A MACHINE LEARNING MODELING FOR BITCOIN MARKET PRICE PREDICTION

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ABSTRACT:

Cryptocurrency is playing an increasingly important role in reshaping the financial system due to its growing popular appeal and merchant acceptance. While many people are making investments in Cryptocurrency, the dynamical features, uncertainty, the predictability of Cryptocurrency are still mostly unknown, which dramatically risk the investments. It is a matter to try to understand the factors that influence the value formation. In this study, we use advanced machine learning frameworks of fully connected Artificial Neural Network (ANN) and Long Short-Term Memory (LSTM) Recurrent Neural Network to analyse the price dynamics of Bitcoin, Etherum, and Ripple. We find that ANN tends to rely more on long-term history while LSTM tends to rely more on short-term dynamics, which indicate the efficiency of LSTM to utilise useful information hidden in historical memory is stronger than ANN. However, given enough historical information ANN can achieve a similar accuracy, compared with LSTM. This study provides a unique demonstration that Cryptocurrency market price is predictable. However, the explanation of the predictability could vary depending on the nature of the involved machine-learning model.

Keywords – ANN, LSTM, Bitcoin price prediction

INTRODCUTION:

Cryptocurrency is digital money managed by an algorithm online. Miners use computers to solve complex puzzles and record transactions on the blockchain, a public ledger. Bitcoin, the first digital currency, was created in 2008 by Satoshi Nakamoto. It's decentralized, meaning no banks are needed for transactions, thanks to blockchain technology. Bitcoin's transactions rely on cryptographic proof, ensuring security and reliability. It also offers controllable anonymity, enhancing user privacy. Investing in cryptocurrencies like Bitcoin has become popular for high returns. Understanding factors like supply shortages and political events is crucial for predicting market trends. Researchers are developing statistical models to forecast cryptocurrency prices, like those by Madan

et al. and Shah et al., aiding investors in making informed decisions.

LITERATURE SURVEY:

Bitcoin is the world's leading cryptocurrency, offering users the ability to conduct secure and anonymous transactions over the Internet. The Bitcoin ecosystem has gained significant attention from consumers, businesses, investors, and speculators in recent years. Although there has been substantial research analysing the network topology of the Bitcoin network, there has been limited investigation into the influence of the network on the overall price of Bitcoin. This paper aims to explore the predictive power of blockchain network-based features on the future price of Bitcoin using machine learning optimization techniques. The research seeks to identify the impact of these features on Bitcoin price movements and aims to achieve classification accuracy for predicting up-down Bitcoin price movements.

EXISTING SYSTEM:

There are unique indicators for each asset based on distinctive characteristics used for price prediction. for instance, in the case of gold, scarcity, profitability, and political anxiety are considered in price prediction, since these factors affect demand and supply, which determine market equilibrium. stocks also have exclusive factors, such as income statements, financial statements, and cash flow statements, that are used for price prediction. in addition, factors like insider ownership and investor protection are also exploited. exogenous factors derived from social media (e.g., Twitter) data have also been utilized for stock price prediction. in the case of the valuation of fiat money, the country's financial situation, monetary policy, and economic power are price determinants. as shown in the conventional asset examples, to predict the price of Crypto-Currency, a unique set of influencing factors should be taken into consideration. to this end, this work utilizes on-chain data that consists of factors that comprehensively reflect the ecosystem, market, and participation of cryptocurrency.

PROPOSED SYSTEM:

This section illustrates the overall framework proposed in this work. The proposed framework consists of five phases. First, extensive variable sets have been collected from on-chain data. Second, some variables are selected from the acquired dataset based on significant statistical correlations. Third, the segmentation of input data based on the CPD technique (PELT) is conducted. Fourth, the proposed price prediction model, composed of LSTM and the attention mechanism, is illustrated. Finally, an experimental setup, including data preprocessing, evaluation metrics, and implementation details, is provided. The complete algorithm for the proposed price prediction framework is presented in Algorithm

FEASIBILITY STUDY:

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

Three key considerations involved in the feasibility analysis are,

- ECONOMICAL FEASIBILITY
- TECHNICAL FEASIBILITY
- SOCIAL FEASIBILITY

ECONOMICAL FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus, the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

TECHNICAL FEASIBILITY

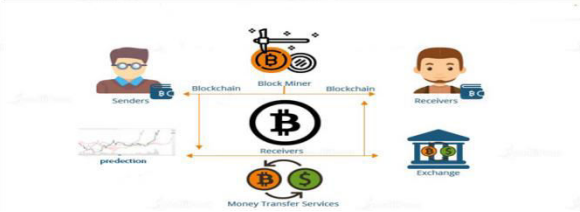
This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

SOCIAL FEASIBILITY

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

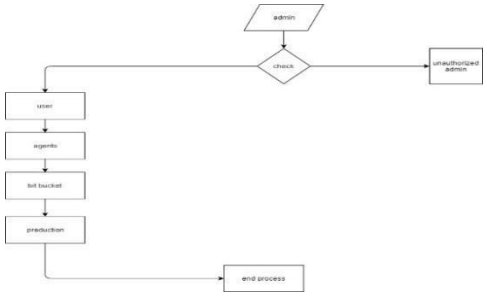
SYSTEM ARCHITECTURE :

The blockchain system architecture utilizes distributed ledger technology, where transactions are grouped into blocks and linked together cryptographically. Unlike traditional ledgers, blockchain is duplicated and shared across a network of computers. Each block contains transaction data, a timestamp, and a unique identifier generated through cryptographic hashing. Consensus mechanisms ensure agreement on transaction order. Parties involved in transactions include senders, receivers, and block miners, who verify and add new blocks. Miners compete in Proof of Work systems by solving complex puzzles. Blockchain has the potential to revolutionize money transfer by offering a secure and efficient method for sending and receiving money.



DATA FLOW DIAGRAM :

ADMIN:



1. Admin: An admin creates a checklist containing the expected contents of the bucket.

2. Checklist: The checklist serves as a reference for what items should be in the bucket.

3. Bucket: This represents the container that holds the items being checked.

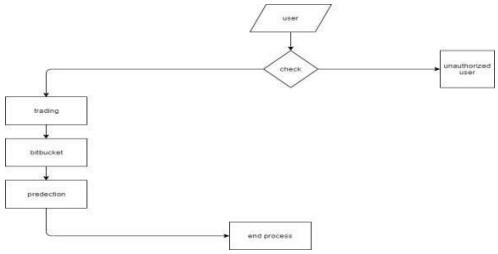
4. Check Unauthorized Admin: This step likely verifies if the person checking the bucket is authorized to do so. If unauthorized, the process ends.

5. Agents: Agents, possibly users or other authorized personnel, perform the physical check of the bucket's contents.

6. Compare: The agents compare the actual contents of the bucket with the checklist.

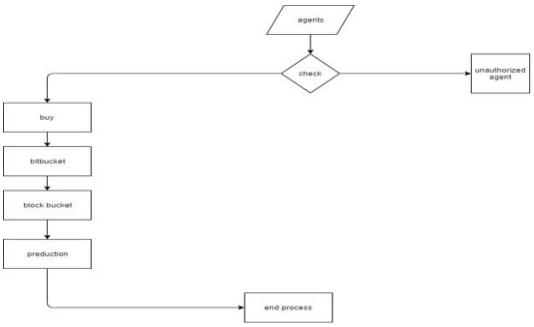
7. End Process: The process ends, indicating that the bucket contents have been checked.

USER:



1. User enters an order to buy or sell a stock.
2. The order is routed to an exchange or market maker.
3. The exchange matches the order with a sell order or fulfills it from its own inventory.
4. The trade is confirmed, and the user's account is debited or credited accordingly.
5. Market data, such as stock prices and volumes, is constantly fed into the system to keep it updated.

AGENT:



1.Agents: This represents the entities adding objects to the bucket. It could be users, applications, or any source that initiates the object addition process.

2.Check Unauthorized Agent: This step likely implies a security check to verify if the adding entity is authorized to add objects. If unauthorized, the process ends.

3.Bitbucket: This term is a play on "Bitbucket," a version control system for software development. In this context, it likely represents a source or repository where the objects reside before being added to the bucket.

4.Block Bucket: This part signifies the actual bucket where objects are stored.

