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Melody-Match: An Emotion Based Song Recommendation System

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Abstract:
This project is a song recommendation system, which maps facial expressions to detect the current mood of the user and recommends the songs based on the analysis. This project uses various modules like Mediapipe and Keras for emotional analysis, OpenCV and Streamlit for making the web app and the Streamlit-WebRTC to accessuser's web camera for mapping facial expressions in real time. The system provides a personalized music experience which in result enhances the user's music listening experience. By analyzing the user's facial expressions, the application can identify the user's current emotional state and recommend songs that match their mood. The web app provides a simple yet user-friendly interface which allows users to easily interact with the system and listen to songs.

Keywords: Open CV, Keras, Mediapipe, Streamlit, Streamlit-WebRTC.

I. INTRODUCTION

In the field of NLP, machine learning has recently emerged as a paradigm-shifting technology that makes it possible to build a variety of systems and chatbots that can communicate with people more effectively. The creation of a system that may suggest songs to users depending on their present emotional state is one example of such an application. The construction of a music suggestion chatbot using machine learning techniques is, all things considered, a promising topic of research with a lot of promise to enhance the user's musical experience. We may anticipate seeing even more advanced and successful chatbots in the future that offer highly personalized recommendations in line with the user's emotional state as machine learning technology continues to progress.

II. LITERATURE SURVEY

III. TRAINING DATA AND APPROACH

1. METHODOLOGIES

- **Convolutional Neural Networks (CNN):** In computer vision applications like image and video recognition, a CNN is a sort of deep learning technique that is frequently utilized. CNN will be utilized in the music recommendation system to examine the user's facial expressions and determine their emotional state.

- **Collaborative Filtering:** A popular form of recommendation algorithm in recommendation systems is collaborative filtering. In order to provide recommendations, it evaluates the user's tastes and contrasts them with those of other users. Collaborative filtering will be employed in the song recommendation system to suggest songs based on the user's current emotional state as determined by their facial expressions.

- **K-Nearest Neighbors (KNN):** KNN is a machine learning method used to solve problems involving classification and regression. It operates by locating the K data points that are closest to a given input and using those to generate predictions. KNN can be used in the song recommendation system to find the songs that are most like the ones the user has already listened to and propose them.

- **Principal Component Analysis (PCA):** In order to minimize the number of features in a dataset while maintaining the variance in the data, PCA is a dimensionality reduction approach. By reducing the number of features in the facial expression dataset, PCA can make it simpler to train the machine learning model for the music recommendation system.

- **Gradient Boosting:** A machine learning approach called gradient boosting combines a number of weak models to produce a stronger model. Each new model added to the ensemble iteratively raises the ensemble's overall accuracy. Gradient boosting can be employed in the music recommendation system to increase the precision of the machine learning model for emotion recognition.

2. IMPLEMENTATION

- **Data Collection:** The collection of a sizable dataset of facial expressions with accompanying emotion labels serves as the foundation for the creation of the music recommendation system. The dataset will be utilized to develop the emotion recognition machine learning model.

- **Data Preprocessing:** The dataset will be preprocessed to reduce noise and improve the data quality after it has been gathered. To enhance the quality of the data, strategies including noise reduction, normalization, and data augmentation may be applied.

- **Model Training:** An emotion detection convolutional neural network (CNN) model will then be trained using the preprocessed data. With the aid of the Keras deep learning library, the CNN model will be trained.

- **Song Recommendation Algorithm:** Following training, the CNN model will use its predictions to suggest music based on the user's current emotional state. Collaborative filtering methods will be used to construct the recommendation algorithm.

- **Web App Development:** The Streamlit framework, which makes it simple to deploy and customize online applications, will be used to construct the web application. Users will be able to interact with the app's recommendation system and get instantaneous suggestions depending on their emotional state.

- **Real-time Facial Expression Analysis:** The system will access the user's webcam and record live facial expressions using the Streamlit-webrtc library. As a result, the system will be able to continually update and make suggestions based on the user's shifting emotional state.

- **Testing and Evaluation:** Real users will test the system to gauge its usefulness and correctness. To enhance the machine learning model and the recommendation algorithm, user feedback will be gathered.

- **Deployment:** Once the system has been tested and refined, it will be deployed on the local host streamlit server and will be available for public use.

3. RESULT

- When you run the code of your song recommendation system, it will first ask the user to enter their preferred melody language and their favorite singer. This information will be used to search for suitable songs for the user based on their preferences.

