00.0000000Z	2017-08-21T00:00:00.0000000Z	2017-08-20T22:24:06.0000000Z	2017-08-20T23:59:35.0000000Z	293.13	298.6	292.3	298.4	289.7027759	202
2017-08-21T00:00:00.0000000Z	2017-08-22T00:00:00.0000000Z	2017-08-21T00:04:06.0000000Z	2017-08-21T23:59:34.0000000Z	297.26	353	292.71	319.31	24750.68925	9772
2017-08-22T00:00:00.0000000Z	2017-08-23T00:00:00.0000000Z	2017-08-22T00:00:18.0000000Z	2017-08-22T23:59:35.0000000Z	319.37	328.8	291.86	312.22	17151.96529	8495
2017-08-23T00:00:00.0000000Z	2017-08-24T00:00:00.0000000Z	2017-08-23T00:01:34.0000000Z	2017-08-23T23:58:36.0000000Z	313.43	324.68	311.34	315.61	11550.12657	6718
2017-08-24T00:00:00.0000000Z	2017-08-25T00:00:00.0000000Z	2017-08-24T00:00:23.0000000Z	2017-08-24T23:59:33.0000000Z	315.61	327.49	312.4	323.84	8279.527551	6403
2017-08-25T00:00:00.0000000Z	2017-08-26T00:00:00.0000000Z	2017-08-25T00:00:24.0000000Z	2017-08-25T23:59:48.0000000Z	323.85	337.22	322.21	329	9866.782091	5052
2017-08-26T00:00:00.0000000Z	2017-08-27T00:00:00.0000000Z	2017-08-26T00:00:01.0000000Z	2017-08-26T23:58:35.0000000Z	329.55	335.12	324.56	332.38	8164.811421	5063
2017-08-27T00:00:00.0000000Z	2017-08-28T00:00:00.0000000Z	2017-08-27T00:00:25.0000000Z	2017-08-27T23:59:54.0000000Z	332.42	347.55	332.38	347.55	8098.540189	5049
2017-08-28T00:00:00.0000000Z	2017-08-29T00:00:00.0000000Z	2017-08-28T00:00:14.0000000Z	2017-08-28T23:56:42.0000000Z	347.71	350.29	333.01	346.68	14196.59652	7010
2017-08-29T00:00:00.0000000Z	2017-08-30T00:00:00.0000000Z	2017-08-29T00:00:30.0000000Z	2017-08-29T23:59:15.0000000Z	346.83	376.55	345	372.37	21849.88014	9804
2017-08-30T00:00:00.0000000Z	2017-08-31T00:00:00.0000000Z	2017-08-30T00:00:26.0000000Z	2017-08-30T23:59:55.0000000Z	372.12	390.68	365	383.03	33918.44657	10233
2017-08-31T00:00:00.0000000Z	2017-09-01T00:00:00.0000000Z	2017-08-31T00:02:02.0000000Z	2017-08-31T23:58:31.0000000Z	383.38	393	380.05	388	15445.3833	8327
2017-09-01T00:00:00.0000000Z	2017-09-02T00:00:00.0000000Z	2017-09-01T00:00:13.0000000Z	2017-09-01T23:59:51.0000000Z	387.98	396	384.2	390	21656.43032	12228
2017-09-02T00:00:00.0000000Z	2017-09-03T00:00:00.0000000Z	2017-09-02T00:00:03.0000000Z	2017-09-02T23:58:10.0000000Z	390.33	392.45	327	351.5	29696.73424	12442
2017-09-03T00:00:00.0000000Z	2017-09-04T00:00:00.0000000Z	2017-09-03T00:00:03.0000000Z	2017-09-03T23:59:47.0000000Z	351.47	370.2	331	350.62	24080.45416	7257
2017-09-04T00:00:00.0000000Z	2017-09-05T00:00:00.0000000Z	2017-09-04T00:00:12.0000000Z	2017-09-04T23:59:30.0000000Z	350.62	352.16	275.15	300	46192.45809	13547
2017-09-05T00:00:00.0000000Z	2017-09-06T00:00:00.0000000Z	2017-09-05T00:02:33.0000000Z	2017-09-05T23:59:20.0000000Z	302.71	323.76	270	316.54	31763.82307	11165
2017-09-06T00:00:00.0000000Z	2017-09-07T00:00:00.0000000Z	2017-09-06T00:01:03.0000000Z	2017-09-06T23:59:37.0000000Z	316.62	341.6	315.01	337.36	27081.57622	12409
2017-09-07T00:00:00.0000000Z	2017-09-08T00:00:00.0000000Z	2017-09-07T00:00:19.0000000Z	2017-09-07T23:59:58.0000000Z	337.36	339.89	323	335.82	22030.9739	7257
2017-09-08T00:00:00.0000000Z	2017-09-09T00:00:00.0000000Z	2017-09-08T00:00:43.0000000Z	2017-09-08T23:59:27.0000000Z	335.63	335.63	290.01	305.86	38661.09095	13931
2017-09-09T00:00:00.0000000Z	2017-09-10T00:00:00.0000000Z	2017-09-09T00:00:16.0000000Z	2017-09-09T23:57:59.0000000Z	305.8	307.96	290	303.81	12409.00343	6887
2017-09-10T00:00:00.0000000Z	2017-09-11T00:00:00.0000000Z	2017-09-10T00:00:55.0000000Z	2017-09-10T23:59:15.0000000Z	303.86	305.98	273	298	38810.91495	10274
2017-09-11T00:00:00.0000000Z	2017-09-12T00:00:00.0000000Z	2017-09-11T00:03:02.0000000Z	2017-09-11T23:59:57.0000000Z	298.17	305.99	285.75	297.32	19404.55101	10219
2017-09-12T00:00:00.0000000Z	2017-09-13T00:00:00.0000000Z	2017-09-12T00:00:06.0000000Z	2017-09-12T23:57:33.0000000Z	297.31	316.5	285	293.85	31113.19204	12588
2017-09-13T00:00:00.0000000Z	2017-09-14T00:00:00.0000000Z	2017-09-13T00:02:48.0000000Z	2017-09-13T23:58:52.0000000Z	293.96	294.31	255.06	275.25	49227.22144	15463
2017-09-14T00:00:00.0000000Z	2017-09-15T00:00:00.0000000Z	2017-09-14T00:00:02.0000000Z	2017-09-14T23:58:45.0000000Z	275.79	280.68	221.6	223.4	71254.52515	18298
2017-09-15T00:00:00.0000000Z	2017-09-16T00:00:00.0000000Z	2017-09-15T00:00:09.0000000Z	2017-09-15T23:59:52.0000000Z	223.1	266	201	257.36	96220.55381	27330
2017-09-16T00:00:00.0000000Z	2017-09-17T00:00:00.0000000Z	2017-09-16T00:00:17.0000000Z	2017-09-16T23:59:15.0000000Z	257.38	271.34	240.47	253.08	31459.44458	12658
2017-09-17T00:00:00.0000000Z	2017-09-18T00:00:00.0000000Z	2017-09-17T00:00:06.0000000Z	2017-09-17T23:59:45.0000000Z	253.08	263.88	236.03	257.1	19524.26276	9445
2017-09-18T00:00:00.0000000Z	2017-09-19T00:00:00.0000000Z	2017-09-18T00:00:06.0000000Z	2017-09-18T23:59:45.0000000Z	257.08	299.91	256.76	298	48043.63475	19049
2017-09-19T00:00:00.0000000Z	2017-09-20T00:00:00.0000000Z	2017-09-19T00:00:42.0000000Z	2017-09-19T23:59:57.0000000Z	298	299.69	275.58	282.62	23891.50812	10408

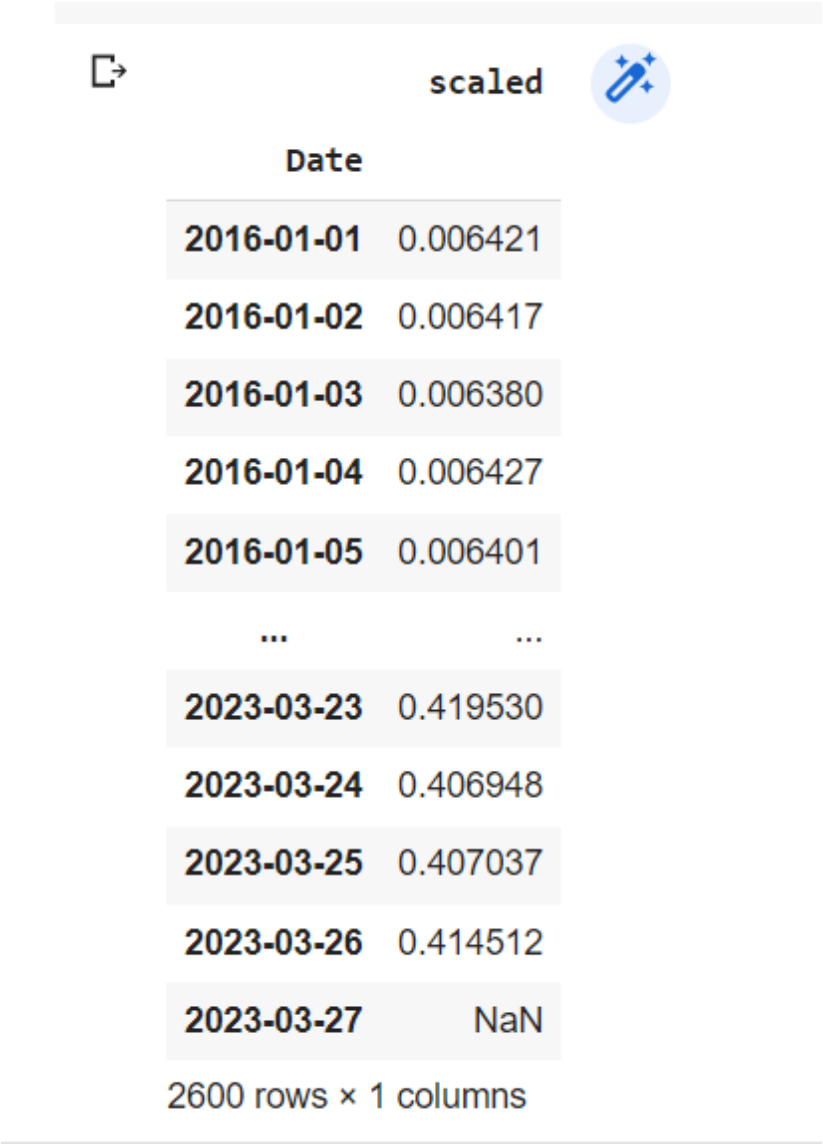
Figure 2.1: Ethereum Dataset



Date	Open	High	Low	Close	Adj Close	Volume
########	1.151006	1.183395	1.108125	1.182148	1.182148	1.32E+09
########	1.182334	1.242865	1.162468	1.170184	1.170184	2.3E+09
########	1.169285	1.239358	1.169033	1.191112	1.191112	1.76E+09
########	1.19098	1.216669	1.167608	1.190385	1.190385	1.42E+09
########	1.190299	1.22632	1.137162	1.141851	1.141851	1.75E+09
########	1.141952	1.172973	1.107619	1.165425	1.165425	1.69E+09
########	1.165444	1.193844	1.15105	1.156007	1.156007	1.22E+09
########	1.155909	1.198543	1.146687	1.185941	1.185941	9.77E+08
########	1.1858	1.240358	1.165493	1.212945	1.212945	2.45E+09
########	1.213029	1.217393	1.167548	1.170801	1.170801	1.19E+09
########	1.170792	1.171607	1.052379	1.052771	1.052771	1.71E+09
########	1.053129	1.098469	1.045138	1.091894	1.091894	1.14E+09
########	1.091632	1.097432	1.02137	1.026326	1.026326	9.26E+08
########	1.025912	1.045075	1.02379	1.045015	1.045015	6.41E+08
########	1.045012	1.06803	1.028757	1.030885	1.030885	6.26E+08
########	1.030671	1.030671	0.920116	0.92045	0.92045	1.4E+09
########	0.920599	0.980855	0.920599	0.955145	0.955145	1.08E+09
########	0.955122	0.978153	0.9374	0.974696	0.974696	7.92E+08
########	0.974569	0.983624	0.925471	0.932412	0.932412	8.12E+08
########	0.932529	0.957988	0.932474	0.954717	0.954717	5.75E+08
########	0.954704	0.961081	0.939852	0.95264	0.95264	4.68E+08
########	0.952531	0.961512	0.915346	0.917466	0.917466	5.28E+08
########	0.917509	0.937368	0.877736	0.93673	0.93673	1.11E+09
########	0.936762	0.954662	0.928201	0.953333	0.953333	7.77E+08
########	0.953325	0.974735	0.93251	0.937341	0.937341	8.28E+08
########	0.937272	0.969453	0.896912	0.910474	0.910474	8.71E+08
########	0.910335	0.923741	0.893973	0.907154	0.907154	7.26E+08
########	0.907185	0.910614	0.88466	0.888503	0.888503	4.48E+08

