

# Music Recommendation System Using Face Recognition for Mood Detection

## Abstract

This project explores the development of an innovative music recommendation system that leverages face recognition technology to detect user emotions and suggest music that aligns with the identified mood. Unlike conventional music platforms that rely on user input and listening habits, this system aims to enhance the listening experience by providing real-time, mood-based recommendations. By integrating face recognition with machine learning, the system adjusts to the user's emotional state, curating personalized playlists to match their current mood. The solution is designed to respect user privacy by processing face data locally and providing full transparency in data usage. This project seeks to offer a more intuitive, adaptive, and engaging music discovery platform.

## Introduction

Music is a powerful medium that can evoke and reflect emotions. With advancements in artificial intelligence and machine learning, personalized music recommendation systems have become more sophisticated, adapting to individual user preferences and behaviors. However, current systems are largely reactive, relying on past user activity or manual input to generate recommendations. This project introduces a novel approach by incorporating real-time emotion detection using face recognition technology to enhance music recommendations.

By analyzing facial expressions, the system can detect the user's mood and respond with a curated playlist that matches their emotional state. This approach provides a more dynamic and personalized listening experience, offering music that resonates with the user's current feelings. Furthermore, the project emphasizes user privacy, with face recognition data processed locally on the device and no facial data stored or transmitted. The goal is to create a seamless, intuitive

platform that brings users closer to the music they love in a more emotionally aware way.

## Recommendation Algorithm

The music recommendation system operates in the following steps, combining emotion detection with real-time playlist generation:

### 1. **\*\*Detect Mood Using Face Recognition\*\***:

- The system captures a user's facial expression using a webcam or camera. An emotion detection model, such as a neural network or pre-trained tool like OpenCV or a deep learning model, is used to classify the emotion (e.g., happy, sad, calm).

Example code snippet for mood detection:

```
```python
def detect_mood(facial_data):
    # Use pre-trained model to analyze facial data
    mood = emotion_detection_model(facial_data)
    return mood
```
```

### 2. **\*\*Map Detected Mood to Music Attributes\*\***:

- Once the mood is detected, it is mapped to certain music characteristics such as tempo (fast/slow), energy level (high/low), and genre (e.g., pop, rock, acoustic). This helps in determining which type of music to recommend based on the mood.

Example mapping code:

```

```python
def map_mood_to_music(mood):
    mood_map = {
        'happy': {'tempo': 'fast', 'energy': 'high', 'genre': 'pop'},
        'sad': {'tempo': 'slow', 'energy': 'low', 'genre': 'acoustic'},
        'calm': {'tempo': 'medium', 'energy': 'low', 'genre': 'chill'}
    }

    return mood_map.get(mood, {'tempo': 'medium', 'energy': 'medium', 'genre': 'ambient'})
```

```

### 3. **\*\*Fetch Songs Based on Mood\*\***:

- The system interacts with a music API (such as Spotify API) to fetch songs that match the identified music attributes like tempo, energy, and genre. The API call retrieves songs that align with the user's detected mood.

```

```python
def query_music_api(tempo, energy, genre):
    # Call to Spotify or other music API to get songs

    songs = music_api.query_songs(tempo=tempo, energy=energy, genre=genre)

    return songs
```

```

### 4. **\*\*Generate Playlist\*\***:

- Based on the songs fetched, a playlist is generated and presented to the user. The playlist is dynamically created based on their current mood, providing an adaptive, mood-based music

experience.

In conclusion, the system provides real-time recommendations by detecting the user's emotions and dynamically adapting music suggestions to their current mood.