

ABSTRAK

IMPLEMENTASI MACHINE LEARNING PADA PERAMALAN PERMINTAAN MENGGUNAKAN ALGORITMA LONG SHORT-TERM MEMORY (LSTM) BERBASIS WEB APPLICATION (STUDI KASUS: MARISA FOOD)

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Peramalan permintaan berperan penting dalam mendukung pengambilan keputusan produksi dan pengelolaan persediaan. Marisa Food, sebagai industri kecil menengah pengolah ikan lele, menghadapi pola permintaan abon lele original 80 gram yang bersifat *non-linier* dan fluktuatif, sehingga menimbulkan kondisi *overstock* dan *understock*. Metode peramalan konvensional dinilai kurang mampu menangani karakteristik data tersebut, sehingga diperlukan pendekatan yang lebih adaptif. Penelitian ini bertujuan menghasilkan peramalan permintaan abon lele original 80 gram untuk 12 minggu ke depan menggunakan model *Long Short-Term Memory* (LSTM) dengan konfigurasi terbaik, serta mengimplementasikannya ke dalam *web application*. Data historis penjualan diolah melalui tahap *preprocessing* dan *feature engineering*, kemudian digunakan untuk membangun dan mengevaluasi berbagai konfigurasi model LSTM. Hasil penelitian menunjukkan bahwa model terbaik menggunakan dua *layer* LSTM dengan 128–128 *neuron*, *learning rate* 0,001, *dropout rate* 0,2, 225 *epoch*, *batch size* 18, dan *optimizer Adam*, serta menghasilkan nilai RMSE sebesar 7,75, yang menunjukkan rata-rata kesalahan prediksi berada pada kisaran ± 8 unit. Model tersebut menghasilkan peramalan permintaan selama 12 minggu ke depan dengan total permintaan sebesar 722 unit. Model LSTM diintegrasikan ke dalam aplikasi web berbasis *Streamlit* yang menyediakan fitur unggah data, pelatihan model, serta visualisasi dan tabel hasil peramalan, sehingga dapat mendukung pengambilan keputusan produksi dan pengelolaan persediaan secara lebih efektif bagi Marisa Food.

Kata Kunci: Peramalan Permintaan, *Long Short-Term Memory*, *Time Series*, Industri Kecil Menengah

ABSTRACT

IMPLEMENTATION OF MACHINE LEARNING IN DEMAND FORECASTING USING THE LONG SHORT-TERM MEMORY (LSTM) ALGORITHM BASED ON A WEB APPLICATION (CASE STUDY: MARISA FOOD)

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Demand forecasting plays an important role in supporting production planning and inventory management decisions. Marisa Food, a small and medium enterprise engaged in catfish processing, faces a non-linear and highly fluctuating demand pattern for its main product, original 80-gram catfish floss, which often leads to overstock and understock conditions. Conventional forecasting methods are considered insufficient to handle these data characteristics, making a more adaptive approach necessary. This study aims to generate demand forecasts for original 80-gram catfish floss for the next 12 weeks using a Long Short-Term Memory (LSTM) model with the best configuration, as well as to implement the model within a web application. Historical sales data were processed through preprocessing and feature engineering stages and then used to build and evaluate various LSTM model configurations. The results show that the best-performing model employs two LSTM layers with 128–128 neurons, a learning rate of 0.001, a dropout rate of 0.2, 225 epochs, a batch size of 18, and the Adam optimizer, achieving an RMSE value of 7.75, which indicates an average prediction error of approximately ± 8 units. This model was used to generate demand forecasts for the next 12 weeks, with a total predicted demand of 722 units. The LSTM model was integrated into a Streamlit-based web application that provides data upload, model training, and visualization and tabular presentation of forecasting results, thereby supporting more effective production planning and inventory management for Marisa Food.

Keywords: *Demand Forecasting, Long Short-Term Memory, Time Series, Inventory Management, Small And Medium Enterprises*