Emotion-Based Music Recommendation System Using Machine Learning

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Abstract: *Everyone likes listening the music and watching the movies. Music plays very important role in improving the mood of a person. Peoples also like to watch the movies according to their current mood. Currently there are various applications available for music and movie recommendation. These systems typically use facial emotions for giving recommendations but, it is a timeconsuming and less accurate model. This report proposes a hybrid system which gives recommendation by taking a survey of user or by detecting face expressions. Survey contains few questions like current emotion, preferred language and choice of user. Based on response of user, the system will generate a list of songs or movies. There are various kinds of user emotions like happy, angry, excited, fear, sad and surprised. Out of that happy, sad, angry and surprise can be captured using face recognition model. The system supports two languages Hindi and English as per the user requirement. The proposed system is implemented using Python, Tkinter, MySQL database for survey. MySQL is used for storing the login details of person. Tkinter module is used for designing the user interface with system. TensorFlow, keras, opencv and streamlit-webrtc are used for detecting facial emotions and Python is used for providing the recommendation.*

***Index Terms** - Emotion Detection, Music Recommendation System, Movie Recommendation System, Survey Analysis, Face Recognition.*

I. INTRODUCTION

People like to listen music for improving their mood or to make relief from the stress or tension. There are various types of songs available on the internet like silent, classical, modern, etc. Everyone wants to listen the appropriate music for current mood. A huge number of songs are there, from that finding the relevant songs is sometime becomes difficult. Also, people like to watch movies or films for enjoyment or reduce the stress of work. There are various types of movies available today like drama, romantic, musical, family, sport, horror, action, thriller, film-noir and western. From large number of movies sometimes it is difficult to find relevant movies. There is various software available for music and movie recommendation but, they typically use facial emotion recognition techniques. That needs more time for training the model and recognizing the facial expressions. The paper proposes a system which gives music and movie recommendation based on survey analysis or face recognition. It takes less time and memory than existing systems. In survey some basic questions are asked to the user like what is your current emotion or mood, which language do you prefer, what is your choice: music or movie, etc. User has given 8 choices of emotions: happy, angry, excited, sad, disgust, surprised, fear and anticipation. Currently, two languages are available in the system: Hindi and English. Based on user response the list of songs or movies is generated automatically. Different types of movies are suggested based on emotions like for happy- thriller, for sad- drama, for fear- sport, for disgust- musical, for angry- family and for surprised- film noir movies. Face recognition is also available but for 4 emotions only i.e. happy, sad, angry, surprise, etc. When user selects the particular song or movie from the list he will be redirected to link of Song or movie for playing it online on various platforms like Spotify for music and Netflix or Amazon prime for films. The proposed system is implemented using Python language, TensorFlow, Keras, Streamlit-webrtc, OpenCV & MySQL database. Two datasets are used: one for songs and one for movies. The recommendation is given using information available in dataset. Python's pandas library is used to read the dataset. Pandas has read_csv() function to read the dataset. The user firstly needs to Register in the system for utilizing its services. The login activity of user is maintained using MySQL database. The database stores user's details in the form of a table. Python's Tkinter library is used for designing the user interface with the system. Tkinter provides various methods like Button, Label, List box, Input field and Message box for maintaining user interface with the system. OpenCV library is used for capturing

live images of face. Mediapipe library is used for detecting face-landmarks for recognizing the micro expressions. Tensorflow & Keras are used for training the face model and for predicting the current Emotion of the user. Streamlit-webrtc is used for web interface of Python code

II. LITERATURE SURVEY

Ziyang Yu, Mengda Zhao, Yilin Wu, Peizhuo Liu, Hexu Chen et.al [1] mentioned a music recommendation system based on facial expressions. Face expressions are captured using deep learning technique. Convolutional neural network algorithm is used for detection and classification of facial expression or emotion. The recognition rate of face emotions is 62.7%. Content based algorithm and cosine similarity algorithm are used for providing the music recommendation based on current mood of user.

Jayadeep Jayakumar, P Supriya et.al [2] mentioned a music recommendation system based on emotion, age and gender of the user. Face emotions are detected and classified using Convolutional neural network algorithm. The system also detects age and gender of the user. Based on combination of emotion, age and gender the songs are suggested to that person.