Figure 2.2: Cardano Dataset

Data preprocessing: The next step is to preprocess the data to prepare it for machine learning. This may involve cleaning the data, filling in missing values, and scaling the data to ensure that all features are on the same scale. We normalised the data by dividing the whole dataset by the maximum value in the dataset. The diagrams are illustrated below:



Date	scaled
2016-01-01	0.006421
2016-01-02	0.006417
2016-01-03	0.006380
2016-01-04	0.006427
2016-01-05	0.006401
...	...
2023-03-23	0.419530
2023-03-24	0.406948
2023-03-25	0.407037
2023-03-26	0.414512
2023-03-27	NaN

2600 rows × 1 columns

Figure 2.3: Bitcoin Dataset

To fit to the LSTM model, we need to convert the dataset into the LSTM understable matrix. For that, we fed seven-days data by forming this matrix illustrated below:

	Target Date	Target-7	Target-6	Target-5	Target-4	Target-3	Target-2	Target-1	Target
0	2016-01-09	0.006417	0.006380	0.006427	0.006401	0.006358	0.006764	0.006701	0.006644
1	2016-01-10	0.006380	0.006427	0.006401	0.006358	0.006764	0.006701	0.006644	0.006643
2	2016-01-11	0.006427	0.006401	0.006358	0.006764	0.006701	0.006644	0.006643	0.006631
3	2016-01-13	0.006401	0.006358	0.006764	0.006701	0.006644	0.006643	0.006631	0.006404
4	2016-01-14	0.006358	0.006764	0.006701	0.006644	0.006643	0.006631	0.006404	0.006358
...	...	...	...	...	...	...	...	...	...
2587	2023-03-23	0.370787	0.406548	0.399355	0.415252	0.411714	0.417295	0.404387	0.419530
2588	2023-03-24	0.406548	0.399355	0.415252	0.411714	0.417295	0.404387	0.419530	0.406948
2589	2023-03-25	0.399355	0.415252	0.411714	0.417295	0.404387	0.419530	0.406948	0.407037
2590	2023-03-26	0.415252	0.411714	0.417295	0.404387	0.419530	0.406948	0.407037	0.414512
2591	2023-03-27	0.411714	0.417295	0.404387	0.419530	0.406948	0.407037	0.414512	NaN

2592 rows × 9 columns

Figure 2.4: Seven Days Normalised Dataset

Model training: Once the data has been preprocessed, it can be used to train a machine learning model. This may involve selecting a suitable machine learning algorithm, such as a neural network or a decision tree, and using the preprocessed data to train the model.

Model evaluation: Once the model has been trained, it can be evaluated to determine its accuracy in predicting the future prices of the cryptocurrency. This may involve splitting the data into a training set and a test set, and using the test set to evaluate the model's performance.

Model deployment: If the model is found to be accurate, it can be deployed for use in predicting the future prices of the cryptocurrency. This may involve integrating the model into a trading platform or making it available to users through an API.

It is important to note that machine learning models may need to be fine-tuned and re-trained periodically to ensure that they continue to perform accurately. In addition, the accuracy of the model may be affected by external factors such as market conditions, which should be taken into account when using the model for prediction.

3 THEORETICAL BACKGROUND

3.1 LSTM

LSTM stands for Long Short-Term Memory, which is a type of recurrent neural network (RNN) architecture that is commonly used for sequence modeling tasks, such as natural language processing and time series prediction.

Unlike traditional RNNs, which can suffer from the vanishing gradient problem, LSTM networks have a more complex architecture that includes memory cells and gates. The memory cells allow the network to remember information over longer time frames, while the gates control the flow of information into and out of the cells.

LSTM networks have been shown to be highly effective for a variety of applications, including speech recognition, image captioning, and sentiment analysis. They are particularly well-suited for tasks that involve long-term dependencies and variable-length sequences. However, they can be computationally expensive and may require a large amount of training data to achieve good performance.

3.2 Random Forest Classifier

Random Forest Classifier is a machine learning algorithm that is used for both classification and regression tasks. It is an ensemble learning method that uses multiple decision trees to classify or predict outcomes.

Each decision tree in the random forest is trained on a random subset of the data, and the final result is obtained by aggregating the predictions of all the trees. This approach helps to reduce overfitting and improve the accuracy of the predictions.

Random Forest Classifier is widely used in various applications such as image classification, text classification, and fraud detection. It is known for its ability to handle large datasets with high dimensionality and noisy features. Moreover, it can provide feature importance measures that help to identify the most important features for the classification task.

However, random forest classifier can be computationally expensive and may require a large amount of memory to store the decision trees. It may also be prone to overfitting if the number of trees in the forest is too high.

3.3 XGBoost Classifier

XGBoost stands for eXtreme Gradient Boosting, which is a powerful machine learning algorithm that is used for classification, regression, and ranking tasks. It is an ensemble learning method that uses a collection of weak decision trees to make predictions.

XGBoost uses a gradient boosting framework, which means that it builds each tree in a way that corrects the errors made by the previous trees. This approach helps to improve the accuracy of the predictions and reduce overfitting.

XGBoost is known for its speed and scalability, as it can handle large datasets with high dimensionality and millions of examples. It also provides feature importance measures that help to identify the most important features for the classification or regression task.

XGBoost has been used successfully in various applications such as fraud detection, recommendation systems, and image classification. However, it can be prone to overfitting if the hyperparameters are not tuned properly, and it may require some expertise to fine-tune the model for optimal performance.

3.4 Flutter

Flutter is an open-source mobile application development framework created by Google. It is used for building high-performance, natively compiled applications for mobile, web, and desktop platforms using a single codebase.

Flutter uses the Dart programming language, which is fast and easy to learn. It also provides a rich set of customizable widgets and tools that help developers to create stunning user interfaces and animations.

Flutter's "hot reload" feature allows developers to see the changes they make to the code in real-time, which speeds up the development process and helps to catch errors quickly. Moreover, Flutter's reactive programming model makes it easy to handle user input, network requests, and state management.

Flutter is widely used by developers for creating cross-platform applications that work seamlessly on both iOS and Android devices. It also has a growing community of developers and contributors who provide support, tutorials, and plugins to enhance the framework's functionality.

Overall, Flutter is a powerful and flexible framework that allows developers to build beautiful and performant mobile applications for a wide range of platforms using a single codebase.

3.5 Firebase

Firebase is a mobile and web application development platform that was acquired by Google in 2014. It provides a suite of tools and services that enable developers to build high-quality applications quickly and easily.

Firebase offers a wide range of features, including real-time database, cloud storage, authentication, hosting, and analytics. It also provides a robust API that allows developers to integrate their applications with other services and platforms.

One of the key benefits of Firebase is its ease of use. It provides a simple and intuitive interface that allows developers to set up and configure their applications quickly. Firebase also offers a range of client libraries for popular programming languages, such as Java, Swift, and JavaScript, which makes it easy to integrate Firebase into existing codebases.

Firebase's real-time database is one of its most popular features, as it allows developers to build real-time applications that sync data across multiple devices and platforms. This can be particularly useful for building collaborative applications, such as chat apps and collaborative document editors.

Overall, Firebase is a powerful and flexible platform that provides developers with a range of tools and services for building high-quality applications quickly and easily. Its ease of use and real-time capabilities make it particularly popular for building real-time applications and collaborative tools.

4 Project Management

4.1 Feasibility Study

Conducting a feasibility analysis is an important step in assessing the potential success of a project. When conducting a feasibility analysis for a project using machine learning for crypto trading, it is important to consider factors such as the availability and quality of data, the availability of expertise and resources, market demand, competition, and cost. If sufficient data is not available, or the data is of poor quality, it may be difficult to develop effective machine learning models. Without the necessary expertise and resources, it may be difficult to successfully develop and implement machine learning models. It is also important to assess whether there is a market demand for the machine learning-based products or services being developed, and to consider the level of competition in the market. The cost of developing and implementing a machine learning-based solution should also be carefully considered. By conducting a thorough feasibility analysis, it is possible to assess the likelihood of success and determine whether a project using machine learning for crypto trading is worth pursuing.

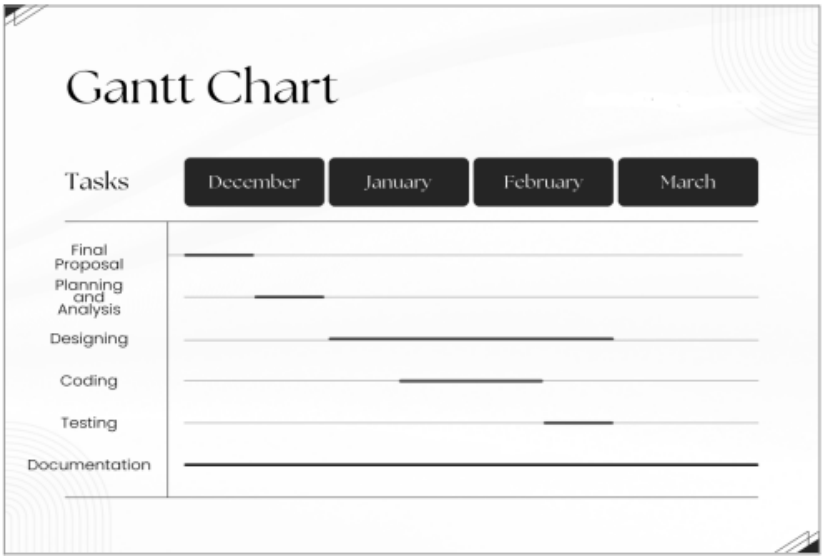


Figure 4.1: Gantt Chart

5 METHODOLOGY AND PROCEDURES

The app is developed in two different phases.The first one is the prototype phase and the second one is the final product . For the first phase, Adobe XD is used as the prototyping engine . For the final app flutter is used which is reliant on the programming language Dart. We followed the agile software development methodology for the overall development of this app from scratch.

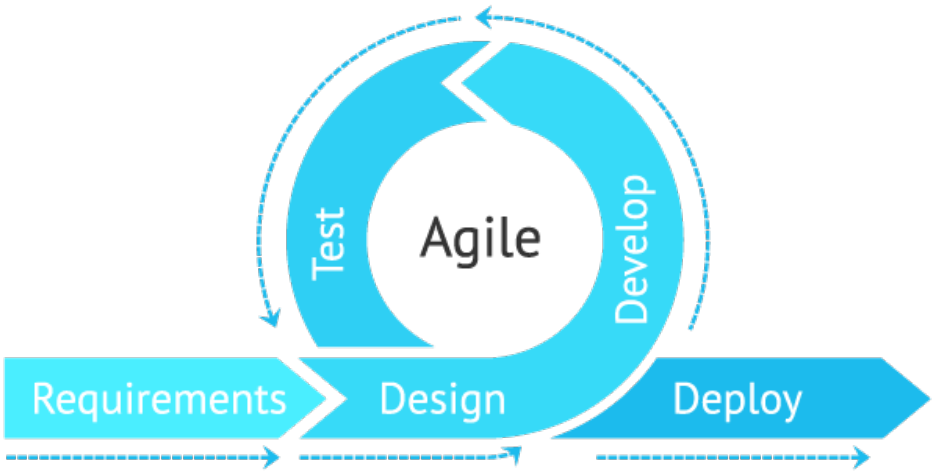


Figure 5.1: Agile Methodology

Agile methodology is a project management approach that emphasizes flexibility, collaboration, and iterative development. Instead of following a rigid plan, agile teams work in short sprints or iterations, focusing on delivering small pieces of functionality that can be tested and reviewed. Agile teams are typically composed of individuals with a variety of skills and backgrounds, and they prioritize tasks based on their business value or importance to the project. Communication and feedback are key components of agile methodology, with team members and stakeholders providing continuous feedback throughout the project. Agile ceremonies, such as daily stand-up meetings, sprint planning, and retrospectives, help keep the team focused and aligned. The adaptability of agile methodology allows teams to respond quickly to changing circumstances, and the emphasis on customer satisfaction ensures that the project stays focused on its goals. Overall, agile methodology is a customer-focused, flexible approach to project management that values collaboration and continuous improvement.

