

Winter of Code

Proposal

for the project

“Emotion Based Music Player using Deep Learning”

Under

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Synopsis

Emotion-Based Music Player

The Emotion-Based Music Player is a system designed to enhance the way we interact with music by recommending songs based on how we feel. It works by detecting your emotional state through your facial expressions and then playing music that matches your mood. For example, if you're feeling happy, the system might suggest upbeat tunes, while if you're feeling sad, it might play more calming or soothing music.

Purpose and Importance

Music has a powerful effect on our emotions. It can lift our spirits, calm us down, or even help us focus. But many music services only recommend songs based on what you've listened to before, which doesn't always match your current mood. This system takes it a step further by reading your emotions through facial expressions and using that information to offer you music that suits how you're feeling right now.

This project matters because it offers a more personalized music experience. By understanding your emotions in real time, it gives you the ability to connect more deeply with the music you're listening to, whether you need a mood boost, relaxation, or motivation. It's a unique way to make music more relevant to your emotional state, improving your overall experience.

Why It's Valuable

- **Tailored Experience:** Instead of just listening to random songs, you get music that fits your mood, making the experience more meaningful.
- **Mental Wellness:** Music has therapeutic benefits, and having the right songs for your emotional state can help you feel better, reduce stress, or increase productivity.
- **Simple and Intuitive:** The system uses real-time emotion detection, making it easy for anyone to use without needing to manually select moods or genres.

In essence, the Emotion-Based Music Player offers a smarter, more connected way to enjoy music, improving not just the listening experience but also emotional well-being.

Benefits to the Community

The **Emotion-Based Music Player** offers several valuable benefits to the community, ranging from enhancing individual well-being to providing organizations with new ways to engage their users. Here's how this project can positively impact various stakeholders:

1. Personalized User Experience

- **For Individuals:** By tailoring music recommendations based on real-time emotional states, users can enjoy a more personalized and meaningful listening experience. This system offers the right music for the right moment, whether the user is seeking relaxation, motivation, or emotional support.

2. Mental Health Support

- **For Users Seeking Emotional Support:** Music has long been recognized for its therapeutic effects. By providing music that aligns with a user's emotions, the system can help in managing stress, anxiety, and even depression. For people feeling down, for instance, the system could offer uplifting songs that enhance mood, contributing to mental well-being.

3. Productivity Enhancement

- **For Students and Professionals:** Music has been shown to enhance concentration and productivity. The Emotion-Based Music Player can

provide focus-enhancing music during study or work sessions, depending on the user's emotional state. For example, calming instrumental music could be played when stress levels are high, while upbeat tracks could help with motivation during tasks that require energy and focus.

4. Innovative Entertainment and Engagement

- **For Music Streaming Services or Platforms:** Organizations in the entertainment industry (e.g., music platforms, apps, or companies) can leverage this technology to offer a unique feature that differentiates them from competitors. By offering an emotion-based music recommendation system, these platforms can foster deeper connections with users, attracting a broader audience and enhancing user engagement.

5. Community Building Through Shared Emotional Experiences

- **For Social Media or Collaborative Platforms:** Integrating emotion-based music into social platforms can encourage users to share their moods through music, building stronger communities. For example, users could share mood-specific playlists with friends, or collaborate on creating music lists for various emotions, creating a sense of shared experience.

6. Market and Business Growth

- **For Businesses:** The project can be used as a value-added service by businesses in various industries such as wellness centers, fitness programs, therapy practices, and entertainment apps. Offering emotion-based music recommendations can open new market opportunities, fostering customer loyalty and generating increased revenue through innovative features.

7. Promoting Emotional Awareness

- **For Educators and Therapists:** The system can be a valuable tool for educators and therapists who work with individuals to better understand and manage emotions. Using music to guide and express emotions can be a powerful tool in educational settings or therapy practices, helping people become more emotionally aware and better equipped to cope with their feelings.