Shanthakumari R, Nalini C, Vinothkumar S, Venkata Prasanna R, Nikilesh A, Nitin Pranav SM et.al [4] mentioned a Music genre recommendation system based on emotion of a person. The system detects and classifies the image of user using deep learning technique. The system uses Spotify API for suggesting the genres based on the current emotion or mood of the user. It helps users to find the appropriate songs from list of millions of songs on Spotify.

Shreya Jain, Richard Essah et.al [6] mentioned a Movie recommendation system using collaborative filtering technique. The user watches many movies on various OTT platforms as per his choice or mood. The system observes that what kind of movies the user watches and gives the recommendation in future based on his prior interaction with the system. It increases the accuracy of prediction of user's need. The system uses K-nearest neighbor and Cosine similarity algorithm for the better recommendation of movies. The system is not only limited to movies.

Mtuthuko Mngomezulu, Ritesh Ajoodha et.al [7] mentioned a content based collaborative filtering approach for recommendation of movies using keyword extraction technique. The system majorly focuses on content-based method for recommendation. When user selects particular movie for watching then this system will suggest some similar kind of movies to him. The system uses Term Frequency - Inverse Document Frequency (TF-IDF) as a keyword extraction technique.
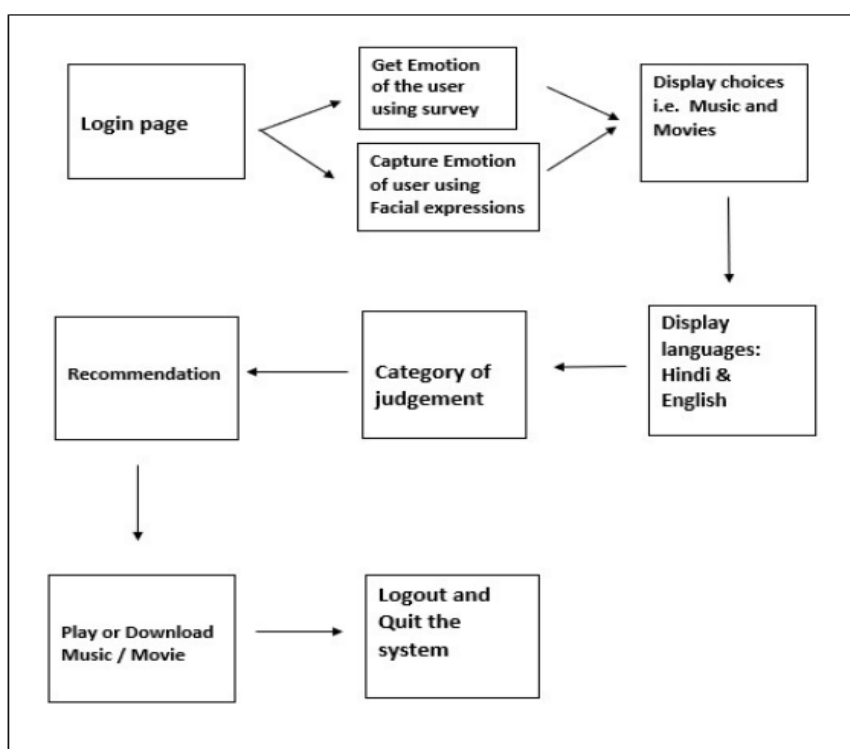
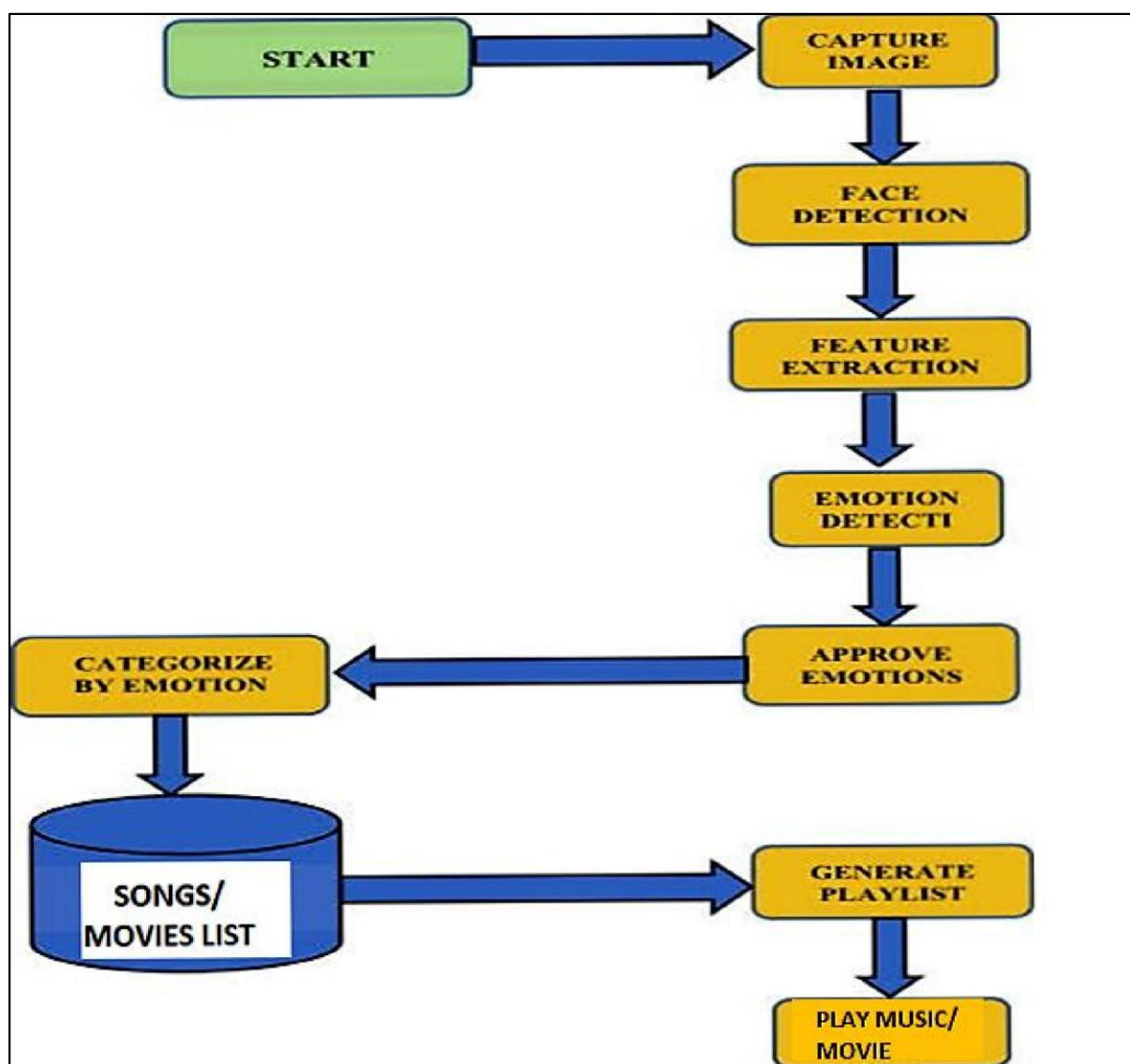## III. PROPOSED METHODOLOGY

Fig.1 System Architecture

Fig. 2 Face recognition model

The music and movie recommendation system. Fig. 1 shows the proposed system architecture. When user interacts with the system, firstly he registers in the system to avail the services. Then this registration details of user are stored by using MySQL database. Now, user will login to the system using his user id and password. The system will take a survey of user to know his current mood or emotion. Also, Using face option is also available. User has given some choices of emotions i.e., happy, sad, excited, fear, surprised, and angry for survey and 4 choices i.e., happy, sad, angry, surprised for face. User have to select one of the above emotions from the list for survey and for face, emotion is automatically captured by the system.

The system will take choice of user either he wants music or movie. The system also provides language option. Currently Hindi and English languages are available in the system. Then the system provides recommendation to user by making category of judgement for survey and by using Deep neural network for face-based system. OpenCV library is used for capturing live images of the face. Mediapipe library is used for detecting face landmarks and for data collection purpose. TensorFlow & Keras are used for training and testing the deep learning model.

