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FINANNISA ZHAFIRA, Mardhani Riasetiawan, M.T., Dr ; Dzikri Rahadian Fudholi, S.Kom., M.Comp.
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ABSTRACT

OPTIMIZING LONG SHORT-TERM MEMORY NETWORKS WITH MULTILAYER PERCEPTRON FOR TIME SERIES PREDICTION

By

Finannisa Zhafira
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Due to the Covid-19 pandemics, occupancy rates in most major cities range from 8.6% - 22.6% with commercial properties in Bali being the lowest. Property business actors struggle to predict the dynamics of hospitality industry demand. Beside that, LSTM is designed to give better performance in capturing long-term dependencies in sequential data such as time series data. However, there are several drawbacks in utilizing LSTM, such as computationally expensive to train than simpler models like feedforward neural networks. With that stated, we find an opportunity to minimize the drawbacks by combining LSTM with one of the feedforward neural networks, MLP. Through this research, the author would like to: (1) Compare the performance of commercial property availability rate forecast using Vanilla LSTM, Stacked LSTM and LSTM Window Method and (2) Optimize the model performance based on the best modeling among Vanilla LSTM, Stacked LSTM and LSTM Window Method with MLP.

The main stages of the execution of this study are summarized in the following mechanism: data collection using web scraping techniques, data cleaning & preprocessing, data modeling and data evaluation. This mechanism is used to execute the process of comparing the Vanilla LSTM, Stacked LSTM and LSTM Window Method models to get the best model, as well as to execute the best model optimization.

Based on experiments conducted using the three models, the LSTM Window Method model was obtained with the smallest error performance of 6.03 RMSE. Therefore, we develop an advanced model for the LSTM Window Method. The development of an advanced model for the LSTM Window Method is carried out by combining it with the other best neural network models, namely the Multilayer Perceptron (MLP). From this experiment, the best model was obtained using 5 windows with the smallest error performance of 4.53 RMSE.

Keywords: Property, Scraping, LSTM, MLP