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Emotion Recognition Based Personal Entertainment Robot Using ML & IP

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ABSTRACT

This project presents a method to automatically detect emotional duality and mixed emotional experience using Linux based system. Co-ordinates, distance, and movement of tracked points were used to create features from visual input that captured facial expressions, head, face gestures, and face movement. Spectral features, prosodic features were extracted using the camera. Espeak and Pyttsx and Face API were used for calculations of features. A combined feature vector was created by feature level fusion and a cascade classifier was used for emotion detection. Live participants and actions are to be used for recording simultaneous mixed emotional experiences. As per the calculated result system will play songs and display the books list.

Keywords : Smart Emotion, Espeak and Pyttsx, and Face API

I. INTRODUCTION

Emotion recognition has important applications in the field of medicine, education, marketing, security, and surveillance. Machines can enhance human-computer interaction by accurately recognizing human emotions and responding to those emotions. Existing research has mainly examined the automatic detection of a single emotion. But psychology and behavioral science studies have shown that humans can concurrently experience and express mixed emotions. For instance, a person can feel happy and sad at the same time. In this research combinations of six basic emotions (happiness, sadness, surprise, anger, fear, disgust, and neutral state) were used. This study aims to develop features that capture data from facial expressions to identify multiple emotions. In the case of a single-label classification problem each annotated feature-vector instance is only associated with a single class label. However, multiple concurrent emotion recognition is a multi-label classification problem. In a multi-label problem, each feature vector instance is associated with multiple labels such as the presence or absence of one of each six basic emotions. The multi-label classification is receiving increased attention and is being applied to many domains such as text, music, images, and video-based systems, security, and bioinformatics. This paper examined the recognition of concurrent emotional ambivalence and mixed emotions. Additionally, the study examined two concurrent emotions (emotion duality) to limit the scope of the research based on the availability of scenarios. This was done so that the experimental design was realistic. The subjects could express dual emotions with ease and observers could annotate the data without ambiguity. This study implemented a multimodal emotion recognition system with multiple

check box inputs to facilitate the annotation of concurrent emotions in the user interface software.

II. PROBLEM STATEMENT

In recent years, a Variety of emotional expression processes shows that there are many ways to describe global and local speech properties, and one of the most effective is emotions. The main motivation of the system is to automatically identify the user's mood and according to that related books list, video list and music will play through Linux based system.

III. LITERATURE SURVEY

[1]. S. Patwardhan, "Augmenting Supervised Emotion Recognition with Rule-Based Decision Model", arXiv, 2016.
Description: In this paper, we investigate the effect of the transfer of emotion-rich features between source and target networks on classification accuracy and training time in a multimodal setting for vision-based emotion recognition.

[2]. M. Liu, R. Wang, S. Li, S. Shan, Z. Huang, and X. Chen. Combining multiple kernel methods on Riemannian manifold for emotion recognition in the wild. ICMI, 2014.
Description: Emotional expressions of virtual agents are widely believed to enhance the interaction with the user by utilizing more natural means of communication. However, as a result of the current technology virtual agents are often only able to produce facial expressions to convey emotional meaning.

[3]. A. S. Patwardhan, "Augmenting Supervised Emotion Recognition with Rule-Based Decision Model", arXiv, 2016.
Description: This paper presents a method to automatically detect emotional duality and mixed emotional experience using multimodal audio-visual continuous data. Co-ordinates, distance, and movement of tracked points were used to create features from visual input that captured facial expressions, head, hand gestures, and body movement. Spectral features, prosodic features were extracted from the audio channel.

[4]. SE. Kahou, C. Pal, X. Bouthillier, P. Froumenty, C. Glehre,R. Memisevic, P. Vincent, A. Courville, Y. Bengio, RC. Ferrari and M. Mirza. Combining modality-specific deep neural networks for emotion recognition in video. Proceedings of the 15th ACM on International conference on multimodal interaction, 2013.
Description: This paper presents the initial implementation of a system of multimodal recognition of emotions using mobile devices and the creation of an effective database through a mobile application. The recognizer works into a mobile educational application to identify user's emotions as they interact with the device.

[5]. A. S. Patwardhan and G. M. Knapp, "Multimodal Affect Analysis for Product Feedback Assessment," IIE Annual Conference. Proceedings. Institute of Industrial Engineers-Publisher, 2013.
Description: In this paper, we investigate the effect of the transfer of emotion-rich features between source and target networks on classification accuracy and training time in a multimodal setting for vision-based emotion recognition.

IV. PROPOSED SYSTEM

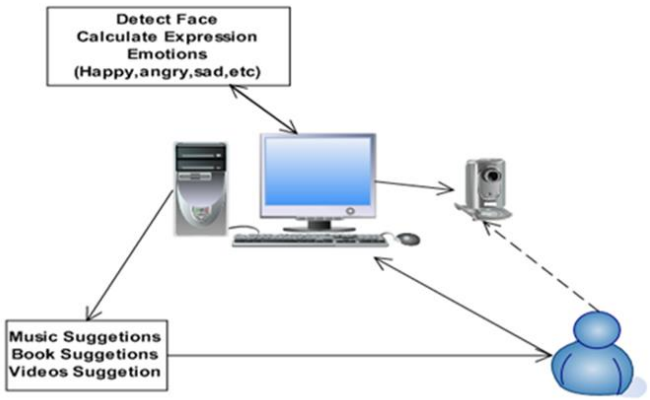

Fig 1. System architecture

A. Module Description:

User: Use this system.

Server: Connection between User and database.

Database: Storage of information related to Facial characteristics, songs, and books uploaded.

Our system has mainly three modules, a user module, a mood detection module, and a video suggestion module. Various processes involved in these two modules are:

User Module:

Users can use the system and store songs and books library in the system.

Mood detection Module:

As per the facial expression, it will recognize the mood of the user it will show a songs list or books library and it will also give video suggestions.

Video suggestion Module:

According to the user's mood, it will give suggestions of videos.

B. Mathematical Model:

Input-Output:

U= {I, O, f, S, F}

Where,

I= {I1, I2,I3}

- I1= {l1,l2…... ln} where n size of image and n>0
- I2= i.e. image capturing using camera
- I3= i.e. face images

O= {O1,O2,O3,O4}

- O1= Image Preprocess
- O2= Image Color Segmentation
- O3 = Image Segmentation (gray scale)
- O4 = emotion face detect

f= {f1,f2,f3,f4,f5}

- f1= preprocess (image,I1, I2, I3)
- f2 = color_segmentation (Image,O2)
- f3 = image_segmentation(Image,O3)
- f4 = face_detection(Image, f2)

