

## RNN-based Prediction for Multi-Cryptocurrency Price Correlation

Wahidur Rahman<sup>o</sup>, Muhammad Ahmad Rathore, Istiaque Ahmed, Heung-No Lee\*

[sm.wahidur,ahmadrathore@gm.gist.ac.kr](mailto:sm.wahidur,ahmadrathore@gm.gist.ac.kr), [isti.ru.cse@gmail.com](mailto:isti.ru.cse@gmail.com), [heungno@gist.ac.kr](mailto:heungno@gist.ac.kr)\*

### Abstract

Cryptocurrencies based on blockchain have been developed to form crypto market which is volatile in nature. To solve the issue of unsecure investment a deep learning model based on time series data is proposed to predict price trend and compute correlation for creating secure portfolio of an investor.

### Introduction

Here, we have implemented RNN based LSTM model to predict time series data of multiple cryptocurrencies and employ the prediction to compute correlation among predicted data [1]. The result of this prediction model and correlation nature analysis of predicted data has significant economic ramification for wise investment in crypto market [2].

### Correlation Model Design

A python-based web scraping tool is used to extract data from price tracking website for crypto assets. We preprocess the data and divide it into training and test set. LSTM model is applied for prediction as shown in figure 1.

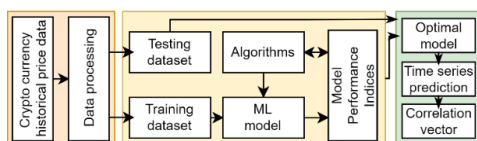
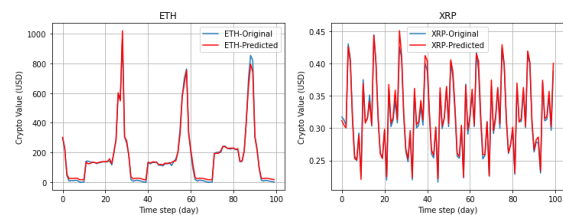


Fig1. Price prediction and correlation model

### Model Verification

Multivariate time series data for, ETH and XRP are taken that contains 2,285 days of data. Open-source ML library TensorFlow and DL framework keras has been used. MAE, RMSE as loss function and 'rmsprop' as model optimizer are used as parameter setting. Model outputs are shown in fig. Pearson correlation coefficient (PCC) is applied to calculate correlation between prediction results of two cryptocurrencies. The resultant coefficient 'r'

is less than 0.3 which indicates two currencies are weakly correlated with each other.



| Dataset | RMSE  | MAE   | R2     |
|---------|-------|-------|--------|
| ETH     | 14.3  | 7.93  | 0.995  |
| XRP     | 0.057 | 0.037 | 0.9705 |

Fig 2. Prediction and accuracy results

### Conclusion

Here, RNN-LSTM model is applied to achieve higher accuracy. Moreover, Pearson correlation coefficient is used to quantify the degree of colocalization between the prices of two cryptocurrencies at a given time.

### Acknowledgement

This work was partly supported by Institute of Information & communications Technology Planning & Evaluation (IITP) grant funded by the Korea government (MSIT) (No.2020-0-00958) and This research was supported by the MSIT (Ministry of Science and ICT), Korea, under the ITRC (Information Technology Research Center) support program (IITP-2021-0-01835) supervised by the IITP (Institute of Information & Communications Technology Planning & Evaluation)

### References

1. C. Wu et al. "A New Forecasting Framework for Bitcoin Price with LSTM," 2018 IEEE International Conference on Data Mining Workshops (ICDMW), 2018, pp. 168-175
2. Kumar et al. "Co-movement in crypto-currency markets: evidences from wavelet analysis." Financial Innovation 5.1 (2019)