

ABSTRAK

PLATFORM WEB LAYANAN INFORMASI KOPI BERBASIS *MACHINE LEARNING* DAN *DEEP LEARNING*

(2025: xviii + 99 halaman + 40 gambar + 12 tabel + 8 lampiran)

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Penelitian ini bertujuan untuk mengembangkan dan mengevaluasi platform web terintegrasi yang menyediakan tiga fitur utama, yaitu sistem rekomendasi produk kopi menggunakan algoritma *K-Nearest Neighbors (KNN)*, *chatbot* layanan informasi berbasis *Support Vector Machine (SVM)*, dan sistem klasifikasi gambar buah kopi menggunakan *Convolutional Neural Network (CNN)* arsitektur *EfficientNetB0*. Data yang digunakan diperoleh dari komunitas "Kopi Sriwijaya" dan platform *Roboflow*, yang meliputi *dataset* produk kopi, *dataset* pertanyaan dan jawaban untuk *chatbot*, serta *dataset* gambar buah kopi dengan tiga kelas (belum matang, matang, rusak). Pada tahap perancangan, model *KNN* diimplementasikan secara *instance-based* untuk memberikan rekomendasi 10 produk kopi terdekat berdasarkan kemiripan atribut preferensi pengguna. Model *SVM* dilatih pada data *intent* percakapan dengan teknik *TF-IDF* dan evaluasi menunjukkan akurasi sebesar 93% pada data uji, dengan *precision* dan *recall* yang tinggi di hampir semua label *intent*. Sementara itu, model *CNN EfficientNetB0* diterapkan melalui *transfer learning* dan *fine-tuning* pada 30 *layer* terakhir, menghasilkan tingkat akurasi sebesar 97,9% pada data uji gambar buah kopi. Integrasi seluruh model dilakukan melalui *backend Flask* dan *frontend Laravel*, yang diuji secara *end-to-end* pada platform web. Pengujian *black box* menunjukkan seluruh fitur dapat berjalan sesuai spesifikasi dan respons sistem konsisten terhadap input pengguna. Analisis hasil pengujian menegaskan bahwa kelengkapan dan keragaman data merupakan faktor utama dalam meningkatkan performa rekomendasi maupun klasifikasi. Platform yang dikembangkan dinyatakan siap digunakan sebagai solusi digital dalam ekosistem layanan informasi digital, dengan potensi pengembangan lebih lanjut melalui perluasan *dataset*, penambahan variasi data *intent*, serta optimalisasi *parameter model*.

Kata Kunci: *Convolutional Neural Network, Deep Learning, K-Nearest Neighbors, Kopi, Layanan Informasi, Machine Learning, Support Vector Machine*

ABSTRACT

AN INTEGRATED FRAMEWORK FOR A WEB-BASED COFFEE INFORMATION SERVICE USING MACHINE LEARNING AND DEEP LEARNING

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This research aims to develop and evaluate an integrated web platform that provides three main features: a coffee product recommendation system using the K-Nearest Neighbors (KNN) algorithm, an information service chatbot based on Support Vector Machine (SVM), and a coffee cherry image classification system utilizing a Convolutional Neural Network (CNN) with the EfficientNetB0 architecture. The datasets employed in this study were sourced from the “Kopi Sriwijaya” community and the Roboflow platform, comprising coffee product data, question–answer pairs for the chatbot, and annotated images of coffee cherries categorized into three classes (unripe, ripe, and defective). In the design stage, the KNN model was implemented in an instance-based manner to recommend the ten most similar coffee products based on user preference attributes. The SVM model was trained using intent data and TF-IDF text representation, achieving an accuracy of 93% on the test set, with high precision and recall across almost all intent labels. Meanwhile, the CNN EfficientNetB0 model was applied through transfer learning and fine-tuning of the last 30 layers, resulting in a classification accuracy of 97.9% on the coffee cherry image test set. All models were integrated using a Flask-based backend and a Laravel-based frontend, then evaluated through comprehensive end-to-end testing on the web platform. Black box testing confirmed that each feature performed according to the specifications and responded consistently to user input. Analysis of the results indicates that data completeness and diversity are critical factors in improving the performance of both recommendation and classification features. The developed platform is considered ready to be utilized as a digital solution within the coffee ecosystem, with further potential enhancements through dataset expansion, increased intent variation, and model parameter optimization.

Keywords: Coffee, Convolutional Neural Network, Deep Learning, Information Services, K-Nearest Neighbors, Machine Learning, Support Vector Machine