Emotion-Based Music Recommender

Finalized Semester Project Report

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1. Project Title

Emotion-Based Music Recommender System

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2. Problem Statement

Music plays a significant role in influencing and reflecting human emotions. In today's digital environment, users typically select songs manually based on their mood, which can be timeconsuming, inconsistent, and often inaccurate.

This project aims to design an automated solution that detects a user's facial emotion from an uploaded image or webcam capture and recommends music that matches their emotional state. The system focuses solely on mood-based song suggestions and does not include music playback functionality.

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3. Dataset Description

This project primarily uses user-provided images for emotion detection. Users can either:

- Upload an image from their device
- Capture a live image through the webcam interface

These images are analyzed using emotion recognition models.

Reference Datasets (Optional / For Testing Purposes)

Although the system operates on user input images, the following public datasets are relevant and can be used for testing or comparison:

- • FER2013 – Facial Emotion Recognition dataset
- • CK+ (Cohn-Kanade) – Standard dataset of posed emotional expressions

Sample images for internal testing may be stored inside a folder such as sample_images/.

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4. **Objectives of the Project**

The objectives of this project are:

1. To detect facial emotions from input images using a pre-trained or custom emotion detection model.
2. To recommend appropriate music based on the detected emotion.
3. To develop a clean, modular, and error-free Python implementation using Google Colab.
4. To provide a simple and user-friendly interface for webcam capture or image uploading.
5. To generate clear output including detected emotion, confidence scores, and recommended songs.
6. To prepare well-organized documentation and demonstration materials for submission.

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5. **Methodology**

Step 1: Image Input

The system allows the user to choose between:

- • Webcam Capture (JavaScript integrated in Google Colab)
- • Upload Image File (JPG, PNG, JPEG)

Step 2: Preprocessing

- • The selected image is loaded into the system.
- • The model processes the image to extract facial features.
- • enforce_detection=False is used to prevent errors when the face is partially visible.

Step 3: Emotion Detection

The emotion recognition model analyzes the face and outputs:

  - Dominant emotion
  - Confidence level
  - Probability distribution across all supported emotions
    (happy, sad, angry, fear, neutral, surprise, etc.)

Step 4: Emotion-to-Music Mapping

Each emotion corresponds to a predefined playlist. Example mappings:

  - Happy: Blinding Lights, Get Lucky, Happy
  - Sad: Lovely, Someone You Loved, Call Out My Name
  - Angry: Lose Yourself, In The End, The Way I Am
  - Fear: Fix You, Breathe Me, 1-800-273-8255
  - Surprise: Starboy, Bad Guy
  - Neutral: Ocean Eyes, Mockingbird

Each playlist includes artist names and YouTube links.

Step 5: Output Display

The system displays:

  - Detected emotion
  - Confidence percentage
  - Emotion breakdown bar structure
  - Music recommendations with YouTube URLs

All results appear neatly inside the Colab interface.

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6. **Expected Results**

The system is expected to:

  - Accurately detect the user's dominant emotion from a clear and frontal facial image.
  - Display confidence levels and a detailed emotion breakdown.
  - Provide mood-appropriate and meaningful music recommendations.
  - Work smoothly on Google Colab, including webcam support.
  - Produce consistent results under good lighting and face visibility conditions.

End of Report

Thank you.