As the app development process is divided in two segments, we too divided our team for each of the processes. The design of the various parts of the system is explained along with system block diagram below:

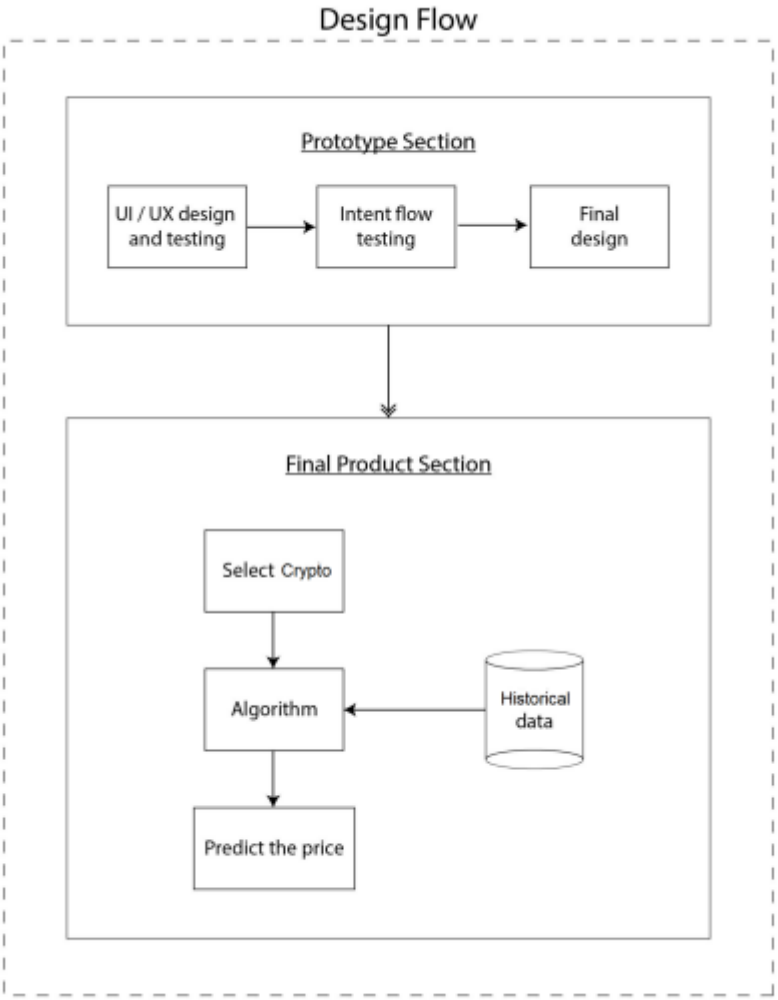


Figure 5.2: Design Flow of Crypto Prophecy

5.1 Use Case Diagram

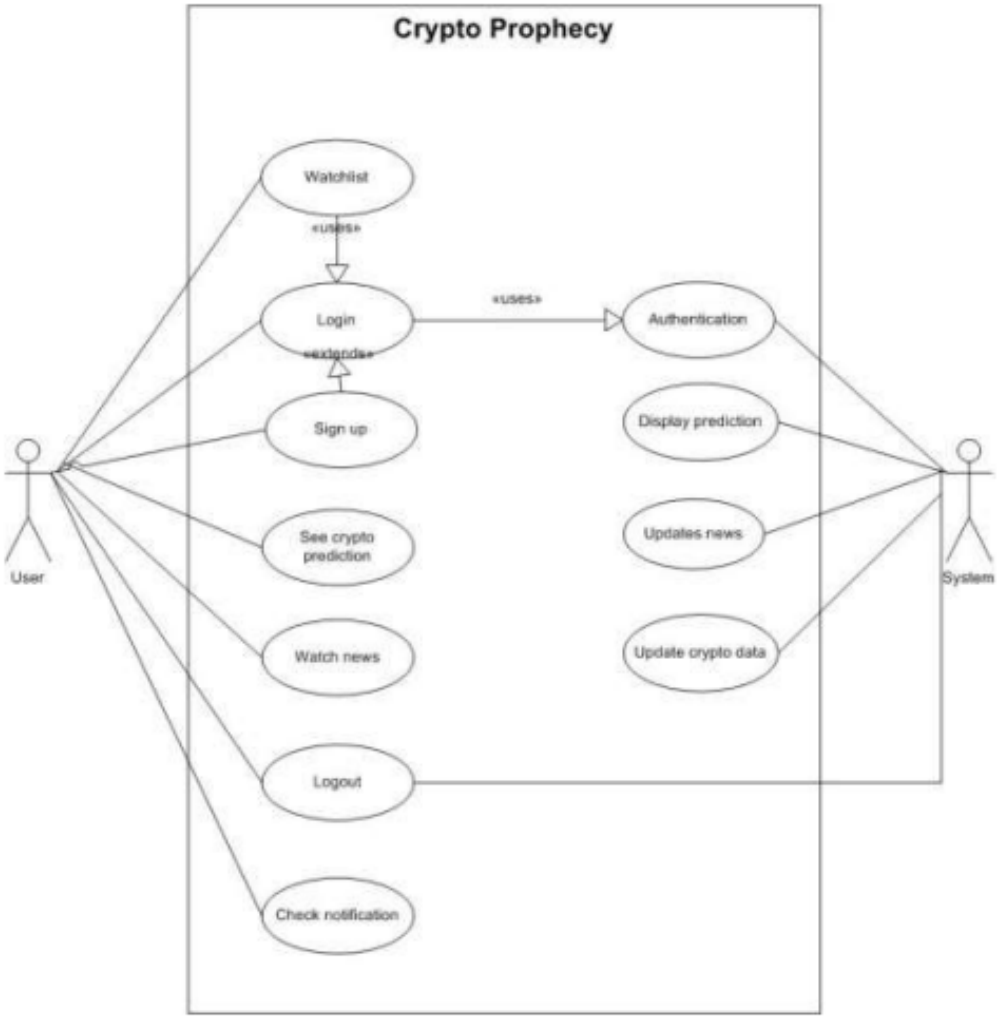


Figure 5.3: Use Case Diagram of Crypto Prophecy

Description:
Pre-condition: The user has downloaded and installed the app.
Actors: User, System
Flow of events: User opens the app. The landing page is the home screen where live data of cryptocurrencies are displayed. User then selects the watchlist to view preferred cryptocurrencies. The user needs to have an account to use this feature. If the user doesn't have an account, then the system redirects the user to sign up and verify them. Only after creating an account, the users are able to use the watchlist feature. The users can then check the prediction tab where they can get the predicted price of selected cryptocurrencies in graphical format. They are also facilitated with news tab feature where the system provides the news related to cryptocurrencies.

5.2 Activity Diagram

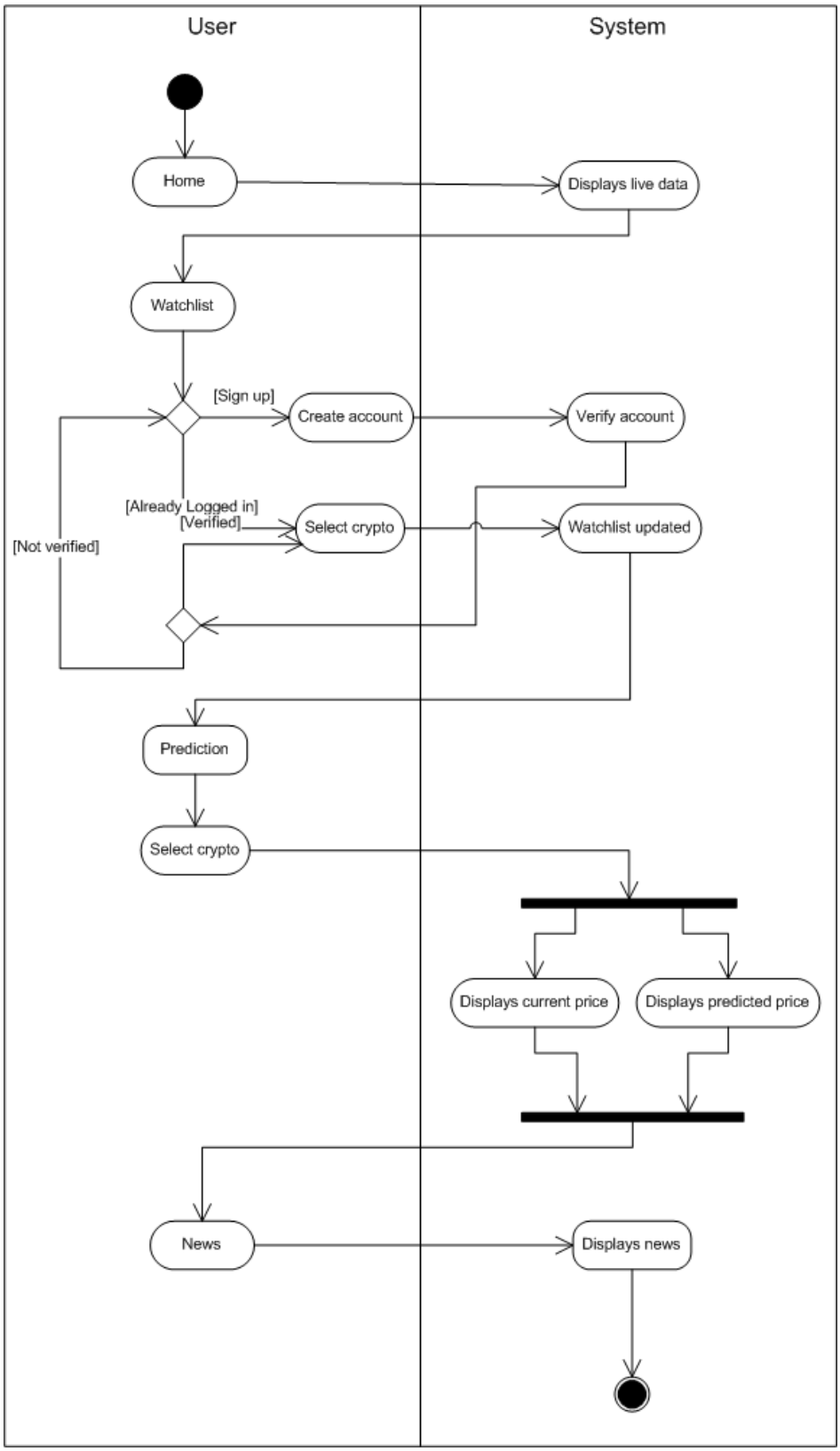


Figure 5.4: Activity Diagram of the Crypto Prophecy

Description: Initially when the user opens the app, then he directly enters the home region. The home region consists of live market data of crypto currency which refreshes every day. Then when the user wants to access our predictions, then he/she will click on the watchlist tab. When the watchlist is accessed then app will check if the user has logged in or not. If the user is logged in then he/she is allowed to proceed. If they are not logged in then they are directed to create an account section. After allowing the proceeding the user is allowed to click or select in any one of the crypto in the watchlist and see the predictions for the coming days. The app then displays the current price and predicted price. The user can also access different news related to crypto and read them.

5.3 Class Diagram

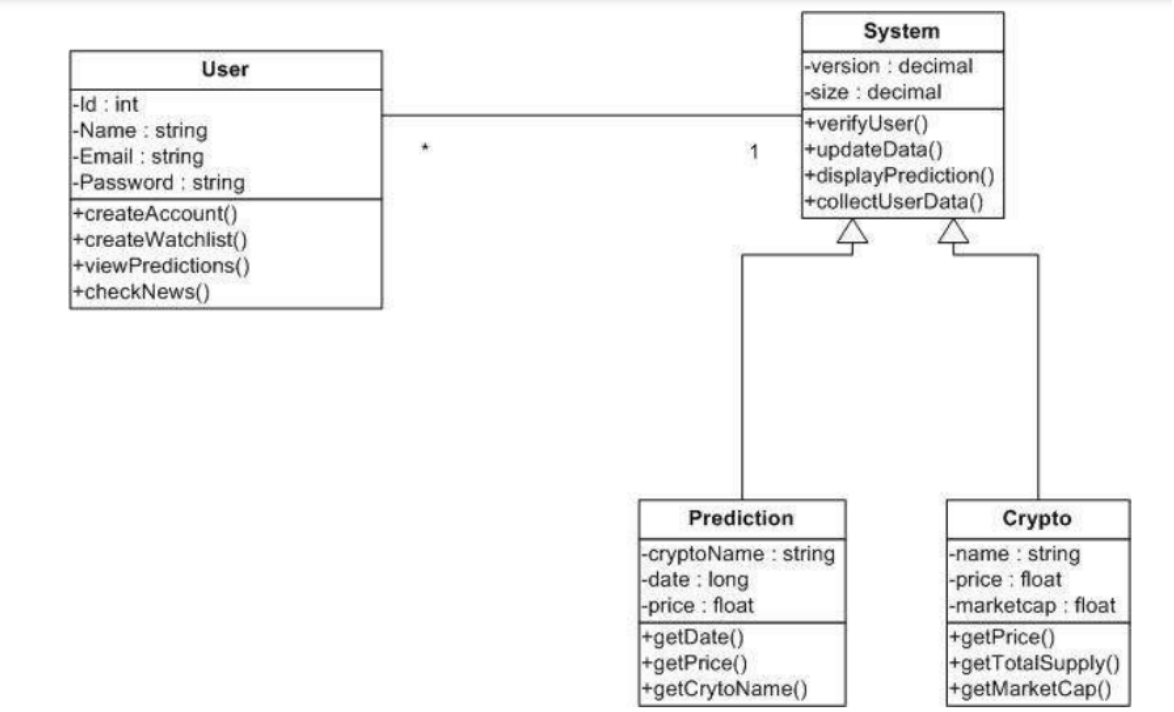


Figure 5.5: Class Diagram of Crypto Prophecy

Description: In this class diagram, we can see that the user has different attributes and functional aspects. The user can createaccount(), createwatchist() etc. The user can access the system and the system has a lot of functions and little attributes. Prediction and crypto class are assosciated to the system class and they have a lot of functions as well. These two classes are the core of the system as they are mainstay in this project. They have the model and the functions required to predict the crypto price and finally display in the system.

