

## BAB VI

### PENUTUP

#### A. Kesimpulan

Berdasarkan hasil penelitian yang telah dilakukan, dapat disimpulkan bahwa tingkat keakuratan algoritma *Random Forest* dalam memprediksi arah pergerakan harga *cryptocurrency* adalah 61%. Hasil prediksi algoritma dipengaruhi oleh kualitas *dataset* dan setelan *hyperparameter* yang digunakan. Kualitas *dataset* dapat ditingkatkan dengan menambah jumlah data dan fitur yang digunakan dalam mengembangkan algoritma. Setelan *hyperparameter* dapat dimaksimalkan dengan menyeimbangkan nilai *hyperparameter* lain yang tersedia pada algoritma. Kualitas *dataset* yang representatif dan setelan *hyperparameter* yang optimal memberikan hasil prediksi algoritma yang lebih akurat dan lebih efisien. Perlu diperhatikan bahwa analisis faktor-faktor eksternal yang dapat memengaruhi kesesuaian hasil prediksi algoritma tidak termasuk dalam ruang lingkup penelitian ini.

#### B. Saran

Berdasarkan kesimpulan dari penelitian yang telah dijabarkan, berikut adalah saran-saran untuk melakukan penelitian lanjutan antara lain:

1. Memprediksi harga *cryptocurrency* secara spesifik menggunakan algoritma *Random Forest* yang menerapkan teknik regresi.
2. Meningkatkan kualitas *dataset* yang digunakan untuk mengembangkan algoritma *Random Forest* dengan menambah jumlah data dan fitur.
3. Mengoptimalkan setelan *hyperparameter* lain yang tersedia dalam algoritma *Random Forest*, seperti *Max Depth*, *Min Sample Split*, *Min Sample Leaf*, dan sebagainya.
4. Mengevaluasi prediksi algoritma *Random Forest* yang menerapkan teknik regresi melalui *MAE (Mean Absolute Error) Test*, *MSE (Mean Squared Error) Test*, *RMSE (Root Mean Squared Error) Test*, dan sebagainya.

## DAFTAR PUSTAKA

- [1] CNBC Indonesia, “Apa Itu Mata Uang Kripto? Begini Penjelasan dan Cara Kerjanya,” 08 April 2022. [Daring]. Tersedia pada: <https://www.cnbcindonesia.com/tech/20220408115818-37-329980/apa-itu-mata-uang-kripto-begini-penjelasan-dan-cara-kerjanya>. [Diakses 21 Juni 2023].
- [2] CNBC Indonesia, “Mengenal Apa Itu Blockchain, Teknologi yang Mengubah Dunia,” 17 Februari 2022. [Daring]. Tersedia pada: <https://www.cnbcindonesia.com/mymoney/20220217153629-72-316221/mengenal-apa-itu-blockchain-teknologi-yang-mengubah-dunia>. [Diakses 21 Juni 2023].
- [3] AWS Indonesia, “Apa itu Teknologi Blockchain?,” 2023. [Daring]. Tersedia pada: <https://aws.amazon.com/id/what-is/blockchain/?aws-products-all.sort-by=item.additionalFields.productNameLowercase&aws-products-all.sort-order=asc>. [Diakses 21 Juni 2023].
- [4] DataIndonesia, “Masyarakat Indonesia Paling Banyak Investasi Emas pada 2022,” 08 Agustus 2022. [Daring]. Tersedia pada: <https://dataindonesia.id/bursa-keuangan/detail/masyarakat-indonesia-paling-banyak-investasi-emas-pada-2022>. [Diakses 21 Juni 2023].
- [5] CNBC Indonesia, “Warga RI, Pernah Dengar Istilah NFT, Kripto, Bitcoin?,” 21 April 2022. [Daring]. Tersedia pada: <https://www.cnbcindonesia.com/tech/20220421082351-37-333437/warga-ri-pernah-dengar-istilah-nft-kripto-bitcoin>. [Diakses 21 Juni 2023].
- [6] Kominfo, “Bulan Literasi Aset Kripto 2023, Masyarakat Harus Makin Paham,” 02 Februari 2023. [Daring]. Tersedia pada: <https://www.kominfo.go.id/content/detail/47201/bulan-literasi-aset-kripto-2023-masyarakat-harus-makin-paham/0/berita>. [Diakses 21 Juni 2023].
- [7] Pluang, “7 Faktor yang Mempengaruhi Harga Aset Kripto,” 2022. [Daring]. Tersedia pada: <https://pluang.com/id/blog/academy/crypto-101/faktor-yang-mempengaruhi-harga-cryptocurrency>. [Diakses 21 Juni 2023].

