

ABSTRAK

Ainurrofik, Akbar. 2026. Klasifikasi *Smartphone* Berdasarkan Spesifikasi Menggunakan *Decision Tree C4.5* dan *Random Forest* dengan *Hyperparameter Tuning*. Tugas Akhir. Program Sarjana. Program Studi Teknik Informatika. Universitas Muhammadiyah Jember.

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Perkembangan *smartphone* yang semakin pesat menghasilkan beragam perangkat dengan spesifikasi dan rentang harga yang berbeda, sehingga diperlukan metode klasifikasi yang mampu mengelompokkan *smartphone* secara objektif berdasarkan karakteristik teknisnya. Penelitian ini bertujuan menganalisis atribut yang paling informatif menggunakan *Decision Tree C4.5* serta membangun model klasifikasi segmen harga *smartphone* menggunakan *Random Forest* yang dioptimalkan melalui *hyperparameter tuning*. Dataset yang digunakan berjumlah 3.260 data *smartphone* dengan enam fitur utama, yaitu kapasitas RAM, penyimpanan internal, jumlah inti prosesor, kapasitas baterai, resolusi kamera utama, dan ukuran layar. Label kelas dibentuk berdasarkan harga yang dikonversi dari INR ke IDR menjadi tiga kategori, yaitu *Entry-Level*, *Mid-Range*, dan *Flagship*. Data dibagi secara *stratified* menjadi 80% data latih dan 20% data uji. Analisis *C4.5* menunjukkan bahwa kapasitas penyimpanan merupakan atribut *root node* dengan *threshold* 192 GB dan *Gain Ratio* sebesar 0,3804. *Random Forest baseline* menghasilkan *Accuracy* 85,12%, *Precision Macro* 82,92%, *Recall Macro* 80,81%, dan *F1-Score Macro* 81,77%. Setelah *tuning* menggunakan *GridSearchCV* dengan *lima-fold StratifiedKfold*, model memperoleh *Accuracy* 85,12%, *Precision Macro* 83,44%, *Recall Macro* 81,03%, dan *F1-Score Macro* 82,15%. Model hasil *tuning* kemudian diimplementasikan pada *website* klasifikasi *smartphone*.

Kata Kunci : *Decision Tree C4.5, GridSearchCV, , hyperparameter tuning Random Forest, smartphone classification*

ABSTRACT

Ainurrofik, Akbar. 2026. *Smartphone Classification Based on Specifications Using Decision Tree C4.5 and Random Forest with Hyperparameter Tuning. Undergraduate Thesis. Bachelor's Program. Informatics Engineering Study Program. University of Muhammadiyah Jember.*

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The rapid development of smartphones has produced a wide variety of devices with different technical specifications and price ranges. This condition makes the process of grouping smartphones into specific price segments increasingly complex when performed manually. This study aims to identify the most informative attribute using the C4.5 Decision Tree C4.5 and to develop a smartphone price-segment classification model using Random Forest optimized through hyperparameter tuning. The dataset consists of 3,260 smartphone records with six main features: RAM capacity, internal storage, number of processor cores, battery capacity, main camera resolution, and screen size. Class labels were generated from prices converted from INR to IDR and divided into three categories: Entry-Level, Mid-Range, and Flagship. The dataset was divided using a stratified 80:20 ratio into training and testing sets. The C4.5 Decision Tree C4.5 analysis identified internal storage as the root node with a threshold of 192 GB and a Gain Ratio of 0.3804. The baseline Random Forest model achieved an Accuracy of 85.12%, Macro Precision of 82.92%, Macro Recall of 80.81%, and Macro F1-Score of 81.77%. After tuning using GridSearchCV with five-fold StratifiedKfold, the model achieved an Accuracy of 85.12%, Macro Precision of 83.44%, Macro Recall of 81.03%, and Macro F1-Score of 82.15%. The results indicate that hyperparameter tuning did not increase the total number of correct predictions but improved the balance of model performance across classes. The tuned model was subsequently implemented in a web-based smartphone classification system.

Keywords: *C4.5 Decision Tree, GridSearchCV, hyperparameter tuning, Random Forest, smartphone classification*