IMPLEMENTASI *EFFICIENTNET* DAN *GATED RECURRENT UNIT* UNTUK MENDETEKSI POTENSI DEPRESI SERTA PENERAPAN MODEL MELALUI DESAIN *USER INTERFACE*

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ABSTRAK

Penelitian ini dilatarbelakangi oleh meningkatnya prevalensi depresi secara global, termasuk di Indonesia, serta perlunya deteksi dini berbasis teknologi yang praktis dan akurat. Sistem ini menggabungkan analisis ekspresi wajah menggunakan *EfficientNetB3* untuk mengenali tujuh ekspresi (marah, sedih, senang, jijik, takut, netral, terkejut) dan analisis teks jurnaling berbahasa Indonesia dengan *Gated Recurrent Unit* (GRU) untuk mendeteksi pola bahasa negatif. Dataset citra dinormalisasi dan diaugmentasi, sedangkan teks diproses melalui pembersihan, tokenisasi, dan *stemming*. Model diuji menggunakan *K-Fold Cross Validation* dan digabungkan melalui metode *late fusion* voting mayoritas, kemudian diimplementasikan pada antarmuka *Streamlit* yang mendukung input kamera dan teks secara *real-time*. Hasil evaluasi menunjukkan akurasi model wajah 99,11% (pelatihan) dan 97,14% (pengujian), serta model teks 98,91% (pelatihan) dan 96,28% (pengujian). Kombinasi multimodal meningkatkan akurasi deteksi gejala depresi. Uji pakar oleh psikolog menilai sistem ini potensial sebagai alat skrining awal, meskipun tetap memerlukan pendampingan profesional untuk interpretasi. Penelitian ini menghasilkan sistem deteksi kesehatan mental yang efisien, akurat, dan mudah diakses dengan antarmuka interaktif untuk mendukung diagnosis dini.

Kata Kunci: Deteksi Depresi, *EfficientNet*, GRU, Analisis Multimodal, *User Interface*

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ABSTRACT

This research is motivated by the increasing prevalence of depression globally, including in Indonesia, and the need for a practical and accurate technology-based early detection system. The proposed system combines facial expression analysis using EfficientNetB3 to recognize seven emotions (angry, sad, happy, disgust, fearful, neutral, and surprised) and Indonesian journaling text analysis using Gated Recurrent Unit (GRU) to detect negative language patterns. Image datasets are normalized and augmented, while text data undergo cleaning, tokenization, and stemming. The models are evaluated using K-Fold Cross Validation and integrated through a late fusion majority voting method. The combined model is implemented in a Streamlit-based interface supporting real-time camera and text input. Evaluation results show facial emotion model accuracy of 99.11% (training) and 97.14% (testing), and text model accuracy of 98.91% (training) and 96.28% (testing). The multimodal combination improves depression symptom detection accuracy. Expert validation by psychologists suggests the system has strong potential as an early screening tool, although professional assistance is still required for interpretation. This study delivers an efficient, accurate, and accessible mental health detection system with an interactive interface to support early diagnosis.

Keywords: *Depression Detection, EfficientNet, GRU, Multimodal Analysis, User Interface*