Real-Time Emotion-Based Movie Recommendation System

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ABSTRACT

In recent years, personalized recommendation systems have gained significant attention, yet most rely solely on user preferences, watch history, or explicit feedback. These approaches often neglect the user's current emotional state, which plays a crucial role in content engagement. This paper presents a Real-Time Emotion-Based Movie Recommendation System that enhances user experience by incorporating affective computing into the recommendation process. The system employs pre-trained facial emotion recognition models such as DeepFace, to detect real-time emotional states from webcam input. Detected emotions - such as happiness, sadness, anger, or neutrality - are mapped to corresponding movie genres. Movie data is fetched dynamically from The Movie Database (TMDB) API, and recommendations are generated accordingly, and uses LangChain to generate emotion specific movie descriptions and thus explains why each movie is perfect for your current mood. A simple and interactive user interface, built using Gradio, provides users with immediate emotion analysis and personalized movie suggestions. The proposed system demonstrates a lightweight, scalable solution that can be implemented within a short time frame, making it suitable for rapid prototyping and academic projects.

TECH STACK

Python: Serves as the core programming language for the entire system, handling data processing, API integration, and application logic.

DeepFace: A comprehensive facial analysis library that performs facial expression analysis using deep learning models to detect and classify emotions from facial images captured through the webcam.

OpenCV: Handles real-time webcam capture, image preprocessing, face detection, and video frame processing to prepare facial data for emotion analysis.

TMDB API (The Movie Database API): Provides access to extensive movie metadata including titles, genres, ratings, descriptions, and poster images, enabling dynamic retrieval of movie recommendations based on detected emotions.

LangChain: An advanced framework that integrates large language models (LLMs) into applications. In this system, LangChain is used to generate emotion-specific movie descriptions by leveraging detected emotions and movie metadata. It enhances the user experience by explaining why a recommended movie aligns with the user's current mood, adding a layer of personalized context and narrative.

Gradio: An alternative framework for building the user interface that provides quick prototyping capabilities for machine learning applications, offering easy-to-use components for webcam input, emotion display, and movie recommendation presentation.