In face recognition, firstly user's live video is captured by using OpenCV library then, face landmarks are detected using mediapipe library and data is collected. During training, Tensorflow and keras is used for building the model from collected data. Then, model is used for detecting the emotion of user. The model contains data in numpy format. Streamlit library is used for designing the web interface of our system.

There are two datasets used in the system, one for music and another for movies. The songs datasets contain 300 Hindi songs and 300 English songs. Movies dataset contain 300 English and 300 Hindi movies.

Recommendation is provided by retrieving the data from datasets. Python language's Pandas library is used for reading the datasets using its read_csv() function. Python's Tkinter module and HTML, CSS is used for displaying the list of music or movies to the end user. Tkinter and Streamlit-webrtc has builtin functions for designing user interface or UI of the system.

The system also provides play or download option for the songs or movies. If user wants to play a music and if he clicks on the song name, he will be redirected to Spotify for online playing of the songs. Similarly, if user wants to watch a movie if he clicks on the movie name, he will be redirected to Amazon prime or Netflix for online streaming of the movie. At the end, the user is able to logout of the system

IV. RESULTS AND DISCUSSION

The proposed system is implemented successfully on various windows devices. Internet is the primary requirement of the system to run. Following are some snapshots of the implementation on Asus vivobook 15 laptop running on windows 10 operating system.
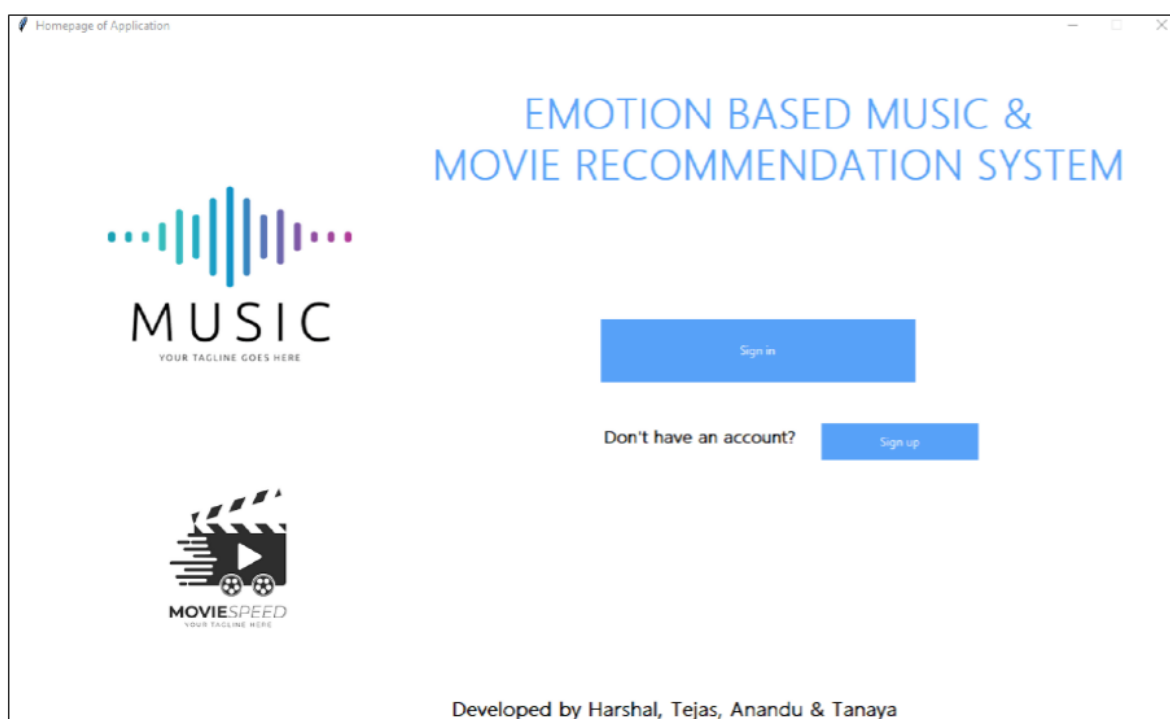
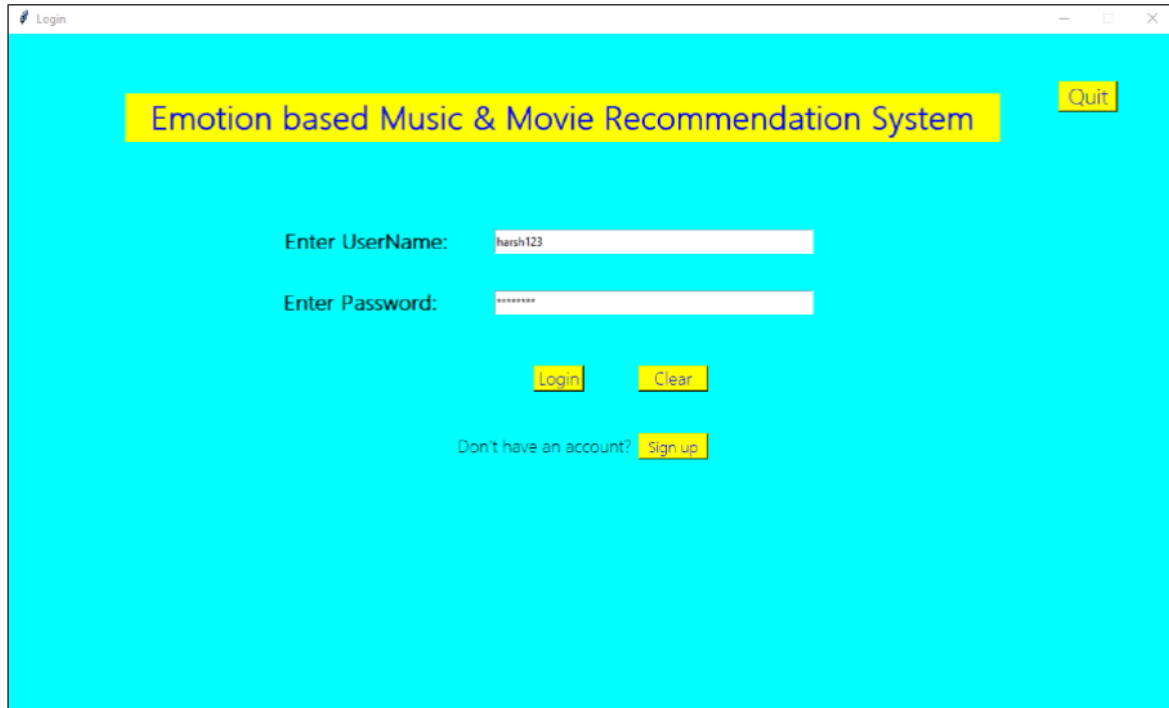

