EMOTION DETECTION MODEL -BASED MUSIC RECOMMENDATION SYSTEM

C. Rashmi[1], A. Akshaya[2], B. Sruthi[2], B. Lavanya[2], A. Lohitha[2]

[1,2]Department of Information Technology

[1,2]Malla Reddy Engineering College for Women (A), Maisammaguda, Medchal, Telangana.

ABSTRACT

People tend to express their emotions, mainly by their facial expressions. Music has always been known to alter the mood of an individual. Capturing and recognizing the emotion being voiced by a person and displaying appropriate songs matching the one's mood and can increasingly calm the mind of a user and overall end up giving a pleasing effect. The project aims to capture the emotion expressed by a person through facial expressions. A music player is designed to capture human emotion through the web camera interface available on computing systems. The software captures the image of the user and then with the help of image segmentation and image processing techniques extracts features from the face of a target human being and tries to detect the emotion that the person is trying to express. The project aims to lighten the mood of the user, by playing songs that match the requirements of the user by capturing the image of the user. Since ancient times the best form of expression analysis known to humankind is facial expression recognition. The best possible way in which people tend to analyse or conclude the emotion or the feeling or the thoughts that another person is trying to express is by facial expression. In some cases, mood alteration may also help in overcoming situations like depression and sadness. With the aid of expression analysis, many health risks can be avoided, and there can be steps taken that help brings the mood of a user to a better stage.

Keywords: Music recommendation, emotions based, facial expression recognition.

1. INTRODUCTION

computing is the study or practice of inventing, designing, building, or using body-worn computational and sensory devices that leverages a new type of human-computer interaction with a body-attached component that is always up and running. As the number of wearable computing device users are growing every year, their areas of utilization are also rapidly increasing. They have influenced medical care, fitness, aging, disabilities, education, transportation, finance, gaming, and music industries [1], [2]. Recommendation engines are algorithms which aim to provide the most relevant items to the user by filtering useful information from a huge pool of data. Recommendation engines may discover data patterns in the data set by learning user's choices and produce the outcomes that co-relates to their needs and interests [3]. Most of the recommender systems do not consider human emotions or expressions. However, emotions have noticeable influence on daily life of people. For a rich set of applications including human-robot interaction, computer aided tutoring, emotion aware interactive games, neuro marketing, socially intelligent software apps, computers should consider the emotions of their human conversation partners. Speech analytics and facial expressions have been used for emotion detection. However, in case of human beings prefer to camouflage their expressions, using only speech signals or facial expression signals may not be enough to detect emotions reliably. Compared with facial expressions, using physiological signals is a more reliable method to track and recognize emotions and internal cognitive processes of people.

Objective of the project

Most of the existing music recommendation systems use collaborative or content-based recommendation engines. However, the music choice of a user is not only dependent to the historical

preferences or music contents. But also dependent to the mood of that user. This paper proposes an emotion-based music recommendation framework that learns the emotion of a user from the signals obtained via images. This project so we are using images with faces to detect user mood and to recommend music. As faces are the best option to predict mood of the users. We tried a lot to search sensors data to classify mood but on internet no such datasets are available. In this application uploading images and detecting the emotion of the user.

2. LITERATURE SURVEY

Yang et. al [4] offers new insights on music emotion recognition methods based on different combinations of data features that they use during the modelling phase from three aspects, music features only, ground-truth data only, and their combination, and provides a comprehensive review of them. Then, focusing on the relatively popular methods in which the two types of data, music features and ground-truth data, are combined, they further subdivide the methods in the literature according to the label- and numerical-type ground-truth data, and analyse the development of music emotion recognition with the cue of modelling methods and time sequence. Three current important research directions are then summarized. Although much has been achieved in the area of music emotion recognition, many issues remain.

