Implementasi Metode *Long Short-Term Memory* dan *Recurrent Neural Network* pada Prediksi Curah Hujan Berdasarkan Waktu

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Abstract

Rainfall in Indonesia exhibits a complex seasonal pattern with high spatial variability and increasing uncertainty in recent years, necessitating a more accurate prediction system for flood and drought mitigation. This study utilizes monthly rainfall data from 2021 to 2024 collected at 27 stations in Java Island to build a predictive model using a deep learning approach. The Long Short-Term Memory (LSTM) and Recurrent Neural Network (RNN) methods were implemented through preprocessing steps including normalization, sliding window, and oversampling to balance class distribution. Models were trained using grid search to determine the optimal configuration of units and epochs, and evaluated using accuracy, precision, recall, and F1-score metrics. Experimental results show that the RNN model with 64 units and 100 epochs achieved the highest accuracy of 85.39%, outperforming LSTM, which reached 65.33%. Predictions were visualized using the Kriging method on Java Island maps for the period 2025 to 2028, illustrating spatial distributions consistent with wet and dry season patterns. This research contributes by providing a more accurate deep learning–based rainfall prediction approach to support agricultural planning, water resource management, and disaster risk mitigation.

Keywords: rainfall prediction, deep learning, recurrent neural network, long short-term memory, kriging