ABSTRAK

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Judul Laporan Skripsi	:	SEGMENTASI TINGKAT KANDUNGAN NO2 PADA LAPISAN TROPOSPHER MENGGUNAKAN ARTIFICIAL NEURAL NETWORK PADA DATA CITRA INSTRUMEN TROPOMI SENTINEL-5P NEAR REAL TIME UNTUK MITIGASI PERUBAHAN IKLIM : STUDI KASUS PLTU SURALAYA
Dosen Pembimbing	:	Mohamad Yusuf, S.Kom., M.C.S

Penelitian ini mengevaluasi performa model Artificial Neural Network (ANN) dalam segmentasi tingkat kandungan NO2 pada lapisan troposphere menggunakan data citra TROPOMI Sentinel-5P, dengan fokus di sekitar PLTU Suralaya. Data sebanyak 18.526 baris dibagi menjadi 70% untuk pelatihan dan 30% untuk pengujian. Arsitektur ANN terdiri dari satu layer input dan dua hidden layers dengan fungsi aktivasi ReLU, serta satu layer output dengan fungsi aktivasi softmax. Model dilatih selama 400 epoch menggunakan Adam optimizer dan learning rate 0.001, menghasilkan nilai accuracy 0.85194, precision 0.85093, recall 0.85194, F1 score 0.85104, dan Cohen's Kappa 0.75078. Segmentasi menunjukkan wilayah dengan kategori "High Density" NO2 sebesar 11.22%, "Medium Density" 44.49%, dan "No Matters" 44.29%, dengan distribusi polusi lebih tinggi di barat laut Selat Sunda dan Anyer. Penelitian ini memberikan rekomendasi untuk mengurangi polusi NO2 melalui pemantauan, teknologi bersih, dan kebijakan ketat, serta berkontribusi pada mitigasi perubahan iklim melalui analisis data satelit dan teknologi ANN.

Kata kunci: TROPOMI, Artificial Neural Network, Sentinel 5P, NO2, Polusi

ABSTRACT

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Title Thesis	:	SEGMENTATION OF NO2 LEVELS IN THE TROPOSPHERE USING AN ARTIFICIAL NEURAL NETWORK ON TROPOMI SENTINEL-5P NEAR REAL-TIME IMAGERY DATA FOR CLIMATE CHANGE MITIGATION: A CASE STUDY OF THE SURALAYA COAL-FIRED POWER PLANT
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This study evaluates the performance of an Artificial Neural Network (ANN) model in segmenting NO2 levels in the troposphere using TROPOMI Sentinel-5P satellite imagery data, focusing on the area around the Suralaya coal-fired power plant. A dataset of 18,526 rows was split into 70% for training and 30% for testing. The ANN architecture consists of one input layer and two hidden layers with ReLU activation functions, and an output layer with a softmax activation function. The model was trained over 400 epochs using the Adam optimizer with a learning rate of 0.001, achieving an accuracy of 0.85194, precision of 0.85093, recall of 0.85194, F1 score of 0.85104, and Cohen's Kappa of 0.75078. Segmentation results indicated that areas with "High Density" NO2 accounted for 11.22%, "Medium Density" for 44.49%, and "No Matters" for 44.29%, with higher pollution distribution in the northwest Sunda Strait and Anyer. This study provides recommendations to reduce NO2 pollution through monitoring, clean technology, and strict policies, contributing to climate change mitigation through satellite data analysis and ANN technology.

Keywords: TROPOMI, Artificial Neural Network, Sentinel 5P, NO2, Polution