5.4 Sequence Diagram

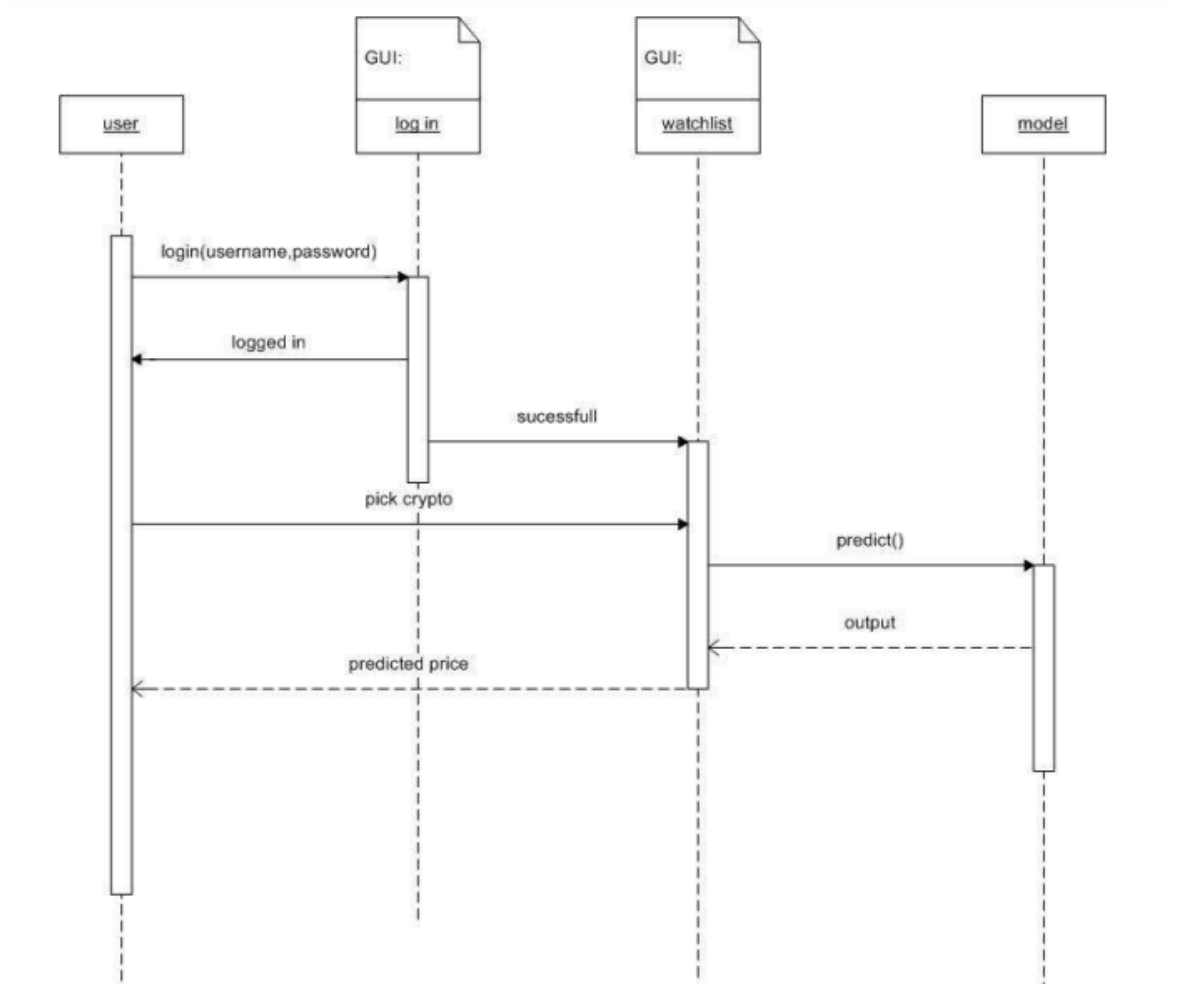


Figure 5.6: Sequence diagram of Crypto Prophecy

Description: This is the sequence diagram of the event that the user tries to access the watch list. When the user enters the username and password then login successful is displayed and the user is guided to the watch list section. Then the user can select the crypto which initiates the predict function that contains the machine learning model. From that model the output is taken. And then finally the predicted price is displayed to the user.

6 HARDWARE AND SOFTWARE REQUIREMENTS

To develop a crypto price prediction app using ML and Flutter, one will need both hardware and software requirements. Here are some possible hardware and software requirements:

6.1 Hardware Requirements

1. A computer with an average-powered CPU and GPU (such as an Intel Core i5 or AMD Ryzen processor and an NVIDIA or AMD graphics card)
2. Sufficient RAM (at least GB) and storage space (at least 128 GB)
3. A stable internet connection for data collection and model training
4. Mobile devices for testing the app on different platforms (iOS and Android)

6.2 Software Requirements

1. An Integrated Development Environment (IDE) for coding the app, such as Android Studio or Visual Studio Code.
2. Python programming language and its related libraries such as NumPy, Pandas, Scikit-Learn, TensorFlow, Keras, etc. for implementing the machine learning model
3. Flutter SDK for creating the user interface and building the app
4. Firebase for user authentication, database management, and cloud messaging services
5. A cryptocurrency API (CoinGecko, CoinMarketCap, etc.) for fetching real-time price data
6. Git for version control and collaboration with team members

7 RESULT AND DISCUSSION

The result of the our crypto prediction app shows that the machine learning models used in the app are able to predict the future price trends of various cryptocurrencies with a certain level of accuracy. The app has been trained on historical data and has provided users with valuable insights into the cryptocurrency market. It has also allowed users to track their investments and monitor the performance of their portfolios in real-time. As the figures of the training processes and the results of the completion process are about to be tallied down, the completed crypto prediction app is expected to provide users with a comprehensive analysis of the cryptocurrency market and help them make informed investment decisions based on data-driven insights. Overall, the app has the potential to revolutionize the way investors approach the cryptocurrency market and make more informed decisions.

7.1 Model Training Process

With continuous evaluation and testing of different strategies and testing, we have been finally able to decide on which model to use in our app. This app is based on day to day prediction and not long term decision making. Hence our model is very dependent upon the sentiment of the market and historical data. We have made our model to predict one day in the future with the help of data three days into the past. We have tried different approaches to solving that problem as well. We tried using different technical indicators like RSI, EMA etc and the result was satisfactory too.

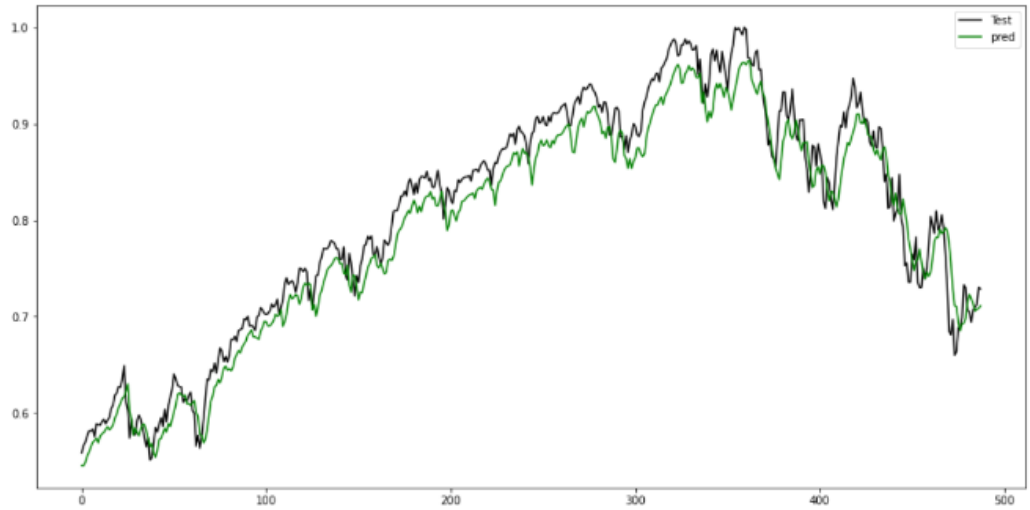


Figure 7.1: Indicators Test and Prediction

Here we can see that the model is able to predict the result with great accuracy. Then we tried to train and test the crypto utilising the past seven days data to predict the next day which is the model we will be using in this app. Here is the model performance on three cryptos and we illustrated the chart of three cryptos only.

Figure 7.2: BTC Training

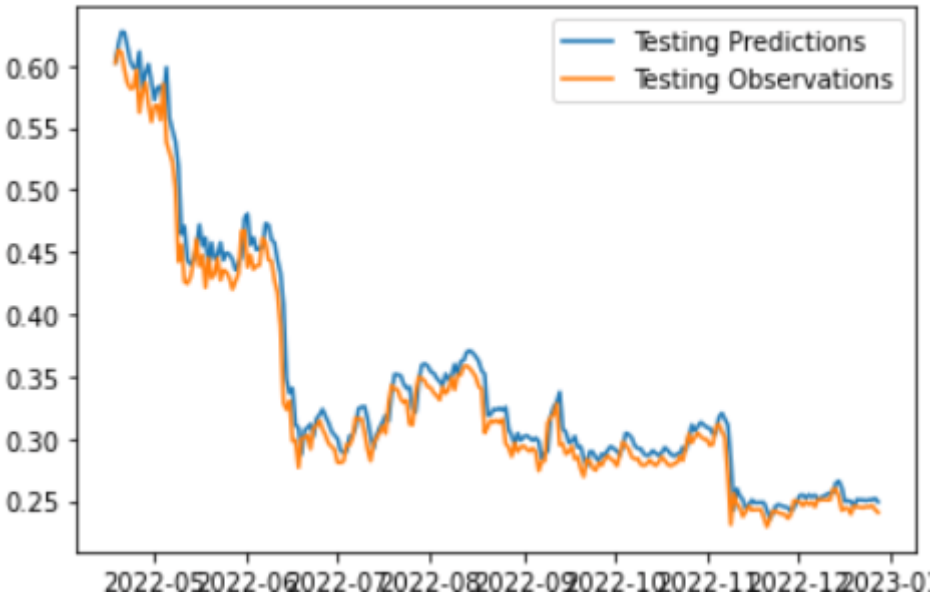


Figure 7.3: BTC Testing

After doing the test and train of the data of bitcoin crypto, we validated the price action of the crypto in line chart which exhibited quite satisfactory result that is illustrated below:

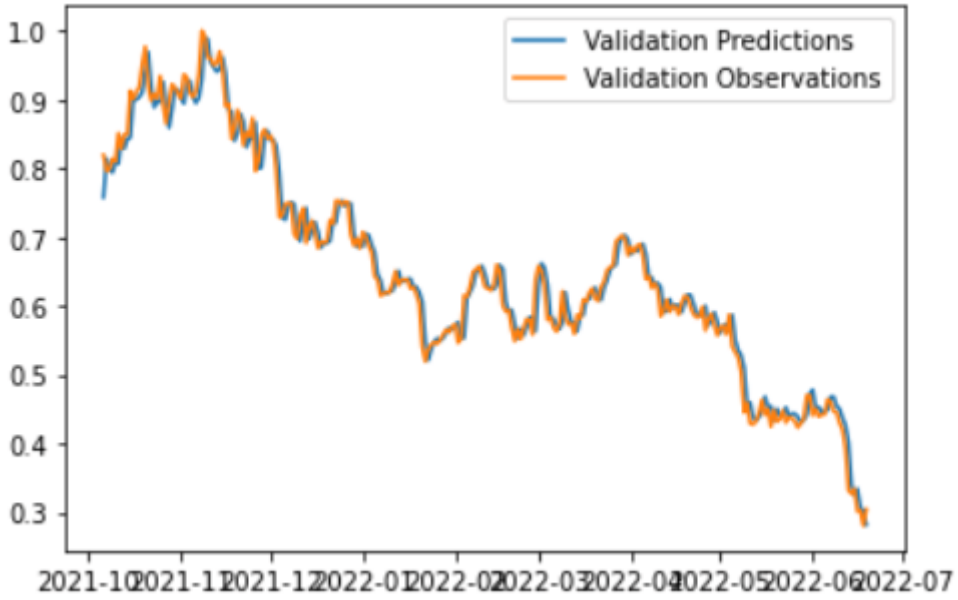


Figure 7.4: BTC Validation

These were the diagrams of the crypto "Bitcoin" where we saw the test, train and validation been done in this crypto using the historical prices. The results we obtained had really impressive accuracy. Following are the results of the same processes done on the crypto "Solano" where we trained the crypto on learning rate at 0.01 and thus, the result we obtained had better accuracy than the one we got in previous learning rate.

