

## **ABSTRAK**

Obesitas merupakan masalah kesehatan global dengan prevalensi yang terus meningkat. Klasifikasi level obesitas secara manual memerlukan waktu lama dan berpotensi menimbulkan kesalahan subjektif. Penelitian ini bertujuan untuk menerapkan algoritma Multiclass Support Vector Machine (SVM) dengan kernel Radial Basis Function (RBF) dalam mengklasifikasikan level obesitas ke dalam tujuh kelas berdasarkan dataset Obesity Levels Estimation dari UCI Machine Learning Repository yang terdiri dari 2.111 data dengan 16 atribut fitur. Penelitian diimplementasikan menggunakan perangkat lunak Orange Data Mining dengan pendekatan visual programming melalui tahapan preprocessing (one-hot encoding dan min-max normalization), implementasi Multiclass SVM dengan strategi one-vs-one, serta evaluasi menggunakan 5-Fold Cross Validation dan Split Data 80:20. Hasil penelitian menunjukkan bahwa algoritma Multiclass SVM dengan kernel RBF mencapai akurasi rata-rata 86,59% pada cross validation dan 86,97% pada data uji split 80:20. Kelas Obesity Type III memiliki performa terbaik dengan F1-Score 92,50%, sedangkan kelas Overweight Level I dan II memiliki performa terendah dengan F1-Score masing-masing 81,60% dan 81,80% akibat tumpang tindih karakteristik dengan kelas obesitas ringan. Analisis fitur penting mengidentifikasi bahwa berat badan (23,45%), tinggi badan (12,67%), dan usia (8,92%) merupakan tiga fitur paling dominan. Perbandingan kernel menunjukkan bahwa kernel RBF (86,59%) unggul dibandingkan kernel polynomial (84,51%) dan linear (82,33%). Penelitian ini berkontribusi dalam menyediakan skema implementasi Multiclass SVM pada Orange Data Mining yang mudah direplikasi serta menjadi baseline bagi pengembangan sistem pendukung keputusan klasifikasi level obesitas.

Kata Kunci : obesitas, klasifikasi, multiclass support vector machine, kernel RBF, orange data mining

## **ABSTRACT**

*Obesity is a global health problem with increasing prevalence. Manual classification of obesity levels requires considerable time and has potential for subjective errors. This study aims to implement the Multiclass Support Vector Machine (SVM) algorithm with Radial Basis Function (RBF) kernel to classify obesity levels into seven classes based on the Obesity Levels Estimation dataset from the UCI Machine Learning Repository, consisting of 2,111 records with 16 feature attributes. The research was implemented using Orange Data Mining software with a visual programming approach through preprocessing stages (one-hot encoding and min-max normalization), Multiclass SVM implementation with one-vs-one strategy, and evaluation using 5-Fold Cross Validation and 80:20 Split Data. The results showed that the Multiclass SVM algorithm with RBF kernel achieved an average accuracy of 86.59% in cross validation and 86.97% in 80:20 split test data. The Obesity Type III class had the best performance with an F1-Score of 92.50%, while the Overweight Level I and II classes had the lowest performance with F1-Scores of 81.60% and 81.80%, respectively, due to overlapping characteristics with mild obesity classes. Feature importance analysis identified that weight (23.45%), height (12.67%), and age (8.92%) were the three most dominant features. Kernel comparison showed that the RBF kernel (86.59%) outperformed the polynomial kernel (84.51%) and linear kernel (82.33%). This study contributes to providing a readily replicable Multiclass SVM implementation scheme on Orange Data Mining and serves as a baseline for developing decision support systems for obesity level classification.*

*Keywords : obesity, classification, multiclass support vector machine, RBF kernel, orange data mining*