Project Plan

The project will be completed in 5 weeks, broken down into key milestones for each week. Here's a detailed plan:

Week 1: Project Setup & Dataset Preparation

- **Objective:** Set up the project environment, download and explore the dataset, and prepare it for use.
- **Tasks:**
 - Download the emotion recognition dataset and inspect its structure.
 - Set up the project directory (images, dataset, model, requirements.txt).
 - Install required libraries: Python, Pandas, NumPy, OpenCV, and Mediapipe.
 - Preprocess the dataset (resize images, normalize data, and split into training/validation sets).
- **Deliverables:**
 - Dataset prepared and ready for use.
 - Project directory and environment set up.

Week 2: Emotion Detection Model Development

- **Objective:** Build and train the emotion detection model using a Convolutional Neural Network (CNN).
- **Tasks:**
 - Create and train the CNN model on the prepared dataset.
 - Use libraries like Keras and TensorFlow for building the model.
 - Evaluate the model's performance (accuracy, confusion matrix) and fine-tune for better results.
- **Deliverables:**
 - A trained emotion detection model with a decent accuracy.

Week 3: Real-Time Emotion Detection Integration

- **Objective:** Integrate real-time emotion detection through webcam input.
- **Tasks:**
 - Use Mediapipe to detect facial landmarks in real time.

- Capture the user's face using OpenCV and predict the emotion using the trained CNN model.
 - Display the detected emotion in real-time on the screen.
 - Deliverables:
 - Real-time emotion detection system working with webcam input.
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Week 4: Music Recommendation System & API Integration

- Objective: Implement the music recommendation system based on detected emotions.
- Tasks:
 - Map each emotion (e.g., happy, sad, angry) to a music genre or playlist.
 - Integrate the Spotify API (or similar) to fetch and play music based on the recommended genre.
 - Ensure the system can play music and update recommendations in real time based on emotions.
- Deliverables:
 - Music recommendation system integrated with emotion detection.

Week 5: UI Development, Testing, and Final Deployment

- **Objective: Build the user interface and test the entire system.**
- **Tasks:**
 - Develop the front-end using Streamlit to display the user's emotion and provide basic music controls (play/pause, skip, volume).
 - Test the system as a whole, ensuring seamless interaction between emotion detection and music recommendation.
 - Final optimizations, bug fixes, and deployment preparation.
 - Document the entire project, including setup instructions and code explanations.
- **Deliverables:**
 - Fully functional Emotion-Based Music Player with a user-friendly interface.
 - Project documentation (README.md).
 - Deployed version of the system (via Streamlit Sharing or similar).

Deliverables

Deliverables for the Emotion-Based Music Player Project

- Emotion Detection Model:
 - A trained Convolutional Neural Network (CNN) model that accurately detects emotions from facial expressions.
 - A performance report with model evaluation metrics (accuracy, confusion matrix, etc.).
- Real-Time Emotion Detection:
 - Integration of Mediapipe and OpenCV to detect facial landmarks and emotions in real-time via webcam feed.
 - A live display of the detected emotion on the user interface.
- Music Recommendation System:
 - A system that maps each detected emotion (e.g., happy, sad, angry) to a corresponding music genre or playlist.
 - Integration with Spotify API (or another music API) to fetch and play music based on the user's emotion.
- User Interface:
 - A Streamlit-based web interface that displays the detected emotion and allows users to control the music player (play/pause, skip, volume).
 - Real-time updates of the music recommendations based on detected emotions.
- System Testing:

- A fully tested, end-to-end functional system that integrates emotion detection, music recommendation, and UI controls.
 - Bug fixes and performance optimizations, ensuring smooth operation.
- Deployment:
 - The project deployed and hosted on a platform like Streamlit Sharing or similar for public access.
- Project Documentation:
 - README.md file with clear setup instructions, usage guidelines, and explanation of the system's components.
 - Detailed documentation covering the architecture, model, and code to make the project easily understandable and reproducible.

Acknowledgement

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played a crucial role in building the system, enabling efficient emotion detection, music recommendation, and interface development.

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- Family and Friends: Finally, I would like to thank my family and friends for their continuous encouragement, patience, and understanding throughout this project. Their support was invaluable in helping me stay focused and motivated.

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