Fig. 3 Homepage of Application

Fig. 4 Login Page of Application
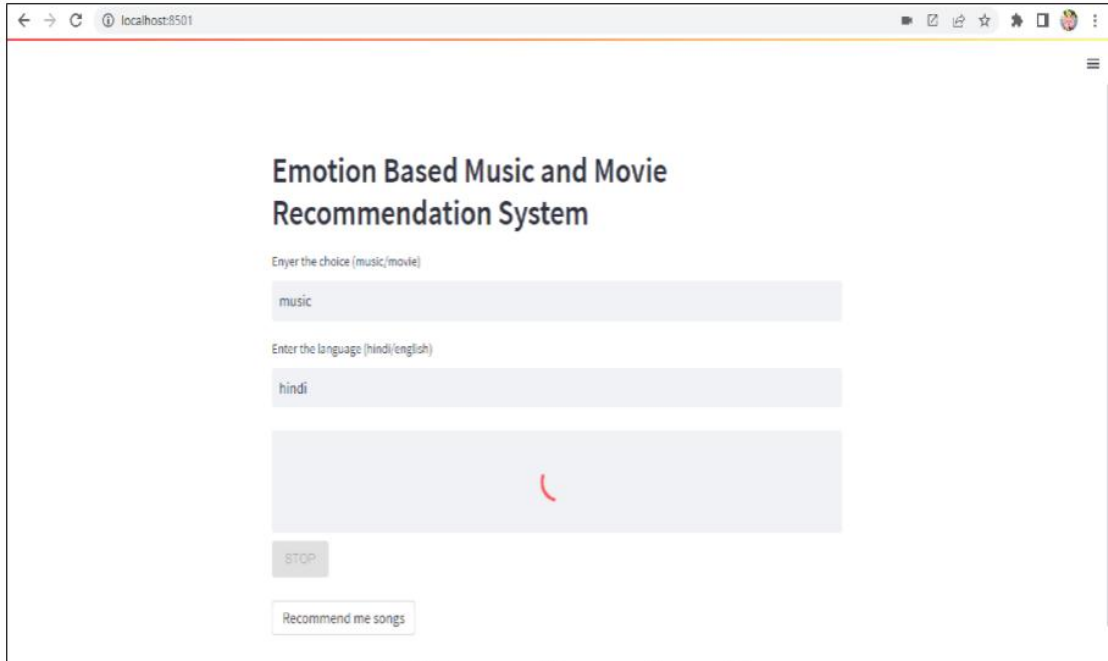

Fig. 5 Survey of the user
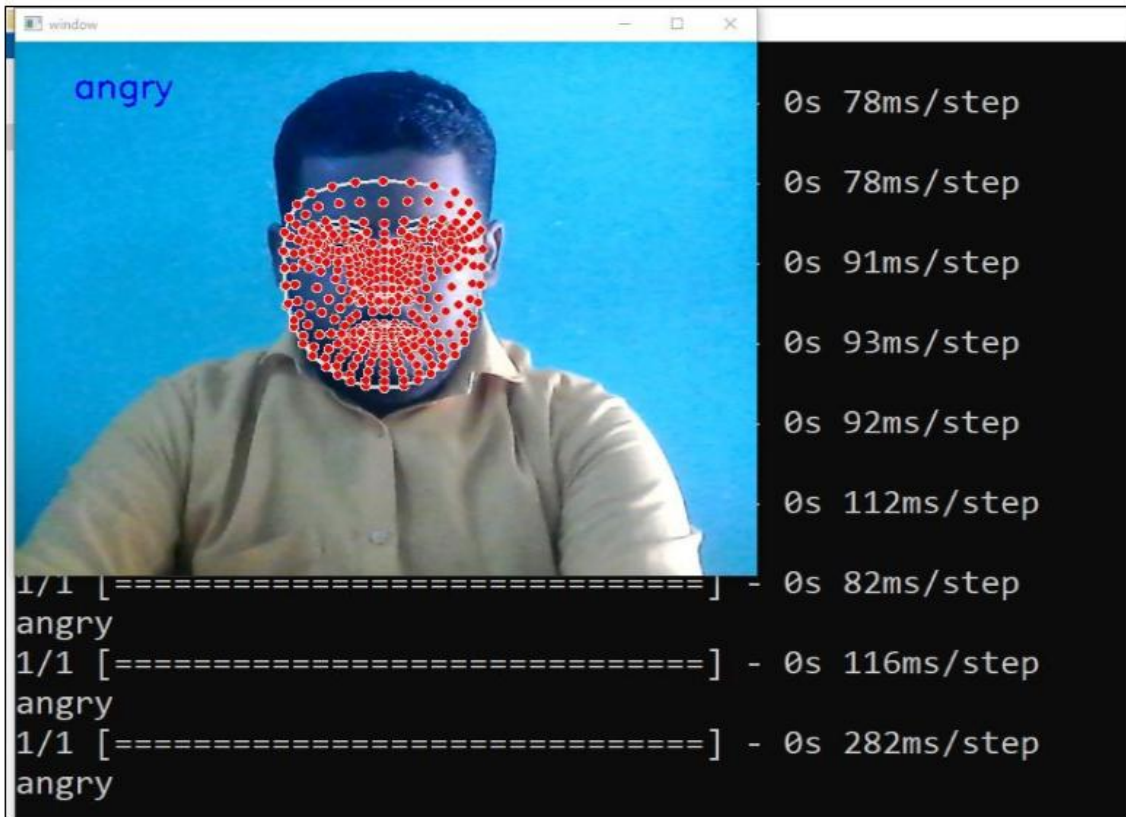
Fig. 6 Homepage of face recognition model

