International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 06 | June -2018 www.irjet.net p-ISSN: 2395-0072

Student Facial Expression Recognition for Lecture Review

Sayali Vairale[1], Parisa Moon[2], Pratiksha Patil[3]

[123](Student, IT Department, MITCOE, Kothrud, Pune, Maharashtra)

Abstract: *Facial emotion recognition is one of the specific issues of computer vision. Emotions which can be classified as fear, smile, disappointment, sadness, and seriousness are recognizable facial expressions using computer vision. Emotional expressions at face are related to the movements or positions of the muscles under the skin and are a form of nonverbal agreement.*

Here we are trying to develop a well-organized method to detect face and emotion feature database and then this will be used for face and emotion identification of the students seating in classroom. To recognize the face from the input image is done Haar cascade detection algorithm, dlib and to estimate the face and emotion detection SVM classifier is used.

Key Words: Haar-Cascade face detection algorithm, Dlib, SVM classifier, Facial emotion recognition, **Image acquisition.**

1. INTRODUCTION

Facial expression is a way of nonverbal communication. A person depicts his/her sentiment by using facial expression but these expressions create imprecision for recognition system. The number of the researchers has investigated a variety of algorithms to solve expression variation [2].
Computer vision techniques are used in many fields such as traffic control, event monitoring, marketing, healthcare field, quality control, military technology, etc. One of the areas under computer visualization is facial expression identification. Facial expressions which can be classified fear, smile, disappointment, sadness, and seriousness are recognizable with computer vision techniques. In this study, we developed a system which can perceive five facial expressions are fear, smile, disappointment, sadness, and seriousness. At the first step of the system, student's faces are detected and located in an image. In the second step, eyes and mouth are detected in facial areas.

Basically, there is eight emotion of human as shown in above figure that is placed at equal distance from each other and At unit distance from the centre. Happiness is extremely active so it placed with positive valence. Feeling of wonder and surprise. This also comes with positive valence. Fear represents highly negative energy and negative valence.
In a general type of a facial appearance detection system, an input image is obtained from webcam and after that, it communicates with the computer. After finding the facial area, of input image attributes from the expressively face image are extracted, followed by pre-processed and a classifier is to categorize them into one of the emotion like an annoyance, fear, shock, glad, neutral etc. There are several detection methods as well as classifier algorithms that can be used in the detection and classification. Easily confused expressions such as angry, sad, fear, etc.

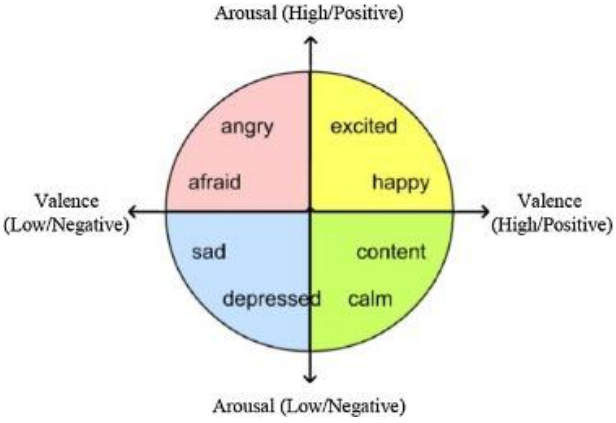

Fig-1: Human Emotions

2. RELATED WORK

Different advance techniques have been used so as to handle the facial expression and recognition tragedy such as motion-based, model-based, and muscles-based approaches are used by the author in [3].

The author gives Gabor filter-based feature extraction [4][5][6] in combination with feed forward neural networks (classifier) for recognition of seven different facial expressions from the persons face. The author in [4] gives simple method in facial expression recognition. For that the Japanese Female Facial Expression (JAFFE) database which encloses many expressed expressions.

The face image from the image sequence segmented and then a hybrid attribute extraction technique based on AAM [5][6] and Gabor wavelet transformation is offered in this paper. Experiments show that their method can recognize the six basic expressions effectively. Especially for the easily confused expressions such as angry, sad, fear, etc [5]

To detect a facial appearance one system need to come across various variability of human faces such as colour, posture, expression, orientation, etc. To identify the expression initially we need to extract different facial attributes such as the movements of eye, nose, lips, etc. and then categorize them contrasting with trained data with a suitable classifier

for appearance detection. The paper gives the recognition system which is modelled using eigenface approach. This method makes use of the HSV (Hue - Saturation -Value) colour representation for finding the face in an image. PCA has been used for reducing the high dimensionality of the eigenspace and then by projecting the test image upon the eigenspace and calculating the Euclidean distance between the test image and meaning of the eigenfaces of the training dataset the expressions are classified easily confused expressions such as angry, sad, fear, etc. [7] gives architecture of hidden Markov models which automatically segment and detect human facial expression from video sequences. [8]. Author in [9] uses fuzzy relational approach to recognize human emotions from facial expressions. They use three different fuzzy sets: HIGH, LOW, and MODERATE using only three facial features eye-opening, mouth opening and the length of eyebrow constriction and recognized six basic emotions.

3. PROPOSED SYSTEM

The main aim of this paper is to implement an efficient method to detect the face and emotion of the students. Facial Expression offers significant information about the sentiment of an individual personality. Face emotion recognition is one of the main applications of machine vision that widely attended in recent years. It can be used in areas of security, entertainment, and human-machine interface or in feedback generation too. In the next step i.e. Image Acquisition and Enhancement, we are getting input images and applying image enhancement techniques which are called as preprocessing phase of the input image. In Image enhancement noise reduction and contrast adjustment will be performed.

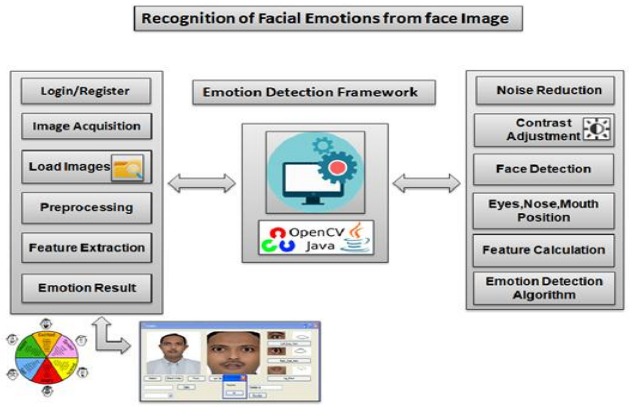

Fig-2: Architecture Diagram

Following is the formula for the RGB Normalization. Haar Cascade is the most recent and most recognized face algorithm available for the face detection from the image. The basic principle of the Haar-Cascade algorithm is to scan a sub-window capable of detecting faces across a given input image. The image processing rescales the input image to dissimilar sizes and then run the fixed size detector during the images. This approach is quite time-consuming because of the estimation of the dissimilar dimension of the images. For eyes, nose and mouth detection we are using Haar Cascade Classifier. We will give the face image as input to this classifier and it returns the eyes, nose and mouth position in the image. On the basis of the extracted feature and their positions like Eyebrow raises 2. Upