ABSTRAK

ANANDA RISWANA, Integrasi *Artificial Neural Network* (ANN) dan *Particle Swarm Optimization* Prediksi Risiko Hipertensi dari Riwayat Medis Pasien (dibimbing oleh Ir. Ida S.Kom.,M.T dan Desi Anggreani S.Kom.,M.T).

Hipertensi merupakan penyakit tidak menular yang sering tidak terdeteksi pada fase awal sehingga diperlukan pendekatan prediktif untuk mendukung skrining dini berbasis data. Penelitian ini mengembangkan model prediksi risiko hipertensi menggunakan Artificial Neural Network (ANN) dan peningkatannya melalui Particle Swarm Optimization (PSO). Data bersumber dari riwayat medis pasien RSU At Medika Palopo dengan variabel faktor risiko, kemudian dilakukan prapemrosesan (pembersihan data, transformasi/encoding, dan standarisasi), pembagian data 80:20, pelatihan model baseline ANN, optimasi bobot awal ANN menggunakan PSO, serta evaluasi menggunakan confusion matrix dan metrik klasifikasi. Hasil pengujian pada data uji (n=120) menunjukkan baseline ANN mencapai akurasi 84,17% (TN=48, FP=12, FN=7, TP=53), sedangkan model ANN+PSO meningkatkan akurasi menjadi 87,50% (TN=57, FP=3, FN=12, TP=48). Optimasi PSO menurunkan false positive secara signifikan sehingga meningkatkan ketepatan prediksi positif hipertensi. Temuan ini mengindikasikan model ANN+PSO berpotensi menjadi alat bantu skrining awal berbasis riwayat medis untuk mendukung pengambilan keputusan preventif di layanan kesehatan.

KATA KUNCI

Hipertensi*, artificial neural network*, *particle swarm optimization*, prediksi risiko, *machine learning*.

ABSTRACT

ANANDA RISWANA, *Integration of Artificial Neural Network (ANN) and Particle Swarm Optimization to Predict Hypertension Risk from Patient Medical History (supervised by Ir. Ida S.Kom.,M.T and Desi Anggreani S.Kom.,M.T).*

Hypertension is a major non-communicable disease that is often undetected in its early stage; therefore, predictive approaches are required to support early screening using patient data. This study develops a hypertension risk prediction model using an Artificial Neural Network (ANN) and enhances it with Particle Swarm Optimization (PSO). The dataset was obtained from patients' medical history at At Medika General Hospital, Palopo. The workflow includes preprocessing (data cleaning, transformation/encoding, and feature scaling), an 80:20 train–test split, baseline ANN training, PSO-based optimization of ANN initial weights, and evaluation using a confusion matrix and classification metrics. Testing on the held-out set (n=120) shows the baseline ANN achieved 84.17% accuracy (TN=48, FP=12, FN=7, TP=53), while the proposed ANN+PSO model improved accuracy to 87.50% (TN=57, FP=3, FN=12, TP=48). PSO optimization substantially reduced false positives, improving the reliability of positive hypertension predictions. These findings suggest that ANN+PSO can serve as a practical decision-support tool for early hypertension screening based on medical history data in healthcare settings.

Keywords:

Hypertension, artificial neural network, particle swarm optimization, risk prediction, machine learning.