5.Prediction: This step might be a placeholder for any additional processing or validation performed on the objects before they are added to the bucket.

6.End Process: This indicates the successful addict.

USE CASE DIAGRAM:

ADMIN:

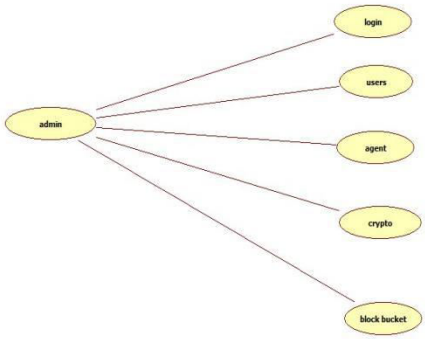
1. Admin: An actor likely responsible for managing user accounts and system administration taska.

2.User:An actor representing the typical users of the web application.

The use case diagram illustrates two interaction paths:

1. Login:This use case allows users to log in to the web application, presumably for authentication purposes.

2. Users:This use case represents the functionalities available to logged-in users within the web application. The specific details of these functionalities are not depicted in this particular diagram.

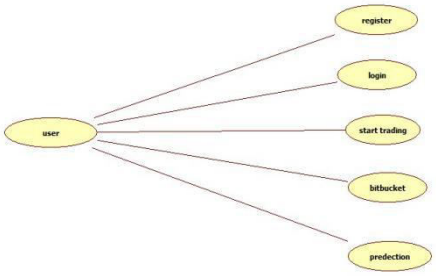


USER:

1. Register: A user creates a new account in the system.

2. Login: A registered user logs in to the system.

3.Start Trading: Upon successful login, the user starts interacting with the system's functionalities, presumably to create or edit logos.



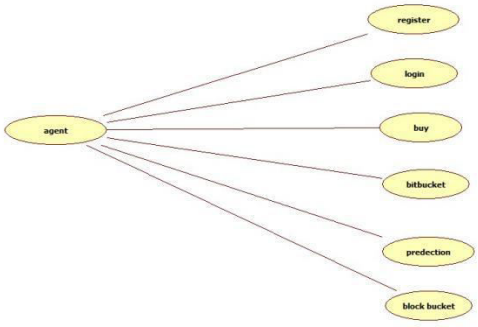
AGENT:

1. Agent:An actor representing users who can interact with the system. Their primary function is to access the block bucket.

2. Register:This system function allows agents to register with the system, presumably to create an account.

3. Block Bucket:This represents the core functionality of the system, which is to provide access to the block bucket.

Overall, the use case diagram focuses on user registration and access to the block bucket.

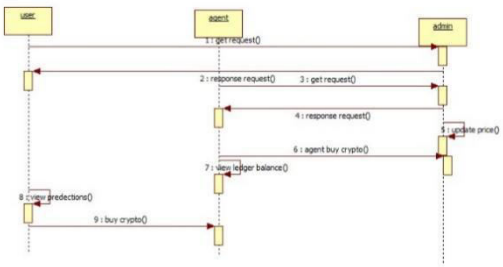


SEQUENCE DIAGRAM:

1.User: Initiates the rescue operation by sending a request to the rescue team.

2. Rescue Team: Receives the request and responds with an acknowledgement.

3. Admin: Potentially involved in coordinating the rescue efforts, though the specific details aren't shown here.



MODULES:

- User
- Agent
- admin

User

Registration of User details next admin activated by the user. go to user page and login. User view some fields [start trading, bit bucket, prediction, logout] now open start trading page contains sale available cryptocurrencies and user buy the currency. User views the transaction history details and user view the prediction for available datasets.

Agent

First registration of the agent page. next activated by the admin. Login agent page. agent view some fields[buy, bitbucket, block bucket, prediction, logout]. here three types of digital currency's are there [bitcoins, ripple, Etherum] agent can buy digital currency (any one or all three).Agent buying the crypto currency. agent transaction history also available.

