

ABSTRAK

Curah hujan merupakan salah satu faktor penting yang mempengaruhi berbagai sektor, seperti pertanian, transportasi, dan industri. Intensitas curah hujan yang tinggi dapat menyebabkan banjir, gangguan aktivitas masyarakat, serta keterlambatan distribusi logistik, sehingga diperlukan sistem prediksi curah hujan yang akurat untuk mendukung pengambilan keputusan. Penelitian ini bertujuan untuk membangun model prediksi curah hujan menggunakan metode *Long Short-Term Memory* (LSTM) dengan memanfaatkan variabel temperatur rata-rata (TAVG), kelembapan rata-rata (RH_AVG), dan curah hujan (RR). Data yang digunakan diperoleh dari Badan Meteorologi, Klimatologi, dan Geofisika (BMKG) sebanyak 3.653 data harian. Tahapan penelitian meliputi preprocessing data berupa penanganan *missing value* menggunakan metode interpolasi linear, normalisasi data menggunakan *Min-Max Scaler*, serta pembentukan data time series. Optimasi model dilakukan menggunakan metode *Grid Search* terhadap kombinasi *hyperparameter epoch*, *learning rate*, dan *time step*. Hasil penelitian menunjukkan bahwa nilai RMSE terkecil sebesar 13.2521 diperoleh pada kombinasi *hyperparameter epoch* 100, *learning rate* 0.0001, dan *time step* 25 dengan pembagian data berurutan 80:10:10. Selain itu, hasil prediksi curah hujan untuk 7 hari ke depan berturut-turut adalah 7.5308, 7.0771, 6.8783, 6.8200, 6.7906, 6.7969, dan 6.6285. Hasil tersebut menunjukkan bahwa model LSTM mampu menghasilkan prediksi curah hujan dengan tingkat kesalahan yang cukup baik sehingga berpotensi dimanfaatkan sebagai sistem pendukung pengambilan keputusan dalam menghadapi kondisi cuaca di Kota Surabaya.

Kata kunci: Prediksi, Curah hujan, LSTM, *Grid Search*, RMSE

ABSTRACT

Rainfall is one of the important factors that affects various sectors, such as agriculture, transportation, and industry. High rainfall intensity can cause flooding, disrupt community activities, and delay logistics distribution. Therefore, an accurate rainfall prediction system is needed to support decision-making processes. This study aims to develop a rainfall prediction model using the Long Short-Term Memory (LSTM) method by utilizing average temperature (TAVG), average humidity (RH_AVG), and rainfall (RR) variables. The data used in this study were obtained from the Indonesian Agency for Meteorology, Climatology, and Geophysics (BMKG), consisting of 3,653 daily data records. The research stages included data preprocessing through handling missing values using the linear interpolation method, data normalization using the Min-Max Scaler, and time series data construction. Model optimization was performed using the Grid Search method on combinations of hyperparameters, including epochs, learning rate, and time step. The results showed that the smallest RMSE value of 13.2521 was obtained using the hyperparameter combination of 100 epochs, a learning rate of 0.0001, and a time step of 25 with an 80:10:10 sequential data split. In addition, the rainfall prediction results for the next seven consecutive days were 7.5308, 7.0771, 6.8783, 6.8200, 6.7906, 6.7969, and 6.6285. These results indicate that the LSTM model is capable of producing rainfall predictions with a relatively good error rate and has the potential to be utilized as a decision support system for anticipating weather conditions in Surabaya City.

Keywords: Prediction, Rainfall, LSTM, Grid Search, RMS