Domínguez-Jiménez et. al [5] proposes a model for recognition of three emotions: amusement, sadness, and neutral from physiological signals with the purpose of developing a reliable methodology for emotion recognition using wearable devices. Target emotions were elicited in 37 volunteers using video clips while two biosignals were recorded: photoplethysmography, which provides information about heart rate, and galvanic skin response. These signals were analyzed in frequency and time domains to obtain a set of features. Several feature selection techniques and classifiers were evaluated. The best model was obtained with random forest recursive feature elimination, for feature selection, and a support vector machine for classification. The results show that it is possible to detect amusement, sadness, and neutral emotions using only galvanic skin response features. The system was able to recognize the three target emotions with accuracy up to 100% when evaluated on the test data set.

Ivana Andjelkovic et. al [6] presented and evaluated MoodPlay –a hybrid recommender system for musical artists which introduces a novel interactive visualization of moods and artists. The system supports explanation and control of a recommender system via manipulation of an avatar within the visualization. Design and implementation of an online experiment (N=279) was presented to evaluate the system through four conditions with varying degrees of visualization, interaction and control.

Jianhua Zhang et. al [7] the emotion recognition methods based on multi-channel EEG signals as well as multi-modal physiological signals are reviewed. According to the standard pipeline for emotion recognition, they review different feature extraction (e.g., wavelet transform and nonlinear dynamics), feature reduction, and ML classifier design methods (e.g., k-nearest neighbor (KNN), naive Bayesian (NB), support vector machine (SVM) and random forest (RF)). Furthermore, the EEG rhythms that are highly correlated with emotions are analyzed and the correlation between different brain areas and emotions is discussed. Finally, they compare different ML and deep learning algorithms for emotion recognition and suggest several open problems and future research directions in this exciting and fast-growing area of AI.

Yu Liu et. al [8] proposed an end-to-end MLF-CapsNet framework for multi-channel EEG emotion recognition. This proposed framework can identify the intrinsic relationship among various EEG channels well. They combine multi-level features extracted from different convolution layers to form primary capsules. Besides, they add bottleneck layer to reduce the number of parameters and

accelerate the speed of calculation. Finally, experiments on DEAP dataset and DREAMER dataset are conducted.

Yongqiang Yin et. al [9] proposed a new emotion recognition method using deep learning model based on EEG's differential entropy, which adopts a novel fusion model of GCNN and LSTM for emotion classification. ECLGCNN utilizes the graph and temporal information, where each EEG channel corresponds to a graph node, and the functional relationship between two channels corresponds to the edge of the graph and LSTM cells' gates are used to extract effective information.

Shamim Hossain et. al [10] proposes an emotion recognition system using a deep learning approach from emotional Big Data. The Big Data comprises of speech and video. In the proposed system, a speech signal is first processed in the frequency domain to obtain a Mel-spectrogram, which can be treated as an image. Then this Mel-spectrogram is fed to a convolutional neural network (CNN). For video signals, some representative frames from a video segment are extracted and fed to the CNN. The outputs of the two CNNs are fused using two consecutive extreme learning machines (ELMs). The output of the fusion is given to a support vector machine (SVM) for final classification of the emotions. The proposed system is evaluated using two audio–visual emotional databases, one of which is Big Data. Experimental results confirm the effectiveness of the proposed system involving the CNNs and the ELMs.

Santamaria-Granados et. al [11] applies the deep learning approach using a deep convolutional neural network on a dataset of physiological signals (electrocardiogram and galvanic skin response), in this case, the AMIGOS dataset. The detection of emotions is done by correlating these physiological signals with the data of arousal and valence of this dataset, to classify the affective state of a person. In addition, an application for emotion recognition based on classic machine learning algorithms is proposed to extract the features of physiological signals in the domain of time, frequency, and non-linear. This application uses a convolutional neural network for the automatic feature extraction of the physiological signals, and through fully connected network layers, the emotion prediction is made. The experimental results on the AMIGOS dataset show that the method proposed in this paper achieves a better precision of the classification of the emotional states, in comparison with the originally obtained by the authors of this dataset.