Admin

The aim of admin is to approve the users and agents. admin contains some fields[user,agents,crypto,bitblock].admin view user and agent registered details and in crypto field user update the currency rate and view the recently crypto currency changes list. admin view the current transaction details. When a miner cracks an algorithm to record a block of transactions to public ledger named blockchain and the cryptocurrency is created when the block is added to the blockchain. It allows people to store and transfer through encryption protocol and distributed network. Mining is a necessary and competitive component of the cryptocurrency system. The miner with more computational power has a better chance of finding a new coin than that of less . Bitcoin is the first and one of the leading digital currencies (its market capitalisation had more than $ 7 billion in 2014, and then it increased significantly to $ 29 billion in 2017) which was first introduced by Satoshi Nakamoto in 2008. Among many features of bitcoin, the most impressive one is decentralisation that it can remove the involvement of traditional financial sectors and monetary authorities effectively due to its blockchain network features.

ALGORITHMS:

LSTM:

LSTM (Long Short-Term Memory) networks are commonly used in Bitcoin market price prediction models due to their ability to capture long-term dependencies in sequential data. In such models, LSTM cells process historical price data, volume, and other relevant features to learn patterns and relationships over time. These learned patterns are then used to make predictions about future price movements. Additionally, techniques like feature engineering, hyperparameter tuning, and ensemble methods may be employed to enhance the model's performance.In a Bitcoin market price prediction model using LSTM, the historical price data is typically organized into sequences, where each sequence

represents a window of past prices. These sequences are fed into the LSTM network, which consists of multiple LSTM cells. During training, the LSTM network learns to update its internal state based on the input sequences, capturing both short-term fluctuations and long-term trends in the data. This ability to retain information over long periods is particularly useful for predicting Bitcoin prices, which often exhibit complex patterns and trends over time.

To improve the model's performance, various techniques can be applied, such as:

1.Feature Engineering: Additional features such as volume, market sentiment indicators, or technical analysis indicators can be incorporated to provide more context to the model.

2.**Hyperparameter Tuning:** Parameters such as the number of LSTM cells, the size of the input sequences, and the learning rate can be optimized through techniques like grid search or random search to improve the model's accuracy.

3.Ensemble Methods: Combining predictions from multiple LSTM models or other machine learning algorithms can help reduce prediction errors and improve overall performance.

4.**Regularization Techniques:** Methods like dropout can be used to prevent overfitting, ensuring that the model generalizes well to unseen data.

ANN:

Artificial Neural Networks (ANNs) are commonly used in machine learning models for Bitcoin market price prediction. ANNs excel at identifying complex patterns in data, making them suitable for forecasting tasks like predicting Bitcoin prices. In this context, ANNs are trained on historical Bitcoin price data along with relevant features such as trading volume, market sentiment, and technical indicators. Once trained, the ANN can analyze new data to make predictions about future Bitcoin prices. Techniques like backpropagation and gradient descent are often used to optimize the ANN's parameters during training, improving its predictive accuracy over time.

In a machine learning model for Bitcoin market price prediction, ANNs are typically used as part of a broader predictive framework. Here's a bit more detail:

1. Data Preprocessing: Before training the ANN, the historical Bitcoin price data and relevant features need to be pre-processed. This may involve tasks such as normalization, handling missing values, and feature scaling to ensure the data is suitable for training.

2. ANN Architecture: The design of the ANN architecture is crucial for its performance. This includes determining the number of layers, the number of neurons in each layer, the activation functions, and the overall topology of the network. In Bitcoin price prediction models, architectures like feedforward neural networks or recurrent neural networks (RNNs) may be used.

3. Training: During the training phase, the ANN learns to map input features (such as historical price data, trading volume, etc.) to output predictions (future Bitcoin prices). Training involves presenting the network with historical data and adjusting its weights and biases iteratively using techniques like backpropagation and stochastic gradient descent.

4. Evaluation: After training, the model's performance needs to be evaluated to assess

its accuracy in predicting Bitcoin prices. This is typically done using a separate validation dataset that the model hasn't seen during training. Common evaluation metrics include mean squared error (MSE), mean absolute error (MAE), and root mean squared error (RMSE).

5. Testing and Deployment: Once the model has been trained and evaluated, it can be tested on unseen data to further assess its performance. If the model performs well, it can be deployed in real-world applications for Bitcoin price prediction.

