

Personalized Music Recommendation via Predictive Emotional Modeling for Individuals with Depression

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Abstract

According to the World Health Organization, more than 280 million people worldwide suffer from depression, underscoring the urgent need for accessible and effective support solutions. This study presents an AI-driven emotion-sensing music recommendation system designed to assist individuals experiencing depression. The system employs deep learning-based facial emotion recognition combined with therapeutic music mapping to deliver immediate, personalized support. Facial images are captured via a web interface, pre-processed using computer vision techniques, and classified by a Convolutional Neural Network (CNN) trained on the FER-2013 and AffectNet datasets. These datasets were also used to validate the robustness and accuracy of the proof-of-concept model. A curated playlist of 200 tracks was categorized by tempo, valence, and arousal to guide emotion-based music recommendations. User testing was conducted on a voluntary basis with institutional ethical approval and informed consent. To ensure privacy, all facial image processing was performed in real time without data retention. The system achieved an emotion recognition accuracy of 78–82%, with particularly strong performance in detecting sadness (85%) and neutral states (88%). Furthermore, 73% of participants reported that the music recommendations were appropriate, and 68% noted an improvement in mood. The system delivered recommendations in under 30 seconds and received a usability rating of 79. This study demonstrates the potential of integrating affective computing, deep learning, and music therapy as a non-invasive mental health support tool. However, limitations were observed in detecting subtle emotional states and in accounting for cultural differences in emotional responses and musical preferences. Future work will focus on enhancing personalization, validating the system across diverse cultural contexts, and conducting clinical trials to assess therapeutic effectiveness.

Keywords: Depression, Music Therapy, Facial Emotion Recognition, Deep Learning, Mental Health