PREDIKSI CURAH HUJAN HARIAN MENGGUNAKAN METODE *LONG SHORT-TERM MEMORY* (LSTM) PADA STASIUN METEOROLOGI PATTIMURA

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ABSTRAK

Variabilitas curah hujan harian di wilayah tropis seperti Kota Ambon sering menimbulkan tantangan dalam perencanaan mitigasi bencana hidrometeorologi. Penelitian ini bertujuan memprediksi curah hujan harian menggunakan metode Long Short-Term Memory (LSTM) berbasis data historis Stasiun Meteorologi Pattimura periode Januari 2019–Desember 2025. Data meteorologi mencakup suhu udara, kelembapan, lama penyinaran matahari, kecepatan angin, dan curah hujan sebagai variabel target. Tahapan penelitian meliputi pembersihan data, penanganan nilai hilang, normalisasi Min-Max, pembentukan fitur musiman (*day of year*), dan pembentukan data runtun waktu menggunakan *sliding window* 30 hari. Model LSTM dilatih dengan arsitektur satu lapisan LSTM (64 neuron), *dropout* 0,2, dan optimizer Adam. Hasil evaluasi pada data uji menunjukkan nilai MAE sebesar 15,83 mm (kategori cukup/sedang) dan RMSE sebesar 29,50 mm. Model mampu menangkap pola curah hujan ringan hingga sedang, namun cenderung *underestimate* pada hujan sangat lebat. Peramalan 365 hari ke depan menghasilkan pola musiman yang fluktuatif dengan puncak pada Juni–September 2026. Hasil penelitian menunjukkan bahwa metode LSTM potensial sebagai pendekatan prediksi curah hujan harian yang adaptif terhadap karakteristik iklim lokal, meskipun masih memiliki keterbatasan dalam memprediksi kejadian ekstrem.

Kata Kunci : Prediksi Curah Hujan, *Long Short-Term Memory* (LSTM),MAE,RMSE.

DAILY RAINFALL PREDICTION USING THE LONG SHORT-TERM MEMORY (LSTM) METHOD AT PATTIMURA METEOROLOGICAL STATION.

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ABSTRACT

High rainfall variability in tropical regions such as Ambon City often poses challenges for hydrometeorological disaster mitigation planning. This study aims to predict daily rainfall using the Long Short-Term Memory (LSTM) method based on historical data from Pattimura Meteorological Station covering January 2019 to December 2025. The meteorological dataset includes air temperature, humidity, sunshine duration, wind speed, and rainfall as the target variable. Research stages consist of data cleaning, missing value handling, Min-Max normalization, seasonal feature construction (day of year), and time-series windowing using a 30-day sliding window. The LSTM model was trained with a single LSTM layer (64 neurons), dropout 0.2, and Adam optimizer. Evaluation on test data yielded MAE of 15.83 mm (moderate category) and RMSE of 29.50 mm. The model successfully captures low to moderate rainfall patterns but tends to underestimate very heavy rainfall events. A 365-day forecast produced fluctuating seasonal patterns with peaks during June–September 2026. The findings suggest that the LSTM method has strong potential as an adaptive approach for daily rainfall prediction reflecting local climatic conditions, though limitations remain in predicting extreme events.

Keywords: Rainfall Prediction, Long Short-Term Memory (LSTM),MAE,RMSE