INPUT AND OUTPUT DESIGN:

Input Design :

The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data in to a usable form for processing can be achieved by inspecting the computer to read data from a written or printed document or it can occur by having people keying the data directly into the system. The design of input focuses on controlling the amount of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy. Input Design considered the following things:

- What data should be given as input?
- How the data should be arranged or coded?
- The dialog to guide the operating personnel in providing input.
- Methods for preparing input validations and steps to follow when error occur.

Output Design:

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision-making.

1. Designing computer output should proceed in an organized, well thought out manner; the right output must be developed while ensuring that each output element is designed so that people will find the system can use easily and effectively. When analysis design computer output, they should Identify the specific output that is needed to meet the requirements.

2.Select methods for presenting information.

3.Create document, report, or other formats that contain information produced by the system.

The output form of an information system should accomplish one or more of the following objectives.

- Convey information about past activities, current status or projections of the
- Future.
- Signal important events, opportunities, problems, or warnings.
- Trigger an action.
- Confirm an action.

SAMPLE TEST CASES:

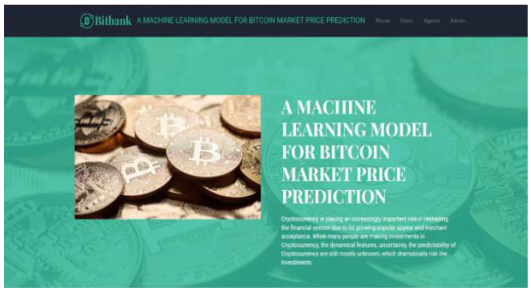
S.no	Test Case	Excepted Result	Result	Remarks(IF Fails)
1	User REGISTERED	If user registration successfully.	Pass	If user is not registered.
2	Agent REGISTERED	If agent registration successfully.	Pass	If agent is not registered.
3	ADMIN	user rights will be accepted here.	Pass	If user are not registered.
4	ADMIN	agent rights will be accepted here.	Pass	If agent are not registered.
5	user LOGIN	If user name and password is correct then it will getting valid page.	Pass	If user name or password is not correct.
6	agent LOGIN	If agent name and password is correct then it will getting valid page.	Pass	If agent name or password is not correct.
7	Agent buying crypto currency from admin	If agent is correct then it will getting valid page.	Pass	If sale crypto currencies are not available .
8	User buying crypto currency from agent	If user is correct then it will getting valid page	Pass	If sale crypto currencies are not available

Sample test cases

IMPLEMENTATION:

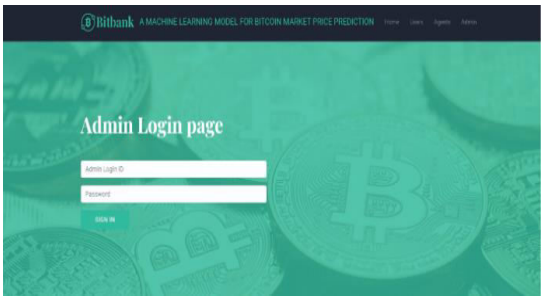
WORKING PROCESS

The website will open after the copy paste the URL in browser from command prompt then home page of the machine learning model for bitcoin market price prediction appear. In home page consisting of users, agents, admin.



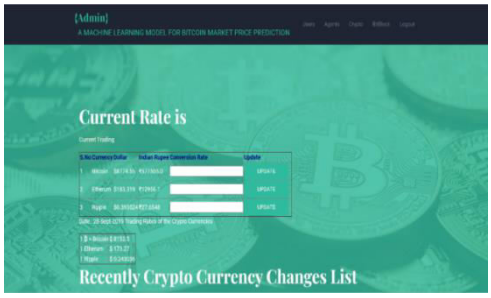
ADMIN

First the admin page should be login, click on admin the admin login page will open then sign in with login id and password of admin, the admin page will open.



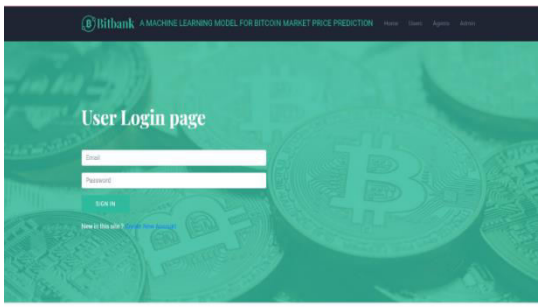
CRYPTO

The crypto will displays the current rates of the currency and the recently crypto currency changes list, by this we can know gain and loss, current and original values of the different currency.