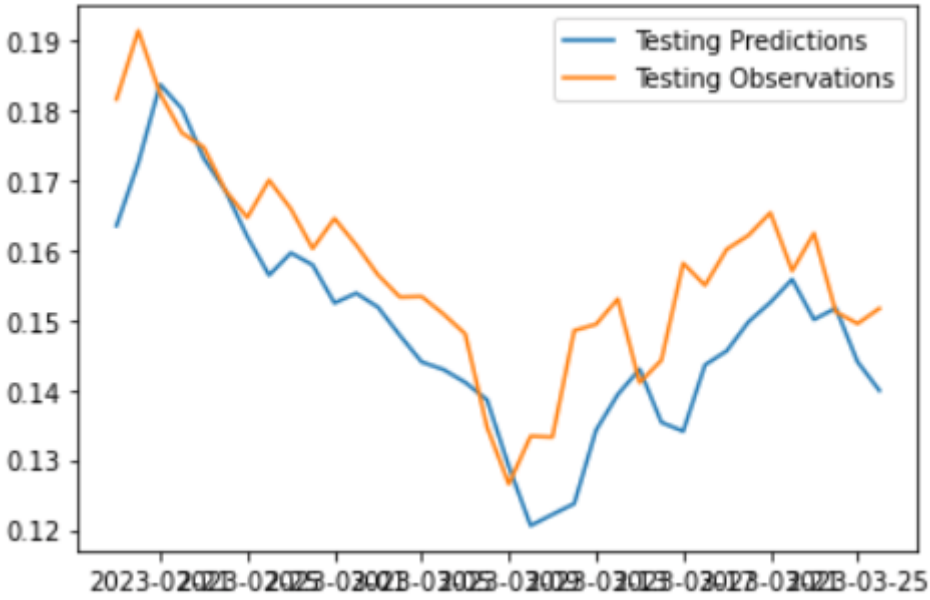


Figure 7.5: Solana Testing

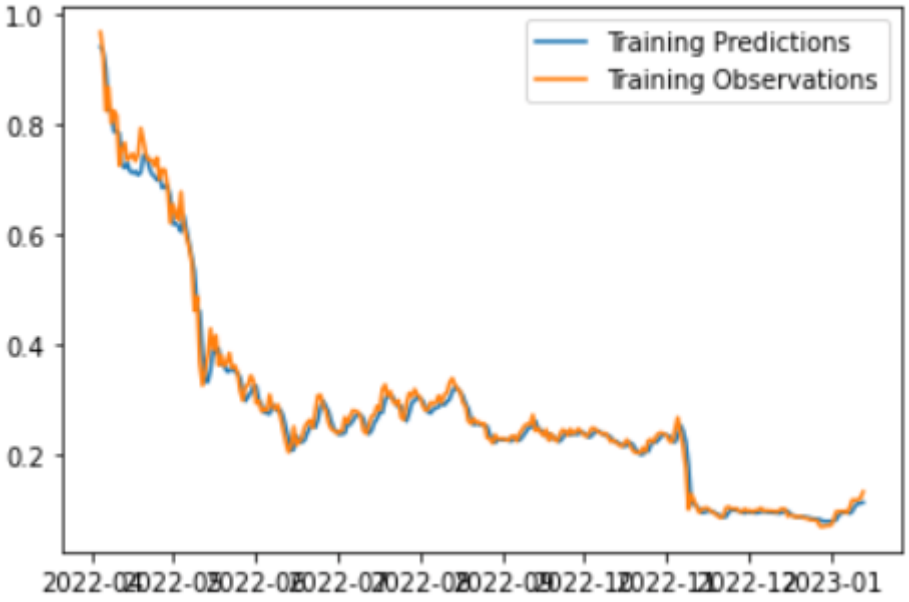


Figure 7.6: Solana Training

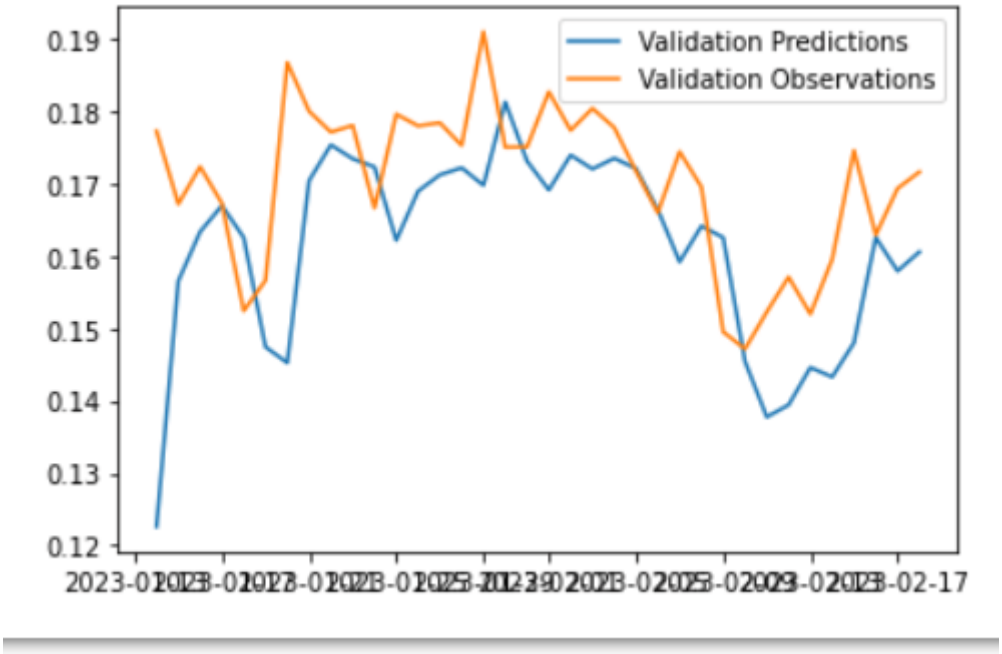


Figure 7.7: Solana Validation

After getting impressive result in the Solano and Bitcoin, we then moved towards the Ethereum crypto where we again trained the crypto at learning rate 0.01. The learning rate seemed to improve the result of all cryptos we have used. The results of the Ethereum crpto is illustrated below:

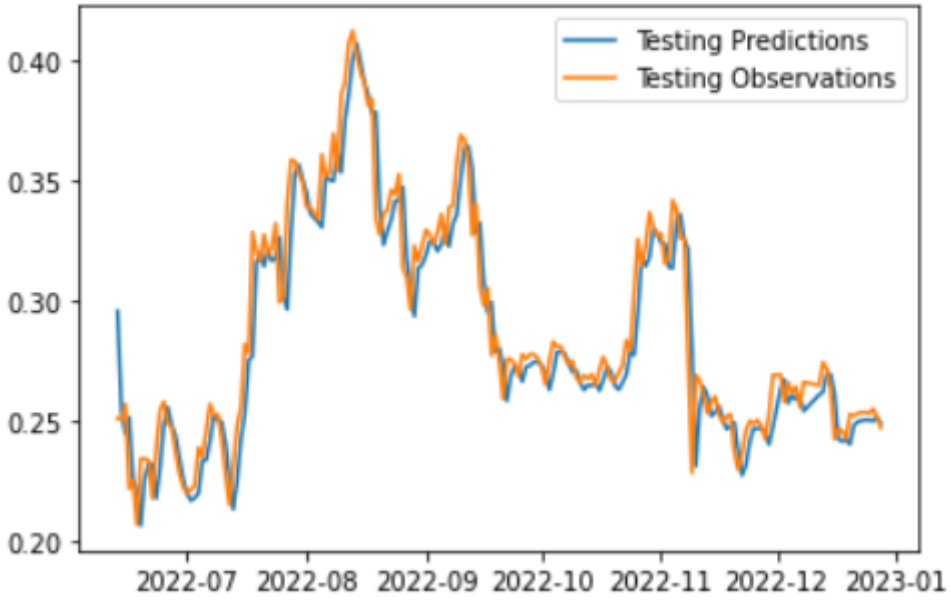


Figure 7.8: Ethereum Testing

Figure 7.9: Ethereum Training

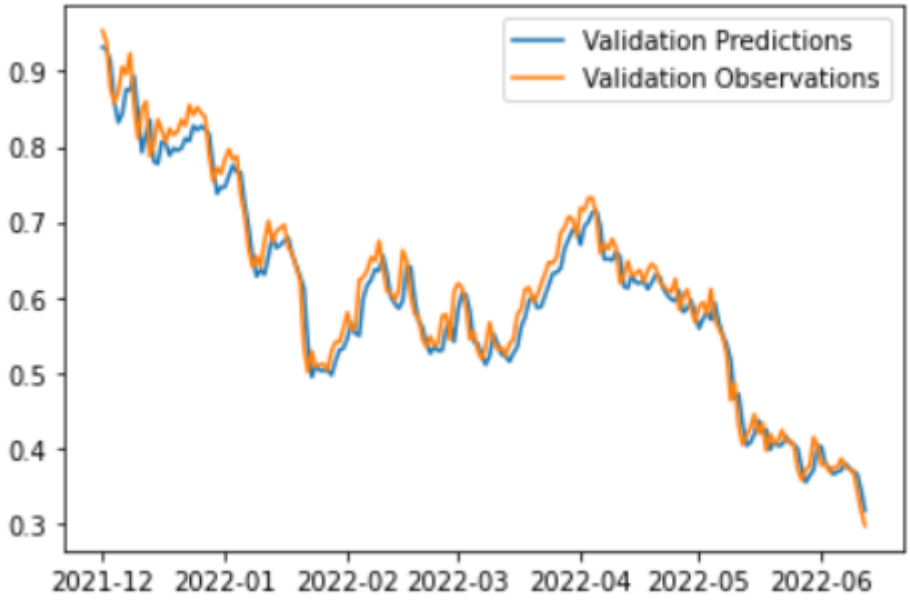


Figure 7.10: Ethereum Validation

We also calculated the loss function of the crypto by iterating it in epoch of around 100, where the error is seemed to have reduced drastically. Also with the gradual increament in epoch from 0 to 100, the mean absolute error has also decreased in a huge amount. The overall explanation is displayed below:

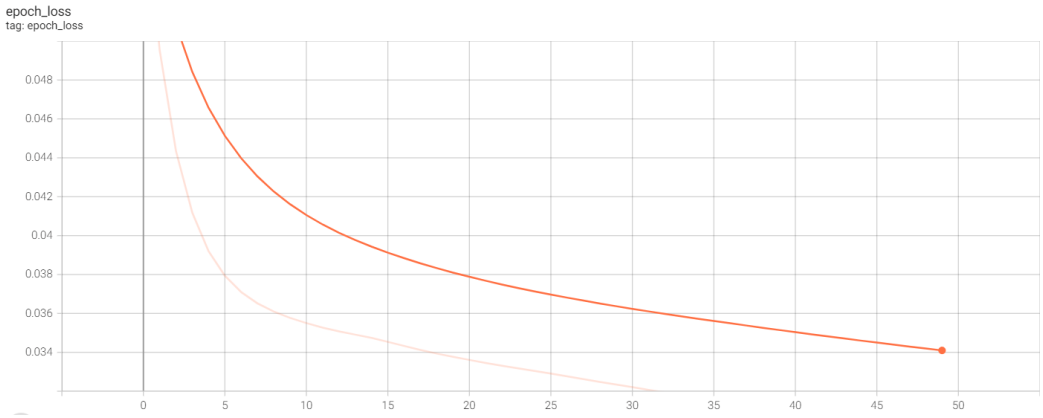


Figure 7.11: Loss Function

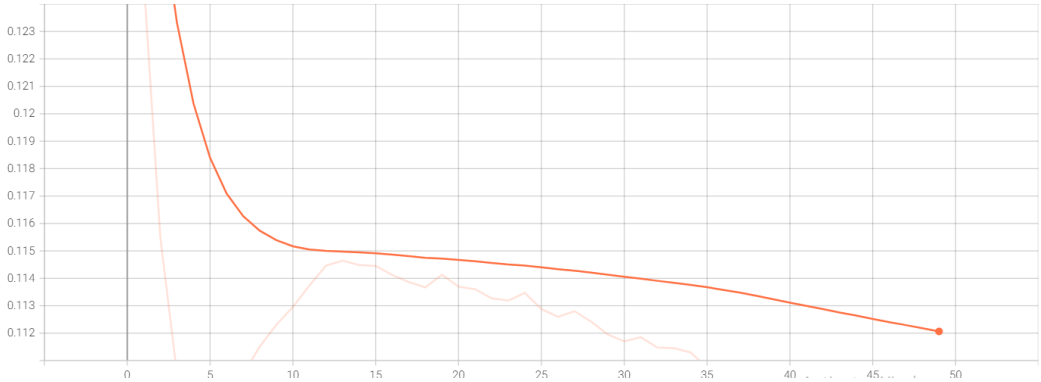


Figure 7.12: Epoch Mean Absolute Error

Hence the prediction model of the app is complete. And we also added an extra feature called sentiment analysis which up to now has relatively less accuracy and is still in the development phase. Here are the results of our sentiment analyzer which is still a work in progress.

	target	predictions
2017-09-16	0	1
2017-09-17	1	1
2017-09-18	0	0
2017-09-19	0	1
2017-09-20	0	1
...	...	...
2023-03-06	0	0
2023-03-07	0	0
2023-03-08	0	1
2023-03-09	0	1
2023-03-10	0	1

2002 rows × 2 columns

Figure 7.13: Sentiment Analysis Training of BTC

The first and the leftmost column of the table represents the trade date of bitcoin followed by target and prediction column. The target column is the actual movement of the crypto for that day and the prediction column is our prediction of its price for the same day where '0' represents the trend is downward and '1' represents upward movement.

