Model Prediksi Urban Heat Island Berbasis Metode Long Short Term Memory (LSTM) di Jabodetabek = Urban Heat Island Prediction Model Based on Long Short Term Memory (LTSM) Neural Network Method in Jabodetabek Area

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Abstrak

Pertumbuhan Jakarta meluas secara spasial membentuk wilayah Jabodetabek. Seiring dengan pertumbuhan kota, ruang hijau digantikan dengan gedung dan jalan menghasilkan fenomena Urban Heat Island. Penelitian ini bertujuan untuk menganalisis distribusi spasial UHI, pola hubungan antara LST, NDVI dan NDBI serta memodelkan prediksi UHI dengan metode Long Short Term Memory (LSTM). LSTM adalah variasi RNN yang memiliki prinsip kerja dengan menyimpan informasi terhadap pola-pola data. Hasilnya distribusi spasial UHI arahnya cenderung kearah timur dan selatan Jakarta. Karakteristik wilayah terdampak fenomena UHI berada pada daerah pusat industri, pengembangan pemukiman, perekonomian, transportasi, pelayanan, serta perdagangan. Profil LST bervariasi berdasarkan jarak dan ketinggian elevasi. Fenomena UHI mampu menghangatkan suatu wilayah sebesar 10C dibandingkan suhu normalnya. Pola spasial UHI berpola random akibat mengikuti pola jaringan jalan yang menyebar secara tidak teratur. Hasil pembangunan model sistem prediksi UHI bulan Januari tahun 2021 – Oktober tahun 2022 didapatkan nilai indeks positive 4,3 – 7,1 ini menunjukan suhu di wilayah Jakarta lebih panas dibandingkan Bogor. Pada uji nilai akurasi didapatkan RMSE sebesar 1,65 dan MAE sebesar 2,73

.....akarta’s growth expanded spatially to the Jabodetabek area. As cities grow, green spaces replaced with buildings and roads, resulting in a temperature difference phenomenon known as Urban Heat Island. This study aims to analyze the occurrence of UHI, synthesize the relationship between LST, NDVI, and NDBI, and model temperature prediction using Long Short-Term Memory (LSTM) method. LSTM is a variation of RNN which has a working principle by storing information and data patterns. The result is that the spatial distribution of UHI tends to be towards east and south Jakarta. The characteristics of the area affected by UHI are areas that centers of industry, settlements, economy, transportation, services, and trade. The LST profile varies with distance and elevation. UHI phenomenon can warm an area by 1°C compared to the average temperature. The spatial pattern of UHI is random as a result of following a road network pattern that spreads irregularly. The results of the development of the UHI prediction system model for January 2021 - October 2022 obtained a positive index value of 4.30C – 7.10C, this shows that temperature in Jakarta always hotter than temperature in Bogor. Accuracy value test, RMSE was 1.65, and the MAE was 2.73.