V. RESULT AND DISCUSSION

Fig 2. Emotion detected and song play

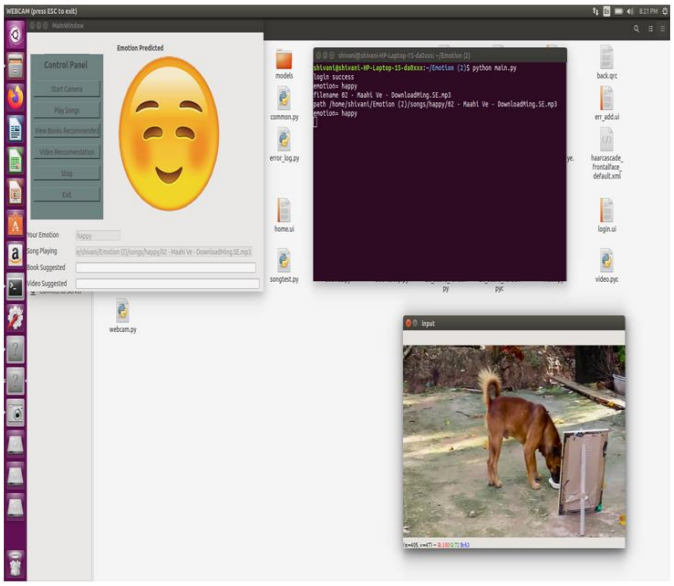

Fig 3. Emotion detected and video play

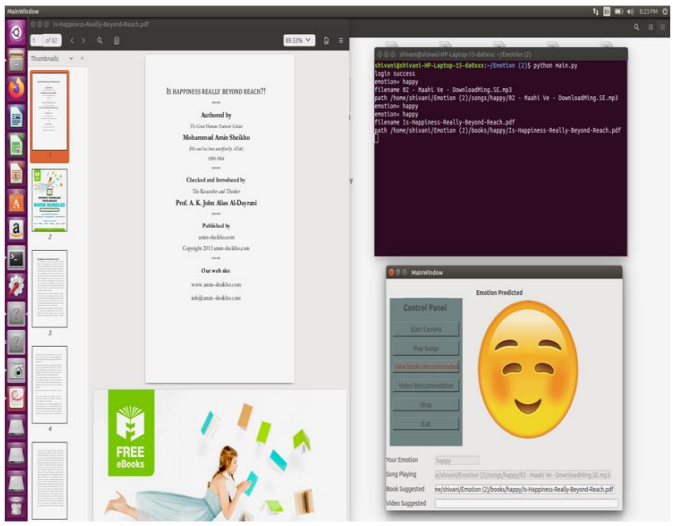

Fig 4. Emotion detected and Book opened

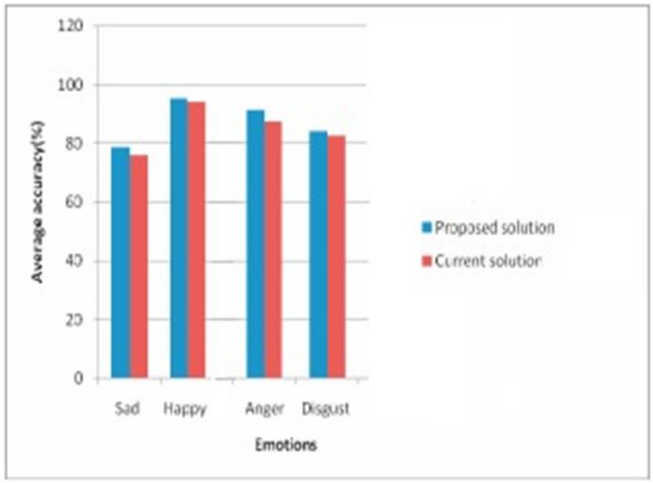

Fig 5. Average accuracy(%) of emotions in a bar graph

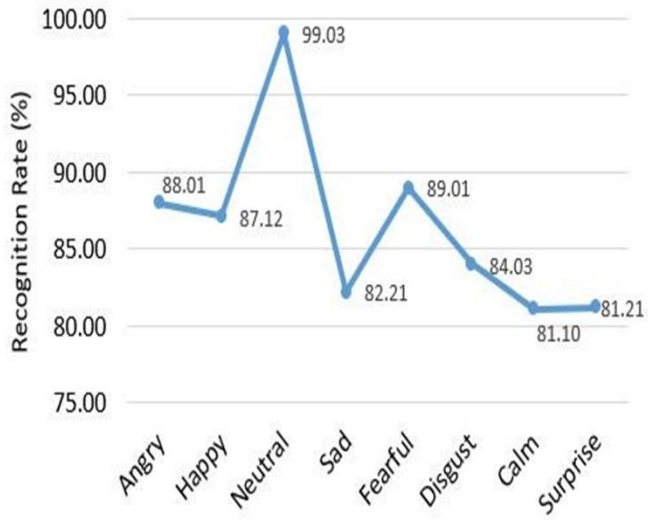

Fig 6. The recognition rate of each Emotion in a line graph

No.	Type of Gesture	No. of Input Images	Recognized	Result (%)
1	Happy	13	12	92.3
2	Disgust	11	10	90.9
3	Anger	10	9	90

Table 1. Average accuracy(%) of some emotions

VI.CONCLUSION

To conclude, music is an important means of regulating mood in various everyday situations. The proposed system is readily available to everyone and can be listened to almost anywhere. The system is directly dependent upon the Facial Expressions of the user, so it is very effective.

VII. REFERENCES

[1]. A. S. Patwardhan, "Augmenting Supervised Emotion Recognition with Rule-Based Decision Model", arXiv, 2016.

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[3]. A. S. Patwardhan and G. M. Knapp, "Multimodal Affect Analysis for Product Feedback Assessment," IIE Annual Conference. Proceedings. Institute of Industrial Engineers-Publisher, 2013.

[4]. SE. Kahou, C. Pal, X. Bouthillier, P. Froumenty, C. Glehre,R. Memisevic, P. Vincent, A. Courville, Y. Bengio, RC. Ferrari and M. Mirza. Combining modality-specific deep neural networks for emotion recognition in video. Proceedings of the 15th ACM on International conference on multimodal interaction, 2013.

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Believable Agents," J. Media Psychology, vol. 23, pp. 100-107, Apr. 2011.

[6]. N. C. Krämer, I. A. Gurgel, and G. Bente, " Emotion and motivation in embodied conversational agents," presented at the AISB'05 Conv., Symp. on Agents that Want and Like: Motivational and Emotional Roots of Cognition and Action, Hatfield, UK, 2005.