INTISARI

PENERAPAN CONVOLUTIONAL NEURAL NETWORK UNTUK IDENTIFIKASI SPESIES BURUNG HAMA PEMAKAN BIJI-BIJIAN PADA LAHAN PADI

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Burung hama pemakan biji-bijian seperti pipit dan bondol sering menyerang lahan padi dan menyebabkan penurunan hasil panen. Sistem pengusiran yang ada saat ini kurang efektif karena hanya mendeteksi keberadaan burung tanpa membedakan jenisnya. Penelitian ini bertujuan mengembangkan model identifikasi otomatis berbasis Convolutional Neural Network untuk mengenali spesies burung hama pemakan biji-bijian secara spesifik. Model dikembangkan menggunakan arsitektur EfficientNetB0 dengan pendekatan transfer learning dari ImageNet. Dataset terdiri dari 2.112 gambar yang dikumpulkan dari eBird.org mencakup empat spesies target yakni Bondol Jawa (Lonchura leucogastroides), Bondol Peking (Lonchura punctulata), Bondol Haji (Lonchura maja), dan Pipit (Passer montanus), serta satu kelas unknown (burung non-hama), yang dibagi menjadi 70% data latih dan 30% data validasi. Data uji lapangan sebanyak 18 gambar diambil langsung dari persawahan di Gedong Tataan, Pesawaran, Lampung. Augmentasi data diterapkan untuk meningkatkan variasi dan mencegah overfitting. Hasil penelitian menunjukkan model mencapai akurasi training 96,2% dan validasi 82,2% dalam 24 epoch. Cross-validation menunjukkan akurasi rata-rata 84,70% dengan AUC macro 0,9724. Bondol Haji memiliki akurasi tertinggi (87,3%), sedangkan Bondol Peking sering teridentifikasi keliru dengan spesies lain. Pengujian lapangan menghasilkan akurasi 50,88%, yang menyoroti tantangan variabilitas lingkungan di kondisi nyata. Secara keseluruhan, model ini menunjukkan performa yang kuat pada data validasi dan berpotensi menjadi dasar pengembangan sistem smart farming untuk pengendalian hama yang lebih efektif di lahan padi.

Kata kunci: Deep Learning, EfficientNetB0, Identifikasi burung hama, Pengolahan citra, Lahan padi

ABSTRACT

APPLICATION OF CONVOLUTIONAL NEURAL NETWORKS FOR IDENTIFYING GRAIN-EATING PEST BIRD SPECIES IN RICE FIELDS

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Grain-eating pest birds such as the Java Munia, Scaly-breasted Munia, White-headed Munia, and Eurasian Tree Sparrow frequently attack rice fields, causing significant yield losses. Existing repellent systems are often ineffective because they only detect the presence of birds without distinguishing specific species. This research aims to develop an automatic identification model using a Convolutional Neural Network (CNN) to accurately classify pest bird species commonly found in rice fields. The model was developed using the EfficientNetB0 architecture with a transfer learning approach pre-trained on ImageNet. The dataset consists of 2,112 images obtained from eBird.org, covering four target species—Java Munia (*Lonchura leucogastroides*), Scaly-breasted Munia (*Lonchura punctulata*), White-headed Munia (*Lonchura maja*), and Eurasian Tree Sparrow (*Passer montanus*), along with an additional unknown (non-pest) class. The dataset was split into 70% training and 30% validation, while 18 field-test images were collected directly from rice fields in Gedong Tataan Sub District, Pesawaran District, Lampung Province. Data augmentation techniques were applied to enhance variation and reduce overfitting. The model achieved a training accuracy of 96.2% and a validation accuracy of 82.2% across 24 epochs. Cross-validation produced an average accuracy of 84.70% with a macro-AUC of 0.9724. The White-headed Munia class achieved the highest accuracy (87.3%), while the Scaly-breasted Munia was most frequently misclassified. Field testing resulted in an accuracy of 50.88%, highlighting challenges related to environmental variability in real-world conditions. Overall, the proposed model demonstrates strong performance on validation data and shows potential as a foundation for developing smart-farming systems aimed at more effective pest control in rice fields.

Keywords: Deep Learning, EfficientNetB0, Pest Bird Identification, Image Processing, Rice Fields