REAL-TIME EMOTION-DRIVEN MUSIC RECOMMENDATION INTEGRATING USER MOOD AND SONG FEATURE ANALYSIS

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Abstract

The pressures of modern lifestyles have heightened stress and emotional challenges, with individuals increasingly turning to social media for emotional expression, while existing music recommendation systems fail to align suggestions with a user's real-time emotional state. This study aimed to design, develop, and evaluate a Real-Time Emotion-Driven Music Recommendation System that integrates social media-based user mood detection with multimodal song feature analysis to deliver personalised music recommendations for emotional wellbeing. Following a mixed-methods design, three machine learning models were developed: a Convolutional Neural Network applied to audio features capturing timbre, energy, and harmony for music emotion recognition; a multi-label Dense Neural Network with TF-IDF term weighting for lyrical emotion classification, both trained on the MIREX Emotion Dataset; and a text-based Dense Neural Network, trained on the GoEmotions corpus, for detecting user emotions from Reddit posts of the preceding 24 hours. A novel emotion score algorithm computed composite emotional probabilities by combining music-feature and lyrical outputs via a literature-weighted average normalised to 100%. An emotion mapping framework, whereby certain emotions ease others, translated six user emotional states (Happy, Anger, Sadness, Anxiety, Curiosity, and Neutral) into five music emotional categories (Energetic, Humorous, Negative, Positive, and Neutral), with songs retrieved by closest emotion-score (Euclidean) match; both verified through functional and user testing. After 50 training passes (epochs), test-set accuracy reached 63.34% (audio features), 99.66% (lyrics), and 66.02% (social media text). Seven of ten functional (75%) and all four non-functional (100%) requirements were fulfilled. Thematic analysis of expert feedback and ratings from 22 user testers confirmed positive usability and that recommended songs effectively supported emotional relief. The findings establish the viability of a multimodal, AI-driven approach to real-time emotion-aware music recommendation; posted text alone as a mood indicator remains a limitation, motivating a hybrid text and facial-recognition approach, multi-language support, and streaming platform integration.

Keywords: Emotion detection, Music recommendation, Machine learning, Natural language processing, Convolutional neural networks