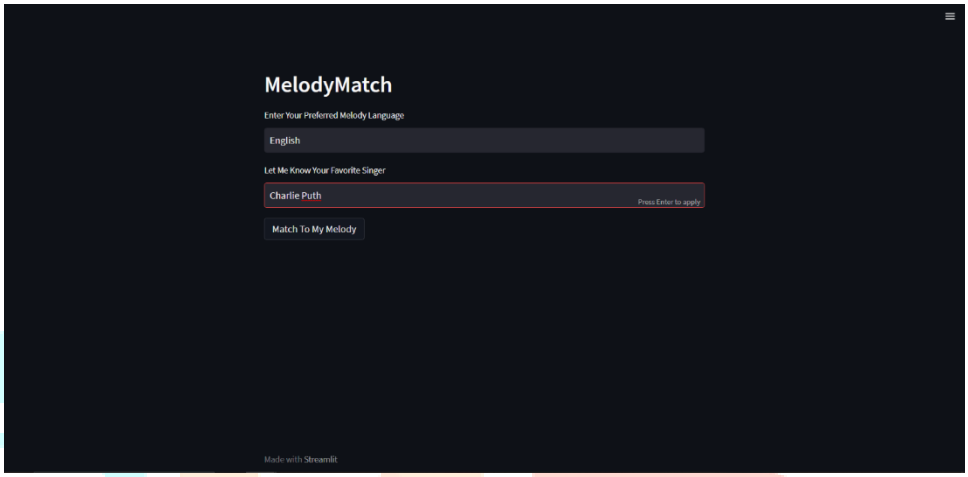

Fig 4.1: User Interface of Web Application

- Next, the system will try to capture and read the user's current emotion by using the emotion analyzer. This will be done by using the webcam framework streamlit-webrtc to capture the user's facial expressions, hand gestures, and analyzing them using the data made available to the model while training.

Fig 4.2: Emotional Analysis of User

- Once the user's mood is mapped, the system will then open a new YouTube window tab in the web browser and search for songs based on the user's preferred language, their favorite singer, and their current mood. This will be done using the YouTube web app to search for songs that match the user's preferences and current mood. The system will display a list of songs that are a good match for the user's preferences and mood.

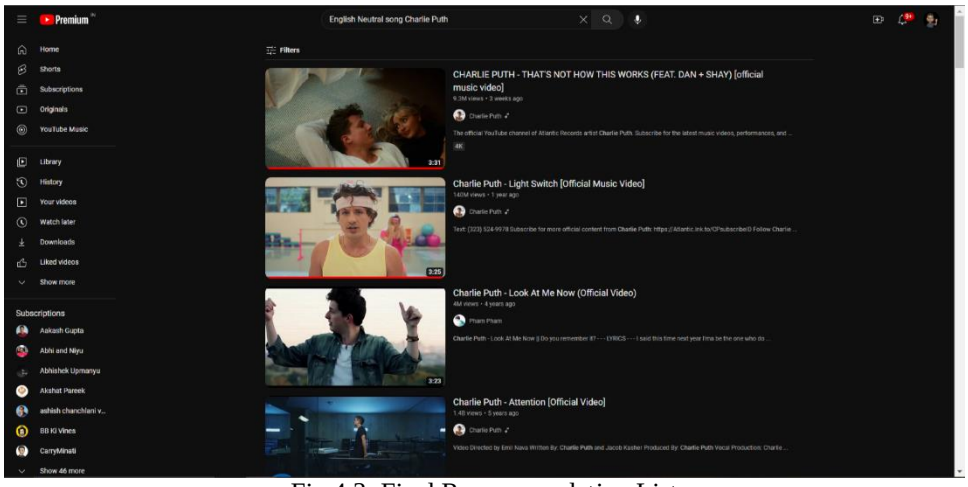

Fig 4.3: Final Recommendation List

IV. CONCLUSION

The concept of predicting crimes before they occur may seem straightforward, but it takes much more than just understanding the concept to make it a reality. This article aims to provide guidance to researchers who are working to implement crime prediction technology in real life. While the police do incorporate new technologies such as Sting Rays and facial recognition every few years, the implementation of such software can fundamentally change the way police work, in a much better way. The proposed system outlined in this article envisions using machine and deep learning, along with computer vision, to create a system that can monitor crime hotspots and recognize people from their voice notes. While there may be challenges such as making the system, implementing it, and using it, all of these problems are solvable. A security system that monitors the entire city around-the-clock can help make tips or leads much more reliable, and perhaps even eradicate crime at a much faster rate. Therefore, incorporating such a system into a police force could lead to a world where crime prediction is a reality, and crime can be prevented before it happens

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