

ABSTRAK

PERBANDINGAN BERBAGAI ALGORITMA *MACHINE LEARNING* UNTUK IDENTIFIKASI TUTUPAN LAHAN TERBUKA HIJAU DI KOTAMADYA BANDAR LAMPUNG

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Pertumbuhan penduduk yang pesat di Kotamadya Bandar Lampung memicu alih fungsi lahan, terutama berkurangnya Ruang Terbuka Hijau (RTH), sehingga diperlukan pemantauan dan analisis tutupan lahan yang akurat. Penelitian ini membandingkan kinerja tiga algoritma *machine learning* *Gaussian Mixture Model* (GMM), *Random Forest* (RF), dan *K-Nearest Neighbor* (KNN) dalam mengklasifikasikan tutupan lahan terbuka hijau menggunakan citra Sentinel-2A tahun 2025. Data primer diperoleh melalui survei lapangan untuk validasi (ground truth), sedangkan data sekunder berupa citra satelit dan peta administrasi diolah menggunakan QGIS dengan plugin Dzetsaka dan AcATaMa. Klasifikasi dilakukan secara supervised dengan 588 RoI yang mewakili kelas-kelas tutupan lahan. Hasil penelitian menunjukkan GMM memberikan performa terbaik dengan *Producer's Accuracy* (PA) RTH 94,53%, *Overall Accuracy* (OA) 93,19%, *Kappa Coefficient* (KC) 92,06%, dan waktu pemrosesan tercepat 6,28 detik. RF dan KNN memiliki akurasi lebih rendah, masing-masing dengan OA 89,96% dan 89,45%. RTH Kotamadya Bandar Lampung mencapai 43,9–44,1%, melebihi batas minimal 30% sesuai UU No. 26/2007, menandakan kondisi lingkungan yang baik. Peta menunjukkan perbedaan distribusi spasial antar metode, namun kelas RTH konsisten akurat di semua algoritma. GMM terbukti paling akurat dan efisien untuk pemetaan RTH perkotaan, sehingga layak dijadikan acuan perencanaan tata ruang dan pengelolaan lingkungan berkelanjutan di kota ini.

Kata kunci: ruang terbuka hijau, klasifikasi tutupan lahan, *supervised*, Algoritma, *machine learning*

ABSTRACT

COMPARISON OF VARIOUS MACHINE LEARNING ALGORITHMS FOR IDENTIFICATION OF GREEN OPEN LAND COVER IN BANDAR LAMPUNG CITY

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Rapid population growth in Bandar Lampung City triggers land conversion, especially the reduction of Green Open Space (GOS), so that accurate land cover monitoring and analysis are needed. This study compares the performance of three machine learning algorithms Gaussian Mixture Model (GMM), Random Forest (RF), and K-Nearest Neighbor (KNN) in classifying green open land cover using Sentinel-2A imagery in 2025. Primary data were obtained through field surveys for validation (ground truth), while secondary data in the form of satellite imagery and administrative maps were processed using QGIS with the Dzetsaka and AcATaMa plugins. Classification was carried out supervised with 588 RoIs representing land cover classes. The results showed that GMM provided the best performance with a Producer's Accuracy (PA) of GOS of 94.53%, an Overall Accuracy (OA) of 93.19%, a Kappa Coefficient (KC) of 92.06%, and the fastest processing time of 6.28 seconds. RF and KNN had lower accuracy, with OA of 89.96% and 89.45%, respectively. Bandar Lampung City's green space coverage reached 43.9–44.1%, exceeding the minimum limit of 30% as stipulated in Law No. 26/2007, indicating good environmental conditions. The maps show differences in spatial distribution between methods, but the green space classification was consistently accurate across all algorithms. GMM proved to be the most accurate and efficient for urban green space mapping, making it suitable as a reference for spatial planning and sustainable environmental management in the city.

Keywords: green open land, land use land cover, supervised, algorithm, machine learning