ABSTRAK

Sistem presensi mahasiswa konvensional di ruang perkuliahan sering kali menghadapi kendala efisiensi dan rentan terhadap praktik manipulasi kehadiran (titip absen). Penelitian ini bertujuan untuk mengembangkan sistem presensi otomatis berbasis identifikasi wajah menggunakan metode Convolutional Neural Network (CNN) dengan arsitektur kustom bernama RASANET V5. Dataset penelitian terdiri dari 1.740 citra wajah yang diperoleh dari 58 mahasiswa dengan masing-masing 30 citra wajah per individu di lingkungan Program Studi Ilmu Komputer Universitas Muhammadiyah Gorontalo. Evaluasi performa model dilakukan melalui 20 skenario pengujian dengan memvariasikan ukuran resolusi citra input, yaitu 100×100, 200×200, 300×300, dan 400×400 piksel, serta rasio pembagian dataset (split size) dari 0,1 hingga 0,5 untuk memperoleh konfigurasi model yang paling optimal. Hasil penelitian menunjukkan bahwa konfigurasi resolusi 100×100 piksel dengan rasio pembagian data 90:10 (Model 5) menghasilkan performa terbaik dengan akurasi validasi sebesar 98,28%, nilai F1-Score sebesar 0,97, dan nilai loss terendah sebesar 0,1127. Sebaliknya, penggunaan resolusi citra 400×400 piksel menyebabkan penurunan performa model secara signifikan akibat jumlah parameter jaringan yang terlalu besar dibandingkan jumlah dataset yang tersedia. Hasil pengujian komparasi arsitektur menunjukkan bahwa model usulan RASANET V5 memiliki performa yang lebih baik dibandingkan model CNN pralatih seperti VGG16, ResNet50V2, dan MobileNetV2 dalam proses identifikasi wajah mahasiswa. Selain itu, penerapan Batch Normalization dan Dropout sebesar 0,5 terbukti efektif dalam meningkatkan kemampuan generalisasi model serta mengurangi risiko overfitting selama proses pelatihan.Berdasarkan hasil penelitian, metode CNN dengan arsitektur RASANET V5 dinilai efektif dan layak diterapkan sebagai sistem presensi otomatis berbasis identifikasi wajah mahasiswa di lingkungan ruang perkuliahan.

Kata Kunci: *Convolutional Neural Network*, RASANET V5, Identifikasi Wajah, Presensi Mahasiswa, *Deep Learning*.

ABSTRACT

Conventional student attendance systems in classrooms often face efficiency issues and are vulnerable to attendance manipulation practices such as proxy attendance. This study aims to develop an automatic attendance system based on facial identification using the Convolutional Neural Network (CNN) method with a custom architecture named RASANET V5. The research dataset consisted of 1,740 facial images collected from 58 students, with 30 facial images for each individual from the Department of Computer Science at Universitas Muhammadiyah Gorontalo. Model performance evaluation was conducted through 20 testing scenarios by varying the input image resolutions of 100×100, 200×200, 300×300, and 400×400 pixels, as well as dataset split ratios ranging from 0.1 to 0.5 in order to obtain the most optimal model configuration. The results showed that the 100×100 pixel resolution configuration with a 90:10 data split ratio (Model 5) achieved the best performance, obtaining a validation accuracy of 98.28%, an F1-Score of 0.97, and the lowest loss value of 0.1127. In contrast, the use of a 400×400 pixel image resolution significantly decreased model performance due to the excessive number of network parameters compared to the available dataset size. Comparative architecture testing demonstrated that the proposed RASANET V5 model outperformed pretrained CNN models such as VGG16, ResNet50V2, and MobileNetV2 in the student facial identification process. In addition, the implementation of Batch Normalization and a Dropout rate of 0.5 proved effective in improving the model's generalization capability and reducing the risk of overfitting during the training process. Based on the research findings, the CNN method with the RASANET V5 architecture is considered effective and feasible to be implemented as an automatic attendance system based on student facial identification in classroom environments.

Keywords: Convolutional Neural Network, RASANET V5, Facial Identification, Student Attendance, Deep Learning.