

ABSTRAK

Saat ini dalam menentukan varietas buah kelapa di Kabupaten Sumenep masih menggunakan cara manual. Hal itu tentu menjadi tidak efisien karena berbagai faktor dapat terjadi seperti kekeliruan dan kelelahan jika penentuan dalam jumlah yang banyak. Penelitian ini menggunakan metode *Convolutional Neural Network* (CNN) dengan arsitektur DenseNet 121 dan dataset citra kelapa 600 yang terbagi kedalam 3 kelas, yaitu Kelapa Dalam Hijau, Kelapa Genjah dan Kelapa Puyuh. Pembagian data dilakukan dengan presentase 80% untuk keperluan training model dan 20% untuk testing model. Data yang digunakan training diaugmentasi hingga menjadi 960. Beberapa skenario pengujian dilakukan seperti skenario tanpa augmentasi dan membandingkan ketika menggunakan *transfer learning* dan tanpa transfer learning. Selain itu skenario pencarian *hyperparameter learning rate* dan *batch size* terbaik menggunakan algoritma *random search* dilakukan. Parameter learning rate berisi 0.0001, 0.0002, 0.0003 dan batch size 16, 32, 64. Hasil pencarian hyperparameter terbaik diperoleh pada kombinasi learning rate 0.0003 dan batch size 32 dengan nilai 85% untuk skenario tanpa augmentasi, 89% pada skenario tanpa transfer learning dengan batch size 16 dan learning rate 0,0002, dan 95% dengan skenario transfer learning dengan batch size 32 dan learning rate 0,0003. Akurasi pengujian yang dilakukan pada skenario dengan transfer learning mendapatkan hasil tertinggi hingga 95%.

Kata Kunci: Buah Kelapa, DenseNet 121, Klasifikasi Citra, Convolutional Neural Network, Transfer Learning

ABSTRACT

Currently, determining the varieties of coconut fruit in Sumenep Regency is still done manually. This method is inefficient due to various factors, such as the possibility of errors and fatigue, especially when processing large quantities. This study uses the Convolutional Neural Network (CNN) method with the DenseNet 121 architecture and a dataset of 600 coconut images, divided into 3 classes: Green Tall Coconut, Dwarf Coconut, and Puyuh Coconut. The data was split, with 80% used for training the model and 20% for testing. The training data was augmented to a total of 960 images. Several testing scenarios were conducted, including scenarios without augmentation and comparisons between using transfer learning and not using it. Additionally, a random search algorithm was employed to find the optimal hyperparameters for learning rate and batch size. The learning rate parameters used were 0.0001, 0.0002, and 0.0003, while the batch sizes tested were 16, 32, and 64. The best hyperparameter combination was found to be a learning rate of 0.0003 and a batch size of 32, yielding 85% accuracy for the scenario without augmentation, 89% accuracy for the scenario without transfer learning with a batch size of 16 and learning rate of 0.0002, and 95% accuracy for the transfer learning scenario with a batch size of 32 and learning rate of 0.0003. The highest test accuracy of 95% was achieved in the transfer learning scenario.

Keywords: Coconut Fruit, DenseNet 121, Image Classification, Convolutional Neural Network, Transfer Learning