Rosa et. al [12] presents a knowledge-based recommendation system (KBRS), which includes an emotional health monitoring system to detect users with potential psychological disturbances, specifically, depression and stress. Depending on the monitoring results, the KBRS, based on ontologies and sentiment analysis, is activated to send happy, calm, relaxing, or motivational messages to users with psychological disturbances. Also, the solution includes a mechanism to send warning messages to authorized persons, in case a depression disturbance is detected by the monitoring system. The detection of sentences with depressive and stressful content is performed through a convolutional neural network and a bidirectional long short-term memory - recurrent neural networks (RNN); the proposed method reached an accuracy of 0.89 and 0.90 to detect depressed and stressed users, respectively.

3. PROPOSED SYSTEM

This work proposes an emotion-based music recommendation framework that learns the emotion of a user from the signals obtained via images. This project so we are using images with faces to detect user mood and to recommend music. As faces are the best option to predict mood of the users. We tried a lot to search sensors data to classify mood but on internet no such datasets are available. In this application uploading image and then using python OPENCV and pre-processing image to extract features and then this feature is applied on SVM/Deep Learning Neural Network Training Model to

predict moods of user and based on user mood all songs will be detected and shown in drop down box and user can select any song and play. The results of comprehensive experiments on real data confirm the accuracy of the proposed emotion classification system that can be integrated to any recommendation engine.

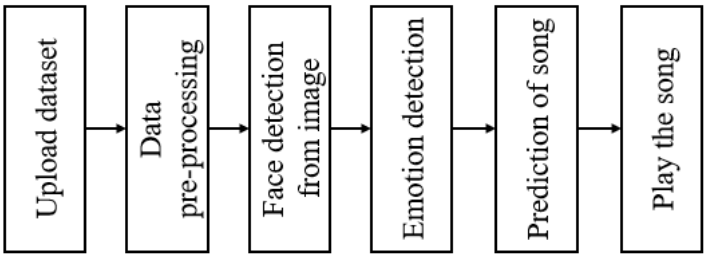


Fig. 1: Block diagram of proposed system.

Advantages of proposed system

1. The emotion of a user from the signals obtained via faces in images.

2. Experiments on real data confirm the accuracy of the proposed emotion classification system that can be integrated to any recommendation engine.