Fig. 7 Realtime Emotion detection

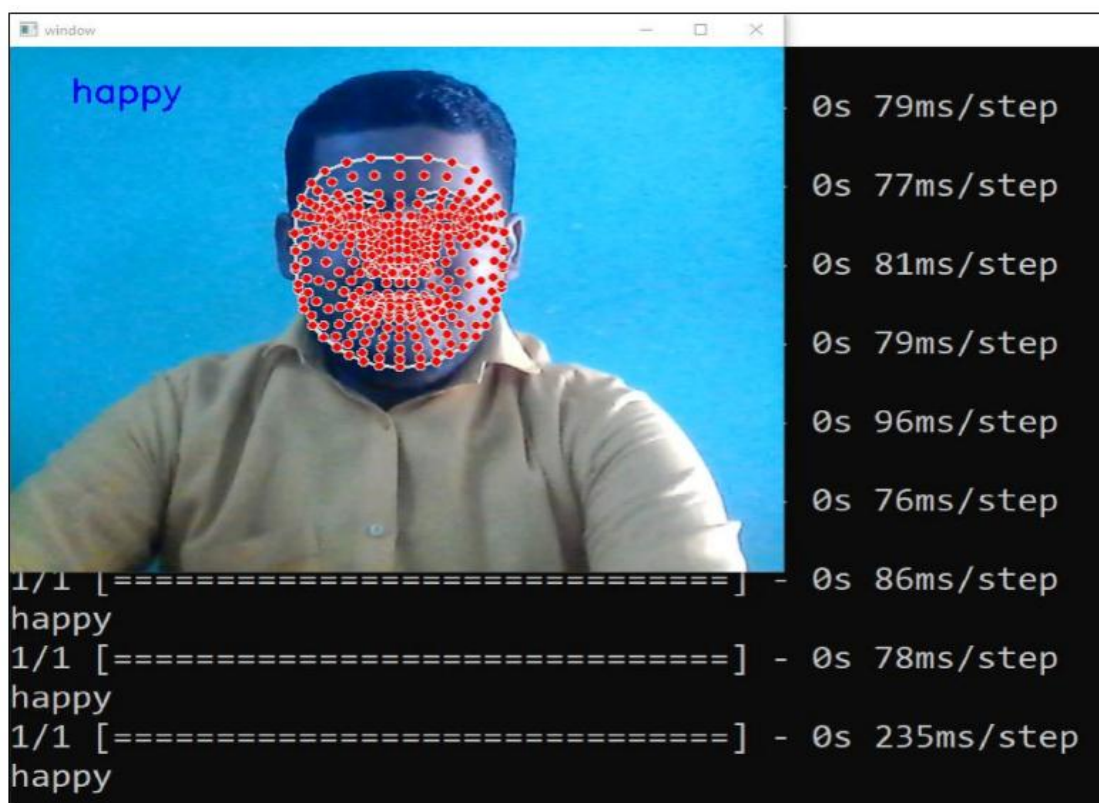**Fig. 8** Realtime Emotion detection

Fig. 9 Recommendation of Music

IV. CONCLUSION AND FUTURE WORK

Hence, the report concludes that the proposed system implements a music and movie recommendation system based on survey analysis and facial emotions in hybrid mode & hence execution time is less than existing system. In proposed system, just a few questions survey is conducted to detect the emotions of the user or there is option of face also. The system combines music and movie recommendation system in one entity. The system makes category of judgement based on emotion and choice of the user and then suggests the songs or movies in appropriate language. Mediapipe library is used for detecting and classifying facial emotions. The system saves the time of the user in searching the songs and movies in two different platforms. Mental health of the person can be improved by listening appropriate songs based on his current mood. Anyone with internet connectivity has

open access to use the system. Currently the system is available as a desktop application. In the future work, more complex emotions will be available in the system. Also, more songs and movies will be available for each emotion. More languages can be added into the system so that anyone can listen songs and watch the films in their favorite language.

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