

ABSTRAK

PENGEMBANGAN ALGORITMA CNN DALAM MENGANALISIS EMOSI SUARA UNTUK REKOMENDASI PEMESANAN ONLINE (2025 : xiv + 60 halaman + 28 gambar + 9 tabel + 10 lampiran)

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Kemampuan sistem komputer dalam mengenali emosi manusia menjadi salah satu aspek penting dalam pengembangan teknologi interaktif berbasis kecerdasan buatan. Penelitian ini bertujuan untuk mengembangkan model klasifikasi emosi berbasis suara menggunakan algoritma Convolutional Neural Network (CNN), dan mengintegrasikannya ke dalam sistem website pemesanan online sebagai fitur rekomendasi menu berbasis emosi pengguna. Dataset yang digunakan adalah RAVDESS (*Ryerson Audio-Visual Database of Emotional Speech and Song*), yang terdiri dari 1.440 rekaman suara dengan enam kategori emosi: *happy*, *angry*, *sad*, *fear*, *neutral*, dan *surprise*. Data suara dikonversi ke bentuk citra mel-spectrogram dan dilatih menggunakan arsitektur CNN ResNet-34 yang dimodifikasi pada bagian fully connected layer. Evaluasi model dilakukan menggunakan *Stratified K-Fold Cross Validation* ($K = 10$), dengan metrik evaluasi berupa akurasi, *precision*, *recall*, *F1-score*, dan confusion matrix. Hasil validasi menunjukkan bahwa model mampu mengenali pola emosi dengan akurasi rata-rata sebesar 92% dan *F1-score* makro sebesar 0.92, serta menghasilkan performa klasifikasi yang seimbang pada seluruh kelas. Namun, saat diimplementasikan ke dalam sistem website, model hanya mampu mendeteksi dua emosi dominan (*happy* dan *angry*) secara konsisten, meskipun seluruh input tetap menghasilkan output emosi. Hal ini mengindikasikan adanya ketimpangan performa antara hasil eksperimen dan penerapan nyata, yang kemungkinan disebabkan oleh perbedaan kualitas input suara dan ketidaksesuaian pipeline pra-pemrosesan. Penelitian ini membuktikan bahwa model deteksi emosi berbasis CNN dapat diimplementasikan secara teknis ke dalam sistem berbasis web. Namun demikian, pengujian pada lingkungan nyata menunjukkan perlunya proses adaptasi lebih lanjut, baik dari sisi data pelatihan, arsitektur sistem, maupun kualitas input pengguna, agar sistem dapat berfungsi secara lebih akurat dan kontekstual.

Kata Kunci : *Algoritma CNN, Convolutional Neural Network, Website, Deteksi Emosi Berbasis Suara*

ABSTRACT

DEVELOPMENT OF CNN ALGORITHM IN ANALYZING SPEECH EMOTIONS FOR ONLINE ORDERING RECOMMENDATIONS
(2025 : xiv + 60 pages + 28 figures + 9 table + 10 attachments)

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The ability of a computer system to recognize human emotions is an important aspect in the development of interactive technology based on artificial intelligence. This study aims to develop a voice-based emotion classification model using the Convolutional Neural Network (CNN) algorithm, and integrate it into an online ordering website system as a menu recommendation feature based on user emotions. The dataset used is RAVDESS (Ryerson Audio-Visual Database of Emotional Speech and Song), which consists of 1,440 voice recordings with six emotion categories: happy, angry, sad, fear, neutral, and surprise. The voice data is converted into mel-spectrogram images and trained using a modified ResNet-34 CNN architecture in the fully connected layer. Model evaluation was carried out using Stratified K-Fold Cross Validation ($K = 10$), with evaluation metrics in the form of accuracy, precision, recall, F1-score, and confusion matrix. The validation results show that the model is able to recognize emotional patterns with an average accuracy of 92% and a macro F1-score of 0.92, and produces balanced classification performance across all classes. However, when implemented in a website system, the model was only able to consistently detect two dominant emotions (happy and angry), even though all inputs still produced emotional output. This indicates a performance gap between the experimental results and the real-world implementation, likely caused by differences in voice input quality and incompatibility of the pre-processing pipeline. This research demonstrates that the CNN-based emotion detection model can be technically implemented in a web-based system. However, testing in a real-world environment indicates the need for further adaptation, both in terms of training data, system architecture, and user input quality, for the system to function more accurately and contextually.

Keywords : CNN Algorithm, Convolutional Neural Network, Website, Voice-Based Emotion Detection