4. RESULTS AND DISCUSSION

Modules

1. Upload Image with Face

2. Pre-process & Detect Face in Image

3. Detect Emotion

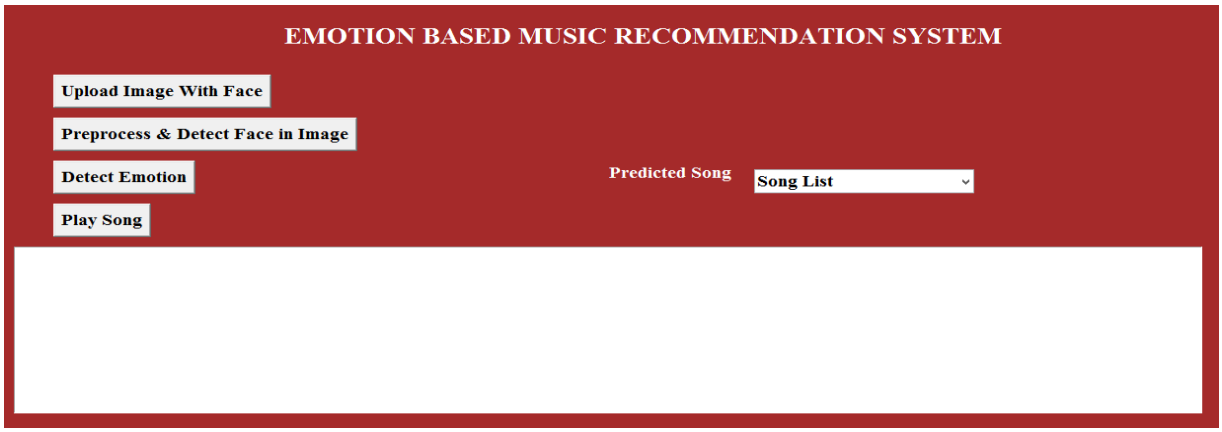
4. Predicted Song

5. Play song

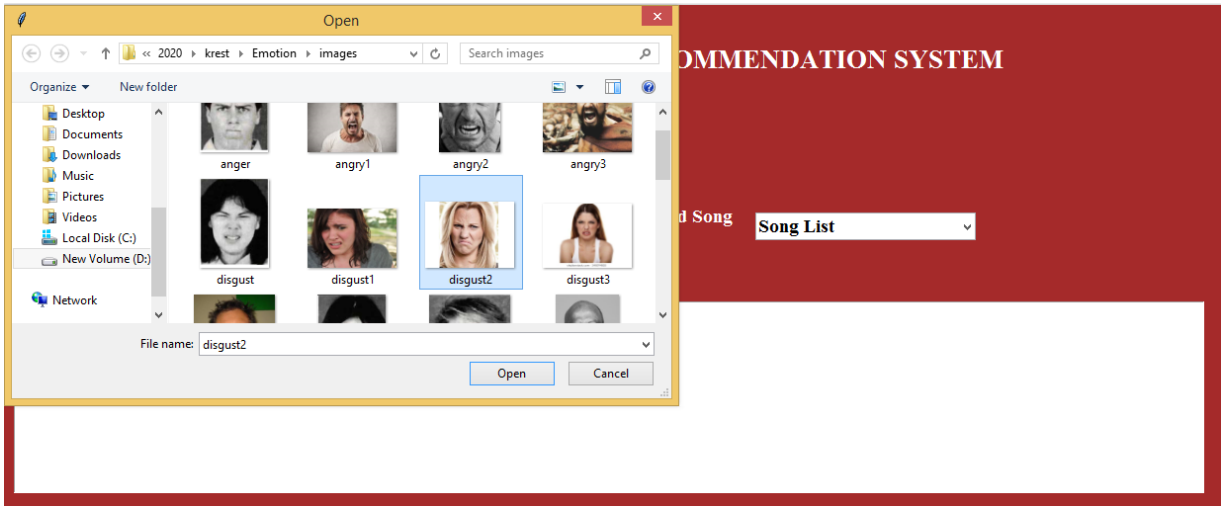
Modules Description

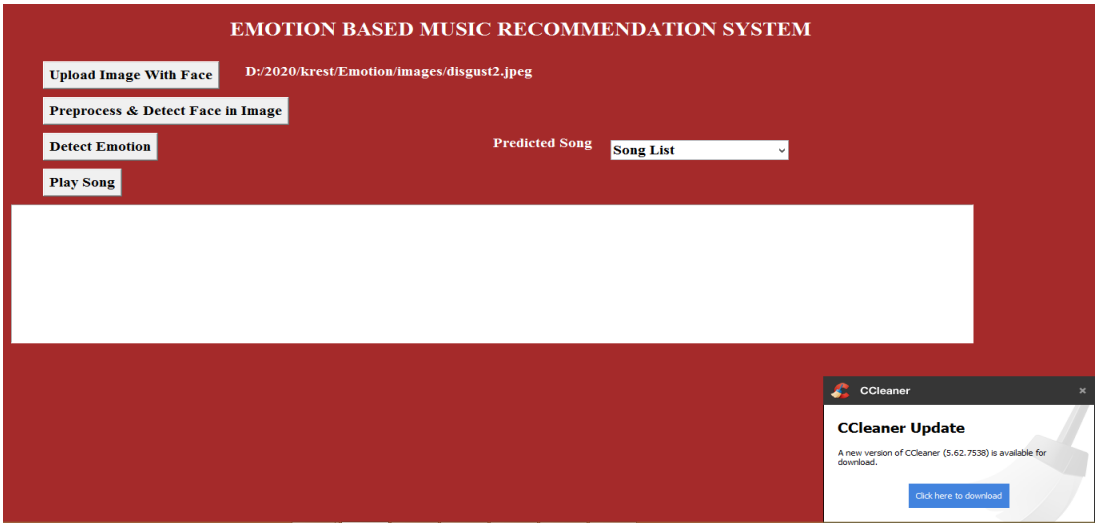
1. *Upload Image with Face*: Upload Image with Face module is used to upload image. And selecting the one image.
2. *Pre-process & Detect Face in Image***:** Pre-process & Detect Face In Image module is used to perform pre-processing and to extract face from images. we can see in uploaded image one face is detected.
3. *Detect Emotion***:** Detect Emotion Module to detect emotion and we can see emotion disgust is detected.
4. *Predicted Song:* now click on drop down arrow link to get all disgust songs list In drop down box we can see 'disgust.mp3' songs is showing, select that song.
5. *Play song:* Play Song' button to play song and If your system has audio driver then u can hear song.

