

“ABSTRAK”

Kopi merupakan salah satu komoditas unggulan Indonesia dengan berbagai bentuk, seperti **Defect**, **Longberry**, **Peaberry**, dan **Premium**, yang memiliki karakteristik fisik berbeda. Namun, proses klasifikasi manual membutuhkan keahlian khusus dan waktu yang tidak sedikit, sehingga otomatisasi sangat dibutuhkan. Oleh karena itu, penelitian ini bertujuan untuk mengembangkan model klasifikasi otomatis kualitas biji kopi menggunakan metode **Convolutional Neural Networks (CNN)** berbasis pemrosesan citra digital. Model **CNN** dirancang dengan beberapa lapisan konvolusi yang bertugas mengekstraksi fitur visual dari gambar, seperti tekstur dan bentuk. Setelah itu, performa model dievaluasi menggunakan metrik akurasi, precision, recall, dan F1-score. Adapun **Dataset citra digital biji kopi yang digunakan dalam penelitian ini diperoleh dari USK Green Beans Dataset milik Universitas Syiah Kuala**, yang mencakup keempat kategori kualitas tersebut. Selanjutnya, data diproses melalui tahapan pra-pemrosesan, seperti normalisasi ukuran gambar dan augmentasi data. Hasil penelitian menunjukkan bahwa model **CNN** dapat mengklasifikasikan kualitas biji kopi secara efektif, dengan akurasi terbaik mencapai **80%**. Model ini mampu membedakan ciri khas masing-masing bentuk, termasuk Defect, Longberry, Peaberry, dan Premium. Kinerja model dipengaruhi oleh kualitas gambar, jumlah data, serta parameter pelatihan seperti **learning rate** dan jumlah **epoch**. Penelitian ini diharapkan dapat meningkatkan efisiensi proses klasifikasi biji kopi di sektor industri serta menjadi referensi bagi pengembangan lebih lanjut dalam penerapan kecerdasan buatan di bidang pertanian.

Kata Kunci: Klasifikasi biji kopi, Convolutional Neural Networks, Pemrosesan citra digital, Augmentasi data, Bentuk biji kopi

“ABSTRACT”

Coffee is one of Indonesia's leading commodities, available in various forms such as **Defect**, **Longberry**, **Peaberry**, and **Premium**, each with distinct physical characteristics. However, manual classification requires specialized expertise and a significant amount of time, thus necessitating automation. Therefore, this study aims to develop an automated classification model for coffee bean quality using the **Convolutional Neural Networks (CNN)** method based on digital image processing. The **CNN** model is designed with several convolutional layers that function to extract visual features from images, such as texture and shape. Subsequently, the model's performance is evaluated using metrics such as accuracy, precision, recall, and F1-score. **The digital coffee bean image dataset used in this study was obtained from the USK Green Beans Dataset, provided by Universitas Syiah Kuala**, which includes all four quality categories. The data was then processed through several pre-processing steps, including image size normalization and data augmentation. The results of the study show that the CNN model can effectively classify coffee bean quality, achieving a best accuracy of up to 80%. The model is capable of distinguishing the unique characteristics of each category, including **Defect**, **Longberry**, **Peaberry**, and **Premium**. The model's performance is influenced by image quality, dataset size, and training parameters such as learning rate and number of epochs. This research is expected to improve the efficiency of coffee bean classification processes in the industrial sector and serve as a reference for further development of artificial intelligence applications in the agricultural field.

Keywords: Coffee bean classification, Convolutional Neural Networks, Digital image processing, Data augmentation, Coffee bean Shape