- [8] Dicoding, "Apa itu Machine Learning? Beserta Pengertian dan Cara Kerjanya," 19 Agustus 2020. [Daring]. Tersedia pada: <https://www.dicoding.com/blog/machine-learning-adalah/>. [Diakses 21 Juni 2023].
- [9] DQLab, "4 Rekomendasi Algoritma Machine Learning untuk Klasifikasi," 29 Juni 2021. [Daring]. Tersedia pada: <https://dqlab.id/4-rekomendasi-algoritma-machine-learning-untuk-klasifikasi>. [Diakses 21 Juni 2023].
- [10] Trivusi, "Algoritma Random Forest: Pengertian dan Kegunaannya," 17 September 2022. [Daring]. Tersedia pada: <https://www.trivusi.web.id/2022/08/algoritma-random-forest.html>. [Diakses 21 Juni 2023].
- [11] Y. Liu dan L. Zhang, "Cryptocurrency Valuation: An Explainable AI Approach," *SSRN*, Volume 44, Nomor 1, 30 Januari 2022, DOI: 10.2139/SSRN.3657986.
- [12] F. Sabry, W. Labda, A. Erbad, dan Q. Malluhi, "Cryptocurrencies and Artificial Intelligence: Challenges and Opportunities," *ACCESS*, Volume 8, Nomor 1, 21 September 2020, DOI: 10.1109/ACCESS.2020.3025211.
- [13] S. Omohundro, "Cryptocurrencies, Smart Contracts, and Artificial Intelligence," *AIM*, Volume 1, Nomor 2, 19 Desember 2014, DOI: 10.1145/2685328.2685334.
- [14] A. Kanji, I. Chaudhary, R. Shankar, dan G. Srinivasa, "Predicting the Price Direction of Bitcoin Using Twitter Data and Machine Learning," *ICDSCA*, 30 Oktober 2022, DOI: 10.1109/ICDSCA56264.2022.9988558.
- [15] M. Saad dan A. Mohaisen, "Towards Characterizing Blockchain-Based Cryptocurrencies for Highly-Accurate Predictions," *INFCOMW*, 19 April 2018, DOI: 10.1109/INFCOMW.2018.8406859.
- [16] S. Velankar, S. Valecha, dan S. Maji, "Bitcoin Price Prediction Using Machine Learning," *ICACT*, 14 Februari 2018, DOI: 10.23919/ICACT.2018.8323676.
- [17] N. Ramya, R. Sanjay, R. Vishal, dan D. Krishna, "Crypto-Currency Price Prediction Using Machine Learning," *ICOEI*, 30 April 2022, DOI: 10.1109/ICOEI53556.2022.9776665.
- [18] K. Rathan, S. Sai, dan T. Manikanta, "Crypto-Currency Price Prediction Using Decision Tree and Regression Techniques," *ICOEI*, 25 April 2019, DOI: 10.1109/ICOEI.2019.8862585.

- [19] S. Basher dan P. Sadorsky, "Forecasting Bitcoin Price Direction with Random Forests: How Important are Interest Rates, Inflation, and Market Volatility?," *MLWA*, Volume 9, Nomor 1, 15 September 2022, DOI: 10.1016/J.MLWA.2022.100355.
- [20] S. Lahmiri dan S. Bekiros, "Cryptocurrency Forecasting with Deep Learning Chaotic Neural Networks," *CHAOS*, Volume 118, Nomor 1, Januari 2019, DOI: 10.1016/J.CHAOS.2018.11.014.
- [21] G. Kim, D. Shin, J. Choi, dan S. Lim, "A Deep Learning-Based Cryptocurrency Price Prediction Model that Uses On-Chain Data," *ACCESS*, Volume 10, Nomor 1, 25 Mei 2022, DOI: 10.1109/ACCESS.2022.3177888.
- [22] M. Patel, S. Tanwar, R. Gupta, dan N. Kumar, "A Deep Learning-Based Cryptocurrency Price Prediction Scheme for Financial Institutions," *JISA*, Volume 55, Nomor 1, 01 Desember 2020, DOI: 10.1016/J.JISA.2020.102583.
- [23] B. Amirshahi dan S. Lahmiri, "Hybrid Deep learning and GARCH-Family Models for Forecasting Volatility of Cryptocurrencies," *MLWA*, Volume 12, Nomor 1, 15 Juni 2023, DOI: 10.1016/J.MLWA.2023.100465.
- [24] S. Mahadevkar, B. Khemani, S. Patil, K. Kotecha, D. Vora, A. Abraham, dan L. Gabralla, "A Review on Machine Learning Styles in Computer Vision - Techniques and Future Directions," *ACCESS*, Volume 10, Nomor 1, 26 September 2022, DOI: 10.1109/ACCESS.2022.3209825.
- [25] F. Cui, Q. Cui, dan Y. Song, "A Survey on Learning-Based Approaches for Modeling and Classification of Human-Machine Dialog Systems," *TNNLS*, Volume 32, Nomor 4, 27 April 2020, DOI: 10.1109/TNNLS.2020.2985588.
- [26] W. Deng, Y. Guo, J. Liu, Y. Li, D. Liu, dan L. Zhu, "A Missing Power Data Filling Method Based on Improved Random Forest Algorithm," *CJEE*, Volume 5, Nomor 4, Desember 2019, DOI: 10.23919/CJEE.2019.000025.
- [27] J. Arun, J. Cuomo, dan N. Gaur, "Blockchain for Business," *Addison-Wesley Professional PTG*, Edisi 1, 2019, ISBN: 9780135581407, 0135581400. [Daring]. Tersedia pada: <https://www.vitalsource.com/products/blockchain-for-business-jai-singh-arun-jerry-cuomo-v9780135581407>. [Diakses 21 Juni 2023].