Double click on 'run.bat' file to get below screen

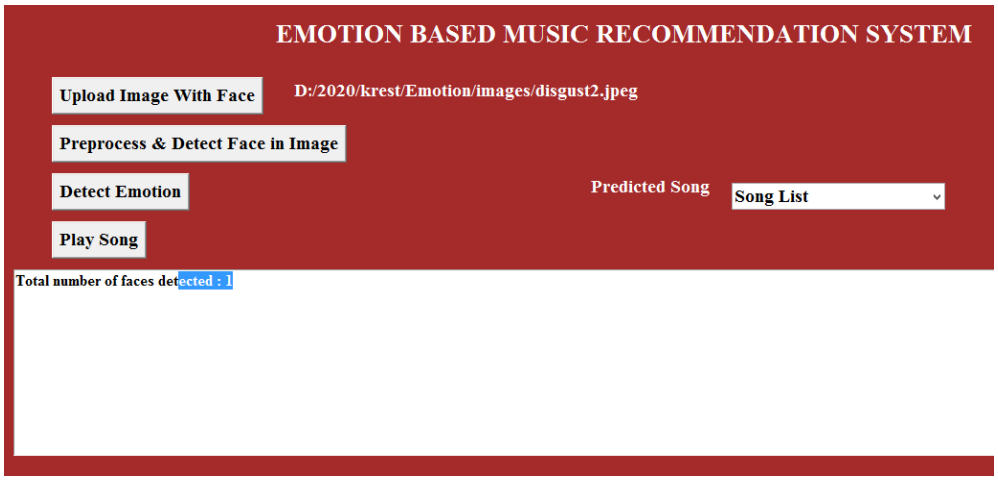


In above screen click on 'Upload Image with Face' button to upload image

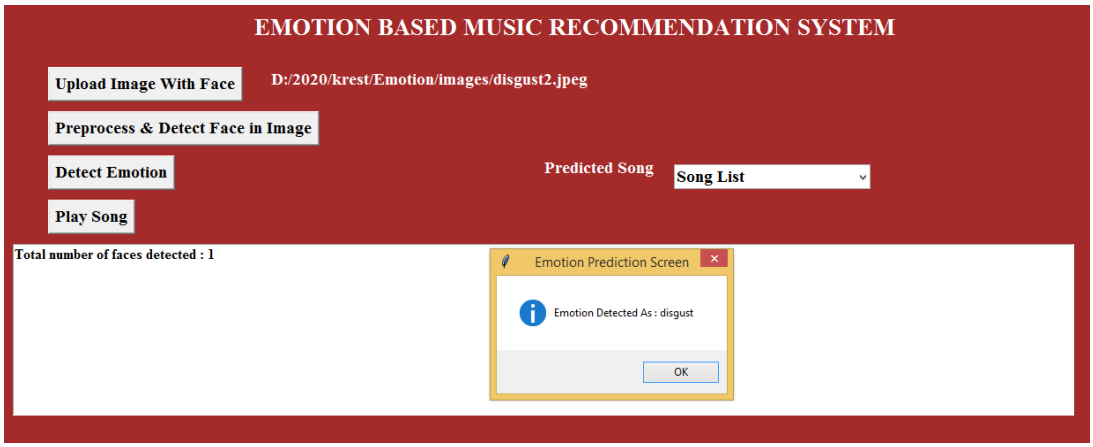




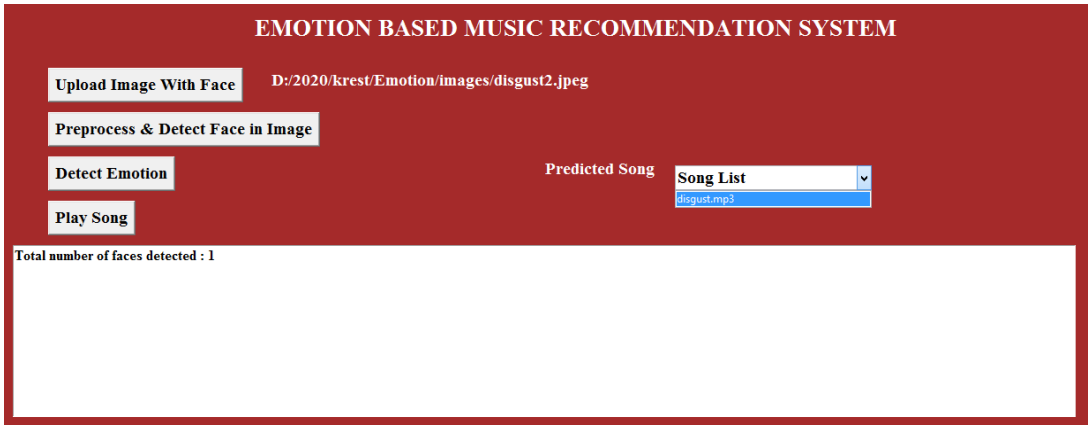
In above screen i am selecting one 'disgust' image. Now click on 'Pre-process & Detect Face In Image' button to perform pre-processing and to extract face from images



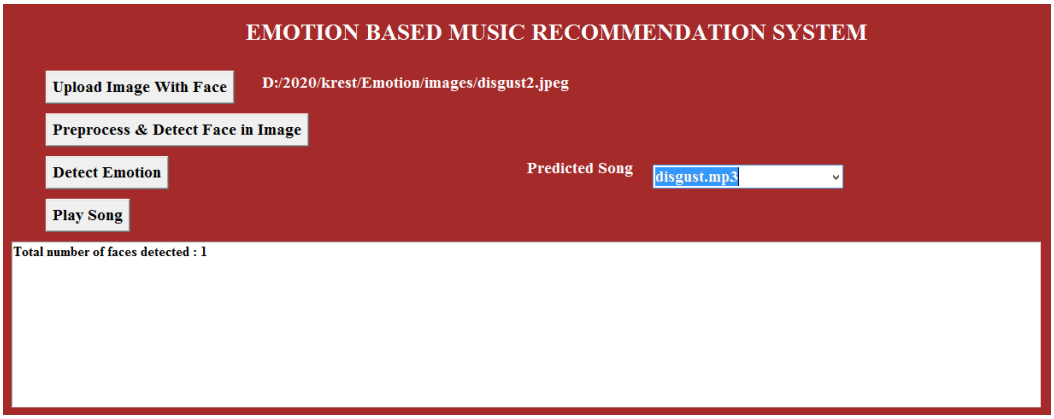
In above screen we can see in uploaded image one face is detected. Now click on Detect Emotion button to detect emotion



In above screen we can see emotion disgust is detected and now click on drop down arrow link to get all disgust songs list



In drop down box we can see 'disgust.mp3' songs is showing, select that song and click on 'Play Song' button to play song



If your system has audio driver then u can hear song.

Note: no technologies can detect 100% emotion from images but this project can detect upto 90%

5. CONCLUSION

In this study, a framework for enhancing music recommendation engines performance via physiological signals has been introduced. An emotion-based music recommendation framework that learns the emotion of a user from the signals obtained via images. This project so we are using images with faces to detect user mood and to recommend music. As faces are the best option to predict mood of the users. We tried a lot to search sensors data to classify mood but on internet no such datasets are available. In this application uploading image and then using python OPENCV and pre-processing image to extract features and then this feature is applied on SVM/Deep Learning Neural Network Training Model to predict moods of user and based on user mood all songs will be detected and shown in drop down box and user can select any song and play. The results of comprehensive experiments on real data confirm the accuracy of the proposed emotion classification system that can be integrated to any recommendation engine.

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