

ABSTRAK

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DETEKSI DAN PREDIKSI KEBAKARAN HUTAN DI AREA SUMATRA MENGGUNAKAN ALGORITME *LONG SHORT-TERM MEMORY*

(xiii + 128 halaman: 31 gambar; 10 tabel)

Kebakaran hutan di wilayah Sumatra merupakan isu berulang yang berdampak signifikan terhadap lingkungan, kesehatan, dan ekonomi. Penelitian ini bertujuan membangun model prediksi kebakaran hutan menggunakan algoritme *Long Short-Term Memory* (LSTM) yang efektif dalam menganalisis data deret waktu. Dataset mencakup data kejadian kebakaran dari FIRMS NASA dan data iklim harian (suhu, kelembaban, angin, dan curah hujan) dari WeatherAPI selama periode 2010–2023. Setelah melalui proses normalisasi, transformasi sekuensial, dan pembagian data secara seimbang, model LSTM dilatih dan dievaluasi. Hasil evaluasi menunjukkan akurasi 91.93%, *precision* 91.62%, *recall* 92.38%, dengan MAE 0.1412 dan RMSE 0.2598. Hasil ini menunjukkan bahwa pendekatan LSTM efektif dalam mendeteksi dan memprediksi potensi kebakaran hutan, serta memiliki potensi untuk diterapkan sebagai sistem peringatan dini berbasis data di wilayah rawan kebakaran.

Kata kunci: Kebakaran hutan, Sumatra, Prediksi, *Long Short-Term Memory* (LSTM), *Deep Learning*, Data deret waktu, FIRMS NASA, Cuaca

Referensi: 70 (2015-2025).

ABSTRACT

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Forest Fire Detection and Prediction in the Sumatra Region Using the Long Short-Term Memory (LSTM) Algorithm

(xiii + 128 pages: 31 figures; 10 tables)

Forest fires in the Sumatra region are recurring events with significant impacts on the environment, public health, and the regional economy. This study aims to develop a forest fire prediction model using the Long Short-Term Memory (LSTM) algorithm, which is effective for analysing time-series data. The dataset includes forest fire occurrence data from NASA's FIRMS and daily climate data (temperature, humidity, wind speed, and rainfall) from WeatherAPI, covering the period from 2010 to 2023. After undergoing normalization, sequential transformation, and balanced data splitting, the LSTM model was trained and evaluated. The evaluation results show an accuracy of 91.93%, precision of 91.62%, recall of 92.38%, with an MAE of 0.1412 and RMSE of 0.2598. These results demonstrate that the LSTM-based approach is effective in detecting and predicting potential forest fires and has strong potential to be implemented as a data-driven early warning system in fire-prone areas.

Keywords: Forest fire, Sumatra, Prediction, Long Short-Term Memory (LSTM), Deep Learning, Time-series data, NASA FIRMS, Weather

References: 70 (2015-2025).