- [28] A. Narayanan, J. Bonneau, E. Felten, A. Miller, dan S. Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction," *Princeton University Press*, Edisi 1, 2016, ISBN: 9781400884155, 1400884152. [Daring]. Tersedia pada: <https://www.vitalsource.com/products/bitcoin-and-cryptocurrency-technologies-arvind-narayanan-joseph-v9781400884155>. [Diakses 21 Juni 2023].
- [29] H. Halaburda dan M. Sarvary, "Beyond Bitcoin: The Economics of Digital Currencies," *Palgrave Macmillan*, Edisi 1, 2016, ISBN: 9781137506429, 1137506423. [Daring]. Tersedia pada: <https://www.vitalsource.com/products/beyond-bitcoin-hanna-halaburda-miklos-v9781137506429>. [Diakses 21 Juni 2023].
- [30] M. Thomsett, "Candlestick Charting: Profiting from Effective Stock Chart Analysis," *De Gruyter*, Edisi 1, 2018, ISBN: 9781501507298, 150150729X. [Daring]. Tersedia pada: <https://www.vitalsource.com/products/candlestick-charting-michael-c-thomsett-v9781501507298>. [Diakses 21 Juni 2023].
- [31] J. Teall, "Financial Trading and Investing," *Academic Press*, Edisi 2, 2018, ISBN: 9780128111178, 0128111178. [Daring]. Tersedia pada: <https://www.vitalsource.com/products/financial-trading-and-investing-john-l-teall-v9780128111178>. [Diakses 21 Juni 2023].
- [32] J. Berk dan P. DeMarzo, "Corporate Finance," *Pearson*, Edisi 5, 2020, ISBN: 9780134998411, 0134998413. [Daring]. Tersedia pada: <https://www.vitalsource.com/products/corporate-finance-jonathan-berk-peter-demarzo-v9780134998411>. [Diakses 21 Juni 2023].
- [33] P. Bernstein, "Machine Learning: Architecture in the Age of Artificial Intelligence," *RIBA Publishing*, Edisi 1, 2022, ISBN: 9781000600681, 1000600688. [Daring]. Tersedia pada: <https://www.vitalsource.com/products/machine-learning-phil-bernstein-v9781000600681>. [Diakses 21 Juni 2023].

- [34] S. Moein, "Electrocardiogram Signal Classification and Machine Learning: Emerging Research and Opportunities," *Medical Information Science Reference*, Edisi 1, 2018, ISBN: 9781522555810, 1522555811. [Daring]. Tersedia pada: <https://www.vitalsource.com/products/electrocardiogram-signal-classification-and-sara-moein-v9781522555810>. [Diakses 21 Juni 2023].
- [35] AI Sciences, "Machine Learning: Random Forest with Python from Scratch," *Packt Publishing*, Edisi 1, 2022, ISBN: 9781803236803, 9781803233369, 1803233362. [Daring]. Tersedia pada: <https://www.vitalsource.com/products/machine-learning-random-forest-with-python-from-ai-sciences-v9781803236803>. [Diakses 21 Juni 2023].
- [36] A. Ong, Y. Prasetyo, K. Velasco, E. Abad, A. Buencille, E. Estorninos, M. Cahigas, T. Chuenyindee, S. Persada, R. Nadlifatin, dan T. Sittiwatethanasiri, "Utilization of Random Forest Classifier and Artificial Neural Network for Predicting the Acceptance of Reopening Decommissioned Nuclear Power Plant," *ANUCENE*, Volume 175, Nomor 1, 15 September 2022, DOI: 10.1016/J.ANUCENE.2022.109188.
- [37] M. Hasan, M. Nasser, S. Ahmad, dan K. Molla, "Feature Selection for Intrusion Detection Using Random Forest," *JIS*, Volume 7, Nomor 3, 07 April 2016, DOI: 10.4236/JIS.2016.73009.
- [38] T. Chen, X. Yin, L. Peng, J. Rong, J. Yang, dan G. Cong, "Monitoring and Recognizing Enterprise Public Opinion from High-Risk Users Based on User Portrait and Random Forest Algorithm," *AXIOMS*, Volume 10, Nomor 2, 27 Mei 2021, DOI: 10.3390/AXIOMS10020106.
- [39] J. Speiser, M. Miller, J. Tooze, dan E. Ip, "A Comparison of Random Forest Variable Selection Methods for Classification Prediction Modeling," *ESWA*, Volume 134, Nomor 1, 15 November 2019, DOI: 10.1016/J.ESWA.2019.05.028.