

ABSTRAK

VERIFIKASI WAJAH BERBASIS ARTIFICIAL INTELLIGENCE OF THINGS DENGAN KOMPARASI MODEL PADA FRAMEWORK DEEPFACE

Muhammad Syamil Hamami – 1217050103
Jurusan Teknik Informatika
Universitas Islam Negeri Sunan Gunung Djati Bandung

Perkembangan teknologi *Artificial Intelligence of Things* (AIoT) mendorong inovasi sistem verifikasi identitas yang lebih cepat dan efisien. Salah satu pendekatan yang banyak digunakan adalah verifikasi wajah, namun implementasinya pada perangkat *edge* seperti ESP32-S3 WROOM CAM sering menghadapi keterbatasan kapasitas komputasi. Penelitian ini mengusulkan arsitektur *hybrid* yang membagi tugas antara deteksi wajah di perangkat *edge* dan proses verifikasi wajah di *server* menggunakan *framework* DeepFace. Model yang diuji mencakup semua model yang tersedia pada DeepFace kecuali Dlib. Sistem dibangun dengan mengintegrasikan kamera dan *buzzer* pada ESP32-S3 untuk mendeteksi wajah dan memberikan respon berupa bunyi sebagai penanda keberhasilan atau kegagalan verifikasi. Sementara itu, proses verifikasi dilakukan di sisi *server* melalui pengiriman citra wajah menggunakan metode HTTP *multipart*. Evaluasi dilakukan dalam berbagai kondisi pencahayaan dan menunjukkan bahwa ArcFace memiliki akurasi paling tinggi, dengan rata-rata akurasi di atas 80% serta waktu respons yang kompetitif dibandingkan model lainnya. Sistem ini juga mampu mengurangi beban bandwidth dan memberikan performa *real-time* yang stabil, dengan rata-rata waktu pengenalan di bawah 5 detik. Hasil penelitian menunjukkan bahwa arsitektur *hybrid* ini efektif untuk diimplementasikan dalam berbagai sistem yang memerlukan verifikasi wajah secara *real-time*, seperti kontrol akses, absensi, dan aplikasi sejenis lainnya.

Kata Kunci: AIoT, Verifikasi Wajah, DeepFace, Arsitektur *Hybrid*, ESP32-S3, Deteksi Wajah, Komputasi *Edge*, *Real-Time*

ABSTRACT

ARTIFICIAL INTELLIGENCE OF THINGS BASED FACE VERIFICATION WITH MODEL COMPARISON IN THE DEEPFACE FRAMEWORK

Muhammad Syamil Hamami – 1217050103
Department of Informatics Engineering
Sunan Gunung Djati State Islamic University Bandung

The development of Artificial Intelligence of Things (AIoT) technology is driving innovation in faster and more efficient identity verification systems. One widely used approach is facial verification, but its implementation on edge devices such as the ESP32-S3 WROOM CAM often faces computational capacity limitations. This research proposes a hybrid architecture that divides tasks between face detection on the edge device and face verification on the server using the DeepFace framework. The tested models include all models available on DeepFace. The system is built by integrating a camera and buzzer on the ESP32-S3 to detect faces and provide an audio response as an indicator of verification success or failure. Meanwhile, the verification process is performed on the server side by sending facial images using the HTTP multipart method. Evaluations were conducted under various lighting conditions and showed that ArcFace has the highest accuracy with average accuracy above 80% and competitive response time compared to other models. The system also reduces bandwidth load and provides stable real-time performance, with an average recognition time of less than 5 second. The research results indicate that this hybrid architecture is effective for implementation in various systems requiring real-time facial verification, such as access control, attendance tracking, and similar applications.

Keywords: *AIoT, Face Verification, DeepFace, Hybrid Architecture, ESP32-S3, Face Detection, Edge Computing, Real-Time*