7.2 App Overview

First when the app opens, the landing page is the login page. This page contains two text fiewl email and password. if the user is preauthorized on our firebase database. He will be logged in else he will be directred to register page.

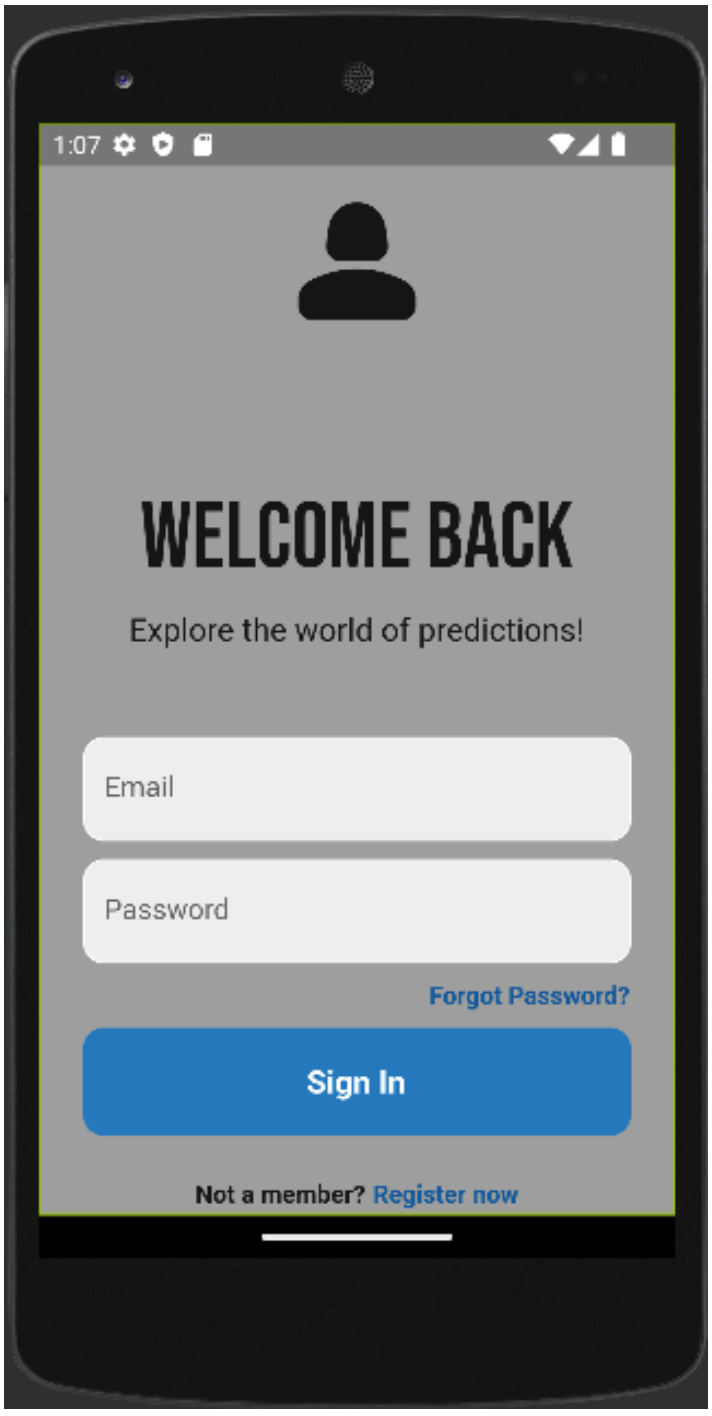


Figure 7.14: Login page of the app

Then after logging in the app, the page appears is the homepage which is illustrated as:

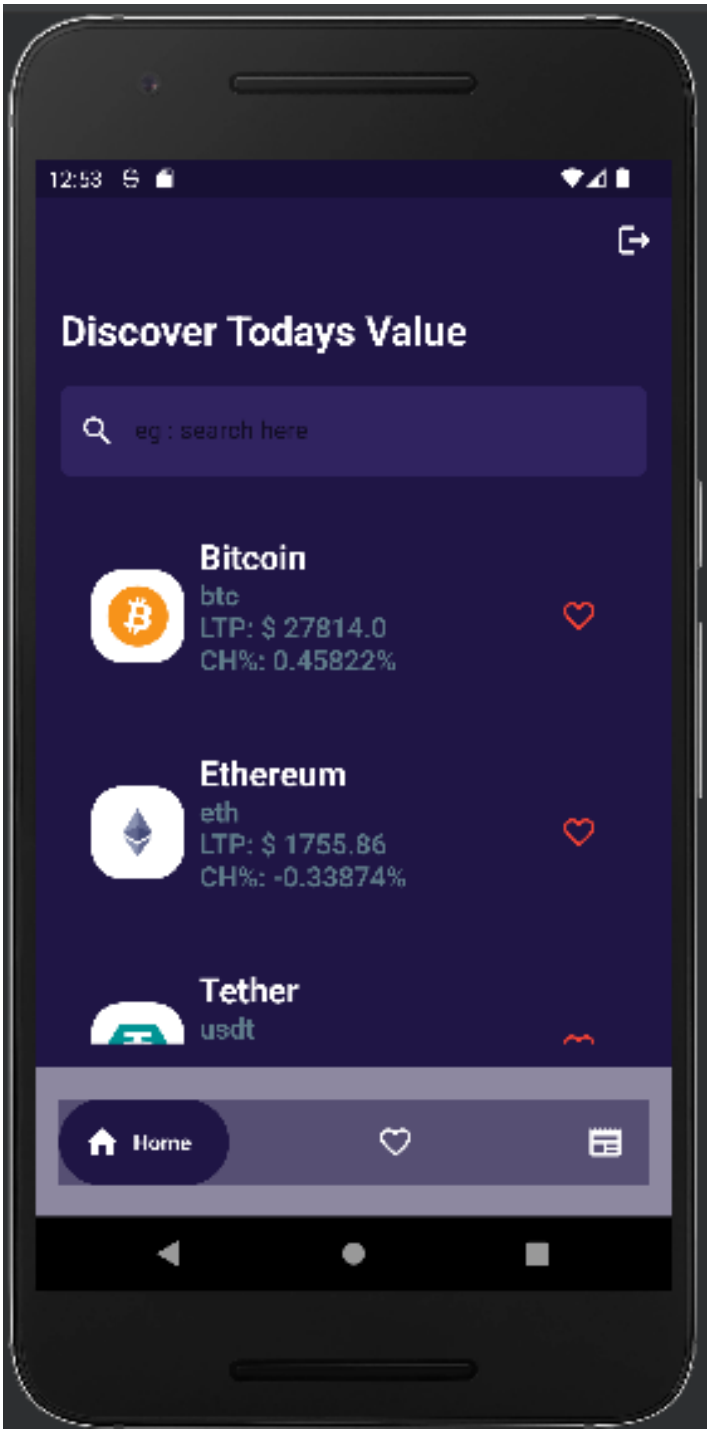


Figure 7.15: Homepage of the app

Then for accessing real-time news, the latest cryptonews ,newsapi is used which is common api for all types of news. However, we filtered it specifically to generate crypto news for our users.

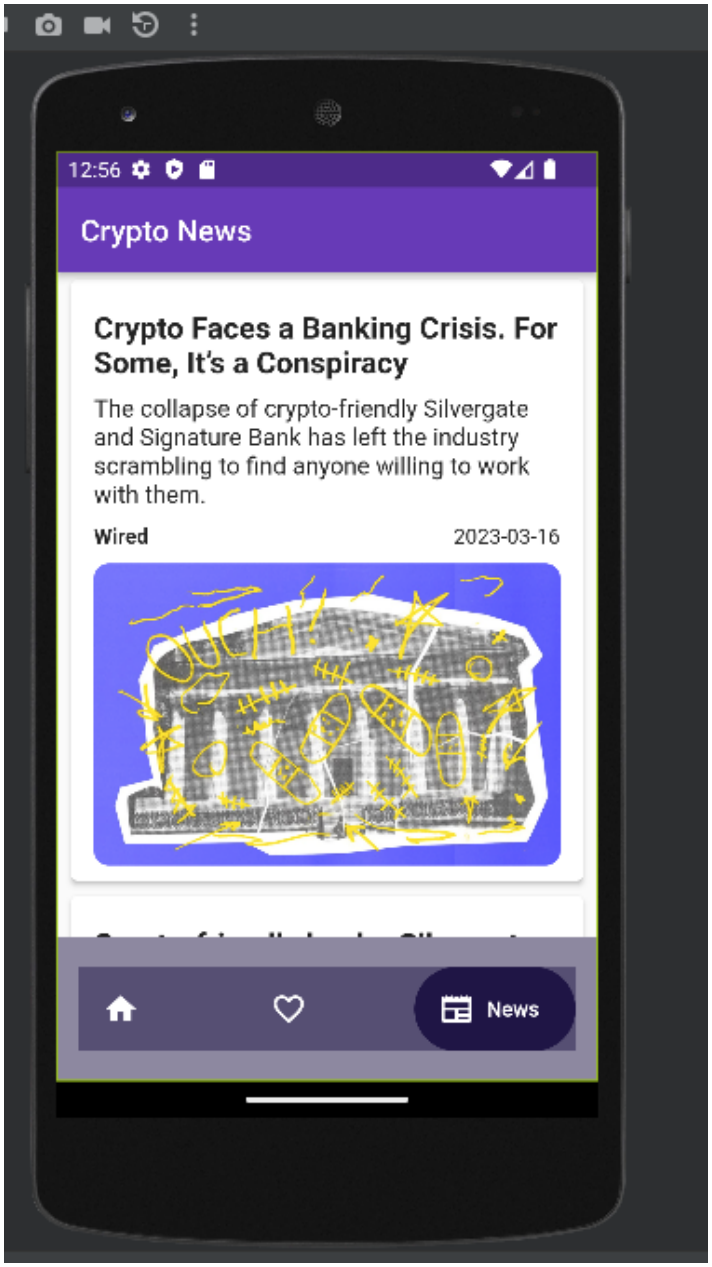


Figure 7.16: Api for the news

Our user have the flexibility of adding their favourite crypto listed out in the home-page by simply clicking the favourite icon.

