UNDERGRADUATE THESIS

EVALUATION THE GRU MODEL FOR PREDICTING INDONESIAN COMPOSITE INDEX IN VARIOUS DATA CONFIGURATION AND HYPERPARAMETERS

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Hereby declares that this undergraduate thesis contains no part of any other scientific work that has been submitted to obtain an academic degree at any higher education institution. Furthermore, it does not contain any work or opinions previously written or published by others, except for those which are explicitly cited in this thesis and listed completely in references.

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ABSTRACT

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The IHSG is a key indicator that reflects the condition of the Indonesian capital market, making predictions of its movements very important for investors and market participants. This study aims to implement a model for predicting the value of the IHSG using the Gated Recurrent Unit (GRU) algorithm by adding the IDR/USD exchange rate and DJIA index as features. The GRU model was chosen because it is capable of modeling time series data patterns, capturing both short-term and long-term dependencies through gating mechanisms, and is more computationally efficient than other, more complex recurrent architectures. These characteristics make the GRU suitable for predicting movements in the IHSG, which exhibits dynamic patterns and is influenced by historical data. Testing was conducted through fifteen test scenarios with variations in features, data split ratio, number of layers and model units, learning rate, and dropout rate. The model was evaluated using MSE, RMSE, and MAPE metrics. The results of the study explain that the use of the DJIA index as a feature, along with an 80:10:10 data split ratio and a two-layer architecture with 32 and 64 units, yields the best performance with MSE values of 3226.2419, RMSE of 56.8, and MAPE of 0.6186%. Increasing the number of layers and modifying hyperparameters does not always improve model accuracy. The best GRU model will be implemented in a real-time prediction website by automatically retrieving data through the Yahoo Finance website. The results of the study show that the GRU model can be effectively used to predict short-term movements in the IHSG value.

Keywords: IHSG, Gated Reccurent Unit (GRU), DJIA, IDR/USD, Yahoo Finance

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The author admits that this thesis is far from ideal and still contains flaws. As a result, the author genuinely hopes for helpful critiques and recommendations to enhance subsequent work. I hope this undergraduate thesis advances knowledge, especially in the area of deep learning-based historical data prediction.

Surabaya, May 11, 2026

RIZKI BAEHTIAR AFANDI

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