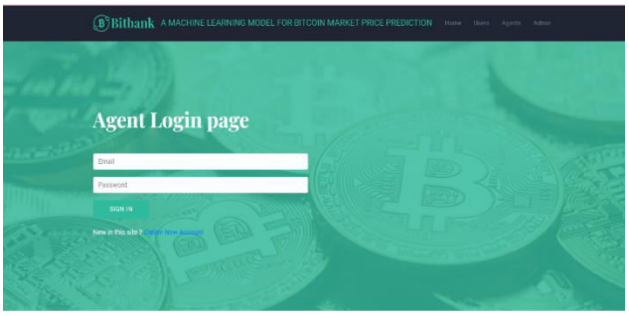
USERS

Users login page with Email and password if sign in or else create an account with your respective details after creating a new account go to admin and activate the user account.



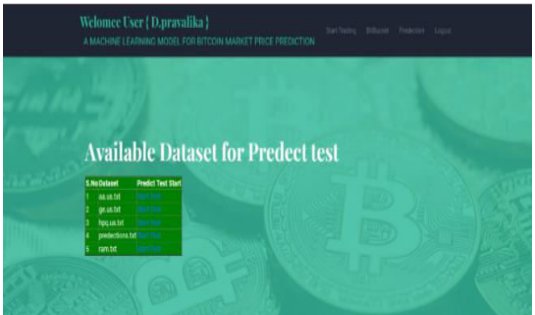
AGENT

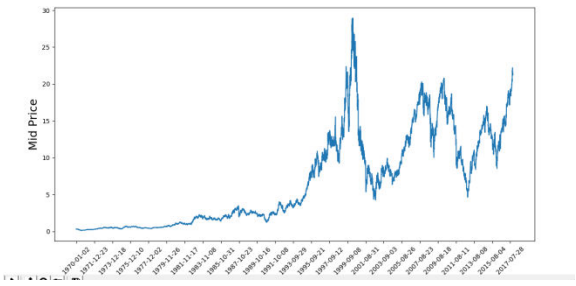
Agent login page with email and password if sign in or else create an account with your respective details after creating a new account go to admin and activate the agent account.

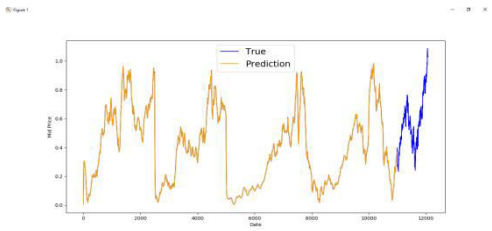


PREDICTIONS

It shows the available dataset for the predictions by this we can know the profit or loss by predict test of datasets in the form of graphs.







CONCLUSION:

Cryptocurrency, such as Bitcoin, has established itself as the leading role of decentralisation. There are a large number of cryptocurrencies sprang up after Bitcoin such as Ethereum and Ripple. Because of the significant uncertainty in its prices, many people hold them as a means of speculation. Therefore, it is critically important to understand the internal features and predictability of those cryptocurrencies. In this study, we use two distinct artificial intelligence frameworks, namely, fully-connected Artificial Neural Network (ANN) and Long-Short-Term-Memory (LSTM) to analyse and predict the price dynamics of Bitcoin, Etherum, and Ripple. We showed that the ANN and LSTM models are comparable and both reasonably well enough in price prediction, although the internal structures are different. Then we further analyse the influence of historical memory on model prediction. We find that ANN tends to rely more on long-term history while LSTM tends to rely more on short-term dynamics, which indicate the efficiency of LSTM to utilise useful information hidden in historical memory is stronger than ANN. However, given enough historical information ANN can achieve a similar accuracy, compared with LSTM. This study provides a unique demonstration that Cryptocurrency market price is predictable. However, the explanation of the predictability could vary depending on the nature of the involved machine-learning model.

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