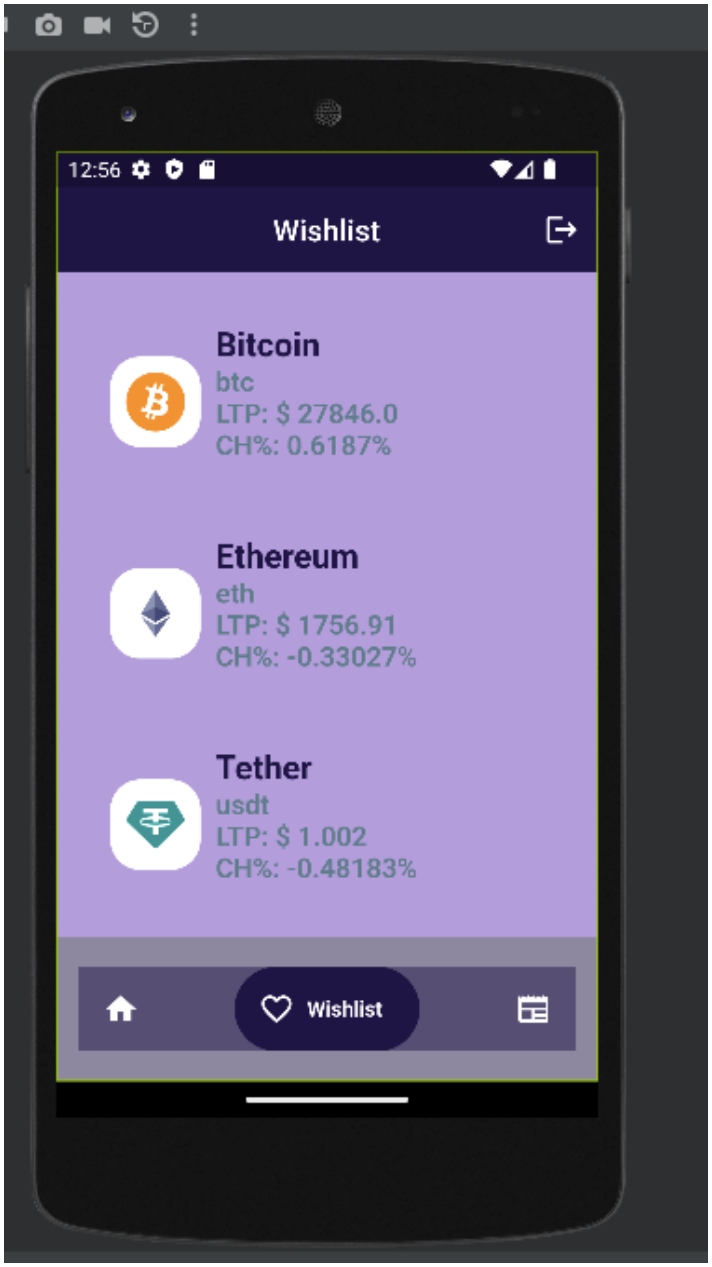


Figure 7.17: Wishlist as per user

And the final and main part where the predicted and sentimental value of cryptos is displayed in our app which is as:

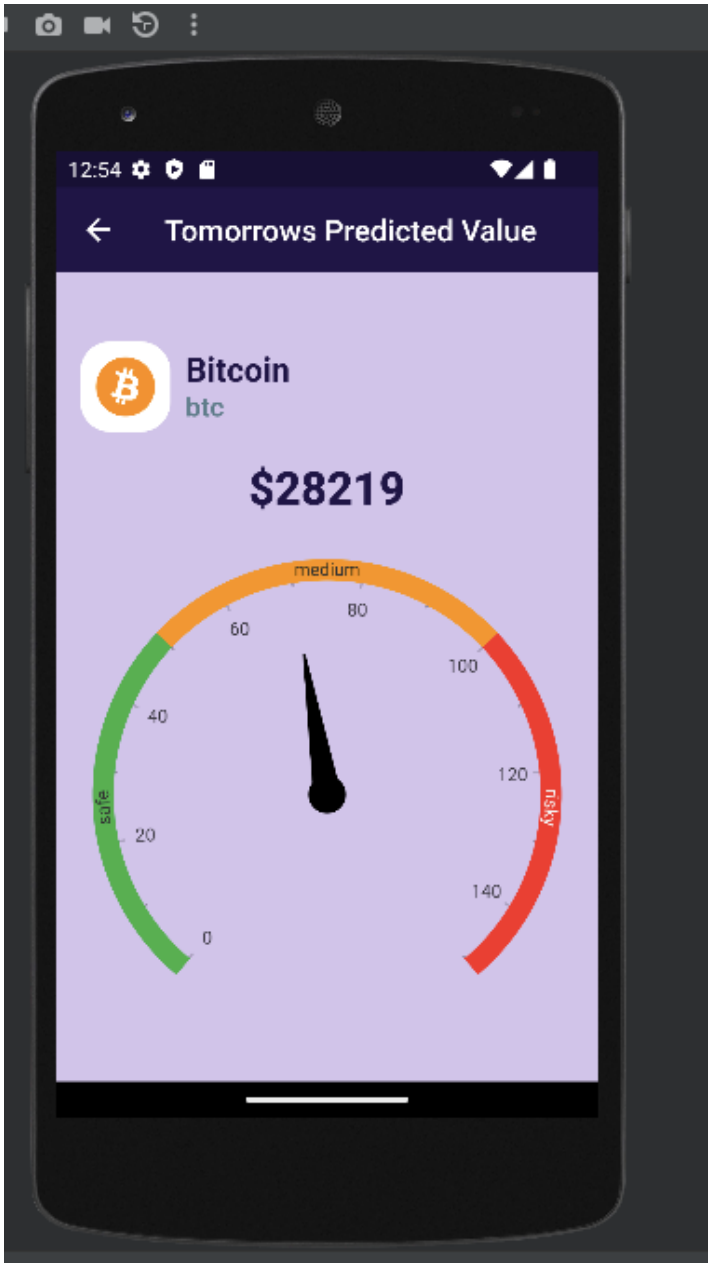


Figure 7.18: Predicted value and Sentiment of Bitcoin

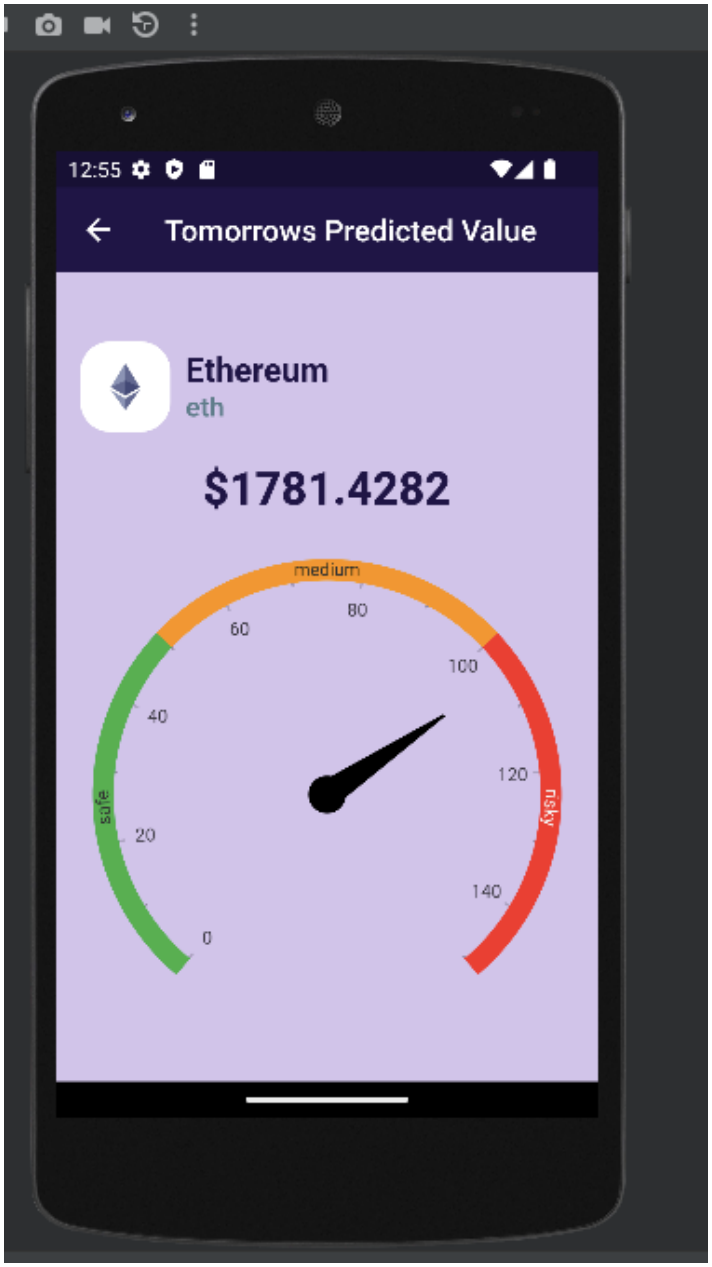


Figure 7.19: Predicted value and Sentiment of Ethereum

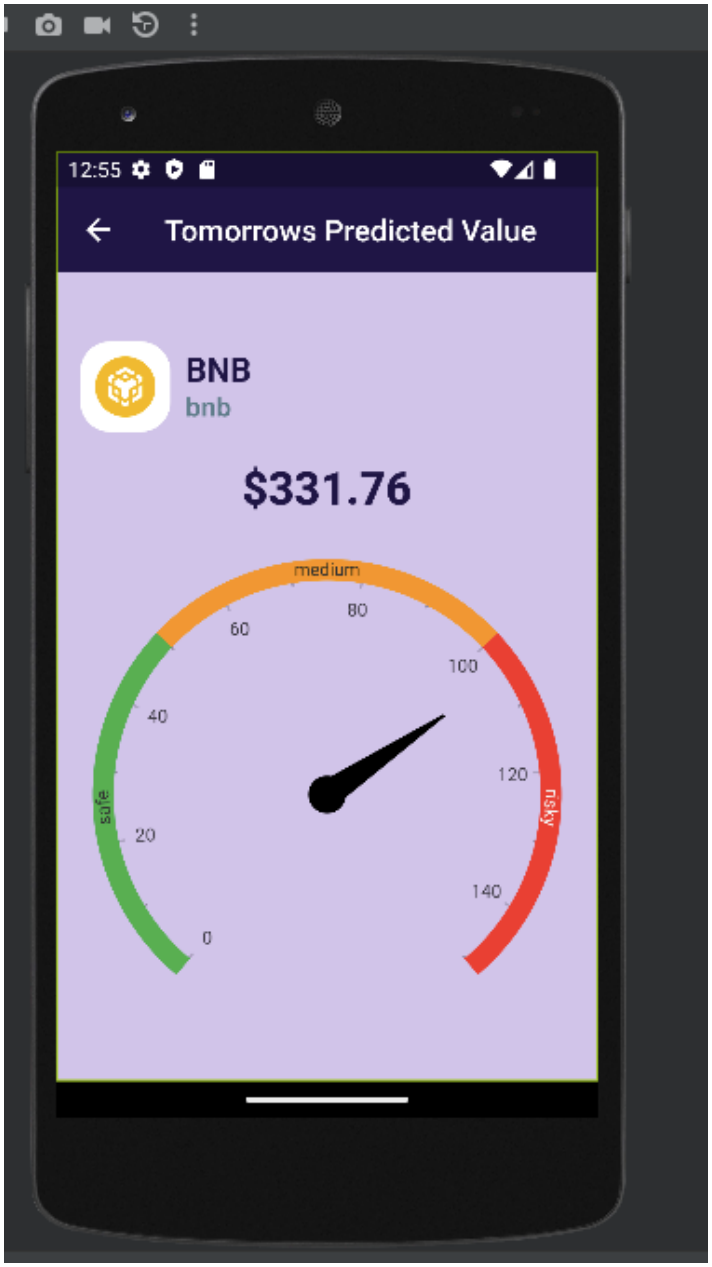


Figure 7.20: Predicted value and Sentiment of BNB

7.3 Real World Application

We not only developed the app but also performed trade based on the result and prediction provided by our app. The overall buy-sell is shown below:

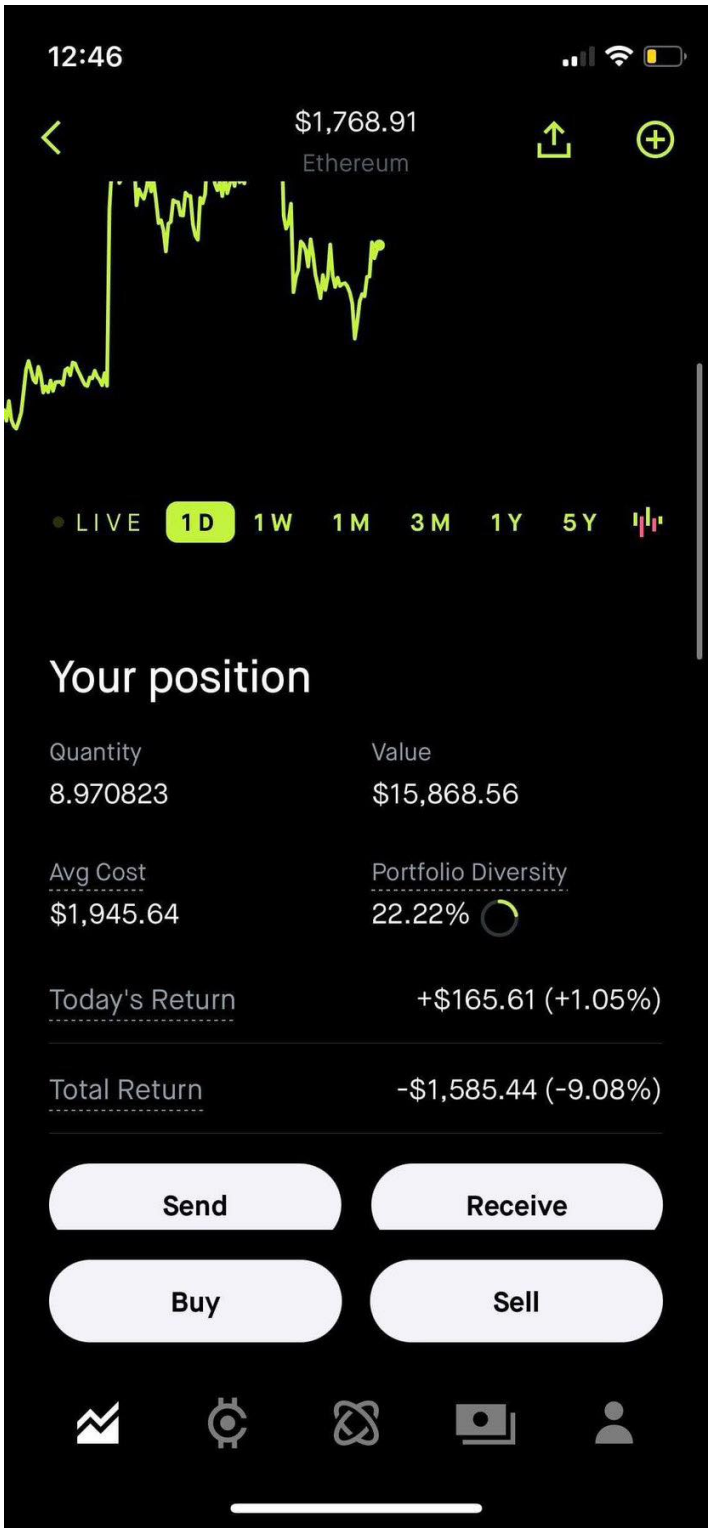


Figure 7.21: Our position in BTC

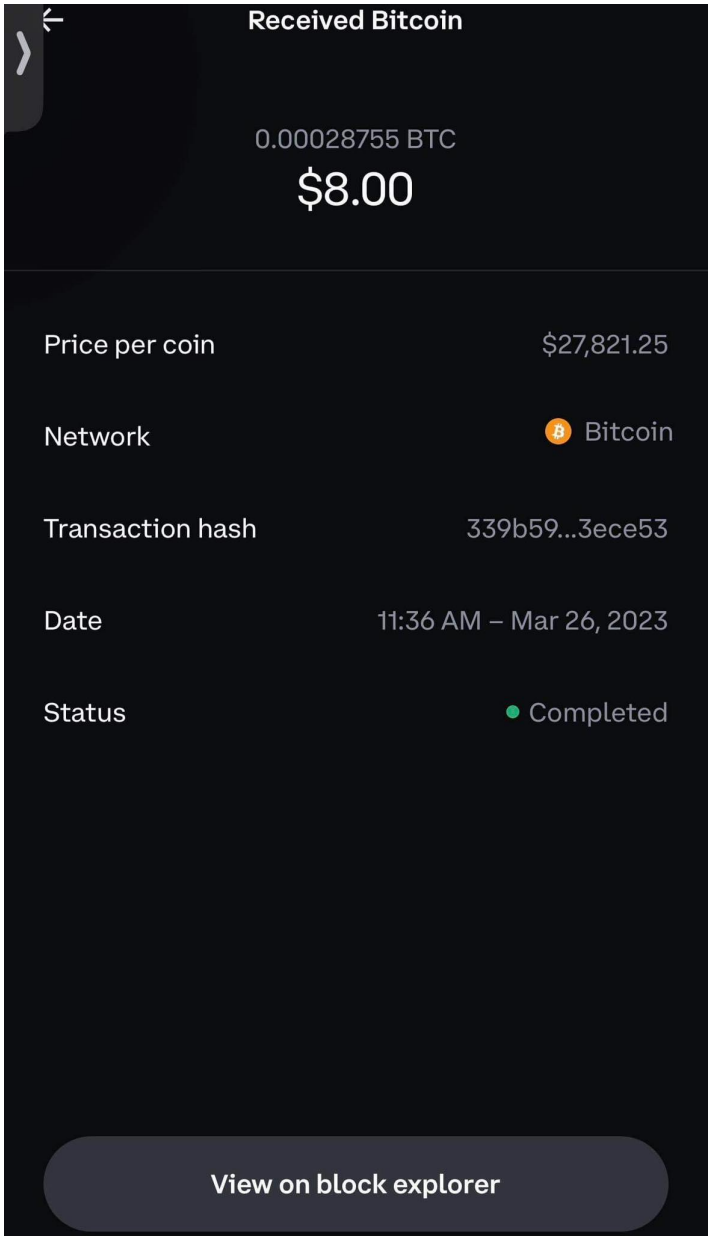


Figure 7.22: BTC Buy

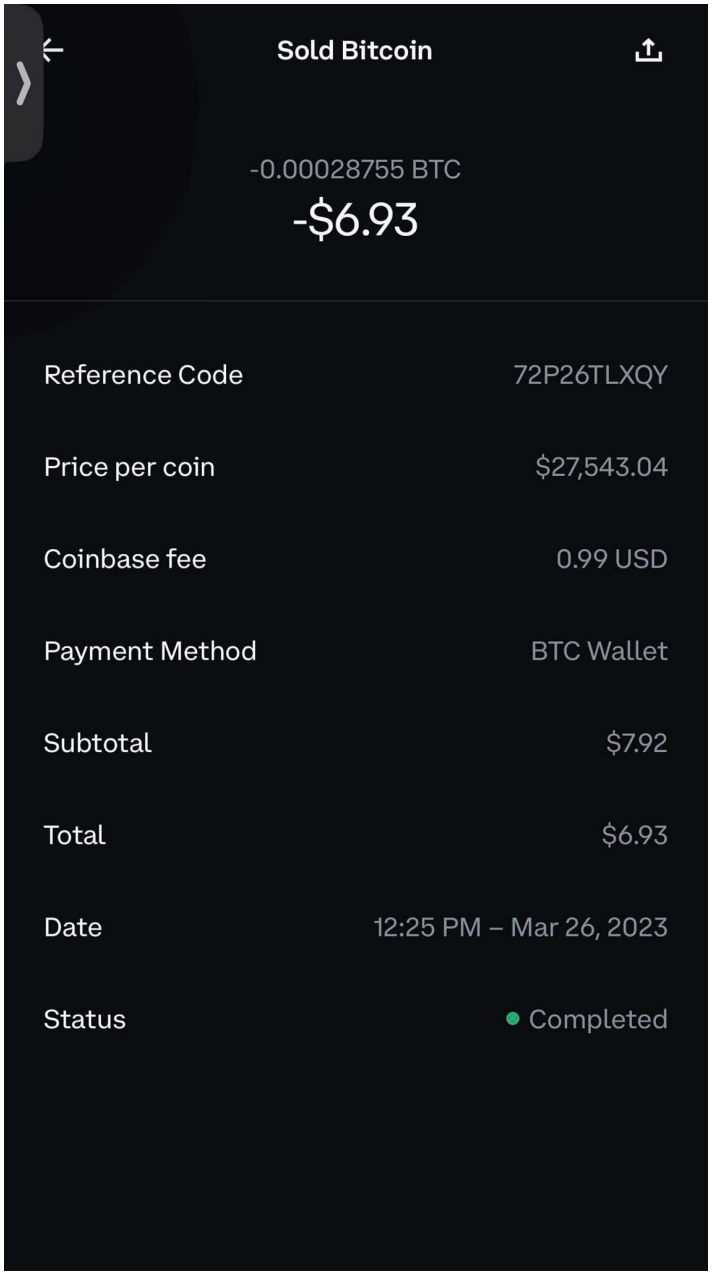


Figure 7.23: BTC Sell

8 CONCLUSION

In conclusion, the machine learning project for predicting the price of cryptocurrency has shown promising results. By utilizing various techniques such as data preprocessing, feature selection, model selection, and hyperparameter tuning, we have been able to build a model that can predict cryptocurrency prices with reasonable accuracy.

However, it's important to note that cryptocurrency markets are highly volatile and unpredictable. While machine learning models can help us make informed predictions, they are not foolproof and cannot guarantee accurate predictions all the time. It's important to continuously monitor the model's performance and adjust it as necessary.

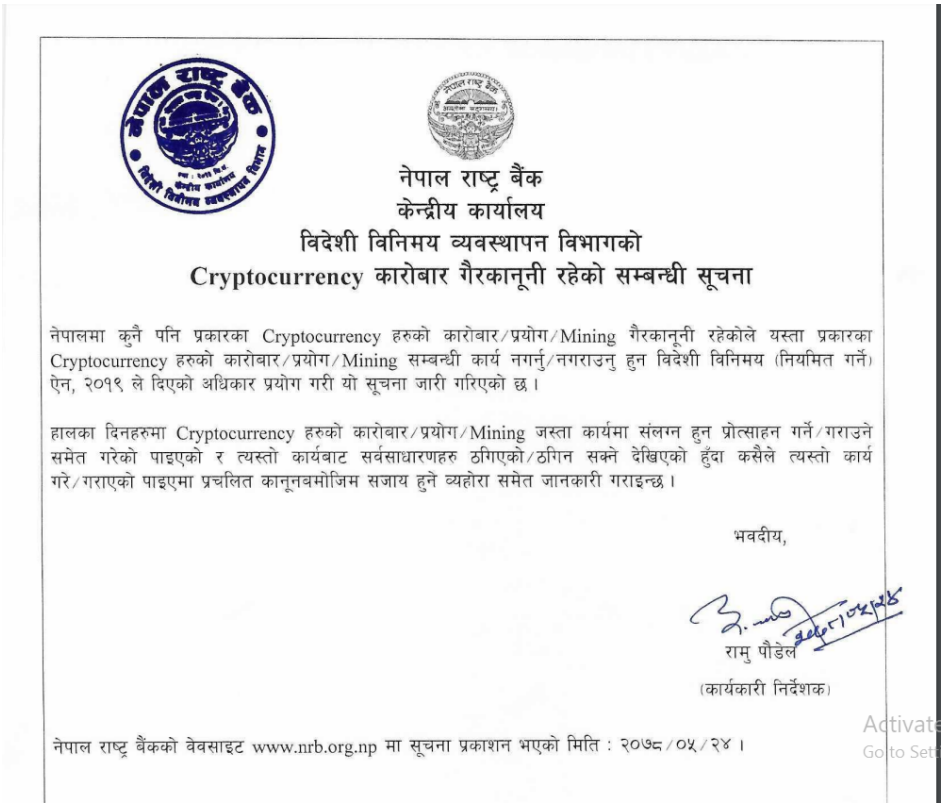
Overall, this project demonstrates the potential of machine learning in the cryptocurrency market and highlights the importance of data-driven decision making in investment strategies.

9 LIMITATION AND FUTURE ENHANCEMENT

9.1 Limitations of the app

:

1. The accuracy of the predictions may be affected by the volatility and unpredictability of the cryptocurrency market.
2. The app may be limited by the availability and quality of historical data, which is necessary for training the machine learning models.
3. The app may not be able to predict sudden market events or changes in cryptocurrency regulations that can significantly impact prices.
4. User behavior and social-media sentiments towards cryptocurrencies may also affect the accuracy of the predictions.
5. The government of Nepal has banned the trading of crypto for the citizens within and outsid of the country.



नेपाल राष्ट्र बैंक
केन्द्रीय कार्यालय
विदेशी विनिमय व्यवस्थापन विभागको
Cryptocurrency कारोबार गैरकानूनी रहेको सम्बन्धी सूचना

नेपालमा कुनै पनि प्रकारका Cryptocurrency हरुको कारोबार/प्रयोग/Mining गैरकानूनी रहेकोले यस्ता प्रकारका Cryptocurrency हरुको कारोबार/प्रयोग/Mining सम्बन्धी कार्य नगर्नु/नगराउनु हुन विदेशी विनिमय (नियमित गर्ने) ऐन, २०१९ ले दिएको अधिकार प्रयोग गरी यो सूचना जारी गरिएको छ।

हालका दिनहरुमा Cryptocurrency हरुको कारोबार/प्रयोग/Mining जस्ता कार्यमा संलग्न हुन प्रोत्साहन गर्ने/गराउने समेत गरेको पाइएको र त्यस्तो कार्यबाट सर्वसाधारणहरु ठगिएको/ठगिन सक्ने देखिएको हुँदा कसैले त्यस्तो कार्य गरे/गराएको पाइएमा प्रचलित कानूनबमोजिम सजाय हुने व्यहोरा समेत जानकारी गराइन्छ।

भवदीय,

रामु पौडेल
(कार्यकारी निर्देशक)

नेपाल राष्ट्र बैंकको वेवसाइट www.nrb.org.np मा सूचना प्रकाशन भएको मिति : २०७८/०५/२४।

Figure 9.1: Cryptocurrency rule in Nepal

9.2 Future enhancements of the app

:

1. Improving the accuracy of the predictions through the use of more advanced machine learning techniques and algorithms.

2. Incorporating more data sources and indicators into the models, such as social media sentiment analysis and news feed analysis.

3. Developing new models that can predict the impact of market events and changes in regulations on cryptocurrency prices.

4. Implementing a feature that allows users to customize their predictions based on their own investment strategies and risk tolerance.

5. Integrating the app with cryptocurrency exchanges to provide real-time price data and enable users to make trades directly from the app.

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