

ABSTRAK

Oleh

Jimmy Lukita

Adaptive Neuro- Fuzzy Inference System (ANFIS) terbukti mampu mengklasifikasikan pola konsumsi energi listrik dengan akurasi rata-rata 66,64% dan tingkat kesalahan 33,36%. Variasi presisi terlihat pada setiap label, dimana label 1 dan 4 memiliki nilai rendah, sementara label 2,3,dan 5 menunjukkan performa lebih baik. Presisi tertinggi mencapai 94,28% pada label 5 menandakan kemampuan ANFIS dalam mengenali pola konsumsi tertentu dengan lebih tepat. Keandalan model diperkuat melalui evaluasi menggunakan RMSE,MAE dan MBE tersebut menunjukkan kecenderungan underestimasi dalam skala yang sangat kecil. Selain itu, penerapan normalisasi data memberikan dampak positif terhadap performa model, dengan perbedaan signifikan dibandingkan data mentah, yaitu selisih RMSE sebesar 0,5022 dan MAE sebesar 0,3595. Temuan ini menekankan bahwa pemilihan fungsi keanggotaan yang tepat serta normalisasi data berperan penting dalam meningkatkan efektivitas anfis untuk deteksi anomali konsumsi listrik.

Keywords: ANFIS, Konsumsi Listrik, Deteksi Anomali,Pra-pemrosesan Data

ABSTRACT

By

Jimmy Lukita

Adaptive Neuro-Fuzzy Inference System (ANFIS) demonstrates the ability to classify electricity consumption patterns with an average accuracy of 66.64% and an error rate of 33.36%. Precision varies across labels, where labels 1 and 4 show relatively low values, while labels 2, 3, and 5 achieve better performance. The highest precision of 94.28% is recorded for label 5, highlighting ANFIS's capability to accurately identify specific consumption patterns. The model's reliability is further validated through RMSE, MAE, and MBE evaluation. The best results are obtained using the generalized bell (gbell) membership function, yielding RMSE of 0.1634, MAE of 0.1197, and MBE of -0.00035. The MBE value indicates a very small and almost negligible underestimation tendency. Moreover, data normalization significantly enhances model performance, as shown by the substantial difference compared to raw data, with RMSE reduced by 0.5022 and MAE by 0.3595. These findings emphasize that both the selection of an appropriate membership function and data normalization play a crucial role in strengthening ANFIS's effectiveness for anomaly detection in electricity consumption.

Keywords: ANFIS, Electricity Consumption, Anomaly Detection, Data Pre-processing