ABSTRAK

PREDIKSI TEMPORAL MEDAN LISTRIK ATMOSFER MENGGUNAKAN *LONG SHORT-TERM MEMORY* (LSTM) BERBASIS DATA *ELECTRIC FIELD MILL*

(2026: 127 Halaman + 22 Gambar + 9 Tabel + Daftar Pustaka + Lampiran)

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Penelitian ini bertujuan untuk memprediksi perubahan medan listrik atmosfer secara temporal menggunakan metode Long Short-Term Memory (LSTM) berbasis data hasil pengukuran *Electric Field Mill* (EFM). Data diperoleh secara *real-time* dan melalui tahapan *preprocessing* yang meliputi penyaringan sinyal, penanganan *missing value*, normalisasi data, serta pembentukan *sequence time series*. Model LSTM digunakan untuk mempelajari pola perubahan medan listrik atmosfer dan dievaluasi menggunakan parameter *Mean Squared Error* (MSE), *Root Mean Squared Error* (RMSE), *Mean Absolute Error* (MAE) dan *Coefficient of Determination* (R2). Hasil penelitian menunjukkan bahwa model LSTM mampu memprediksi perubahan medan listrik atmosfer dengan baik sehingga hasil prediksi mendekati data aktual. Penelitian ini diharapkan dapat mendukung pengembangan sistem pemantauan kondisi atmosfer dan peringatan dini potensi petir berbasis Internet of Things (IoT).

Kata Kunci: Medan Listrik Atmosfer, *Electric Field Mill*, Long Short-Term Memory (LSTM), Prediksi Temporal, *Time Series*, Internet of Things (IoT).

ABSTRACT

TEMPORAL PREDICTION OF ATMOSPHERIC ELECTRIC FIELD USING LONG SHORT-TERM MEMORY (LSTM) BASED ON ELECTRIC FIELD MILL DATA

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This study aims to predict temporal variations in the atmospheric electric field using the Long Short-Term Memory (LSTM) method based on data acquired from an Electric Field Mill (EFM). The data were collected in real time and processed through several preprocessing stages, including signal filtering, missing value handling, data normalization, and time-series sequence generation. The LSTM model was employed to learn the temporal patterns of atmospheric electric field variations and was evaluated using Mean Squared Error (MSE), Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), and the Coefficient of Determination (R^2). The results indicate that the LSTM model is capable of accurately predicting temporal changes in the atmospheric electric field, with prediction results closely matching the actual observations. This research is expected to contribute to the development of atmospheric monitoring systems and Internet of Things (IoT)-based early warning systems for potential lightning events.

Keywords: Atmospheric Electric Field, Electric Field Mill, Long Short-Term Memory (LSTM), Temporal Prediction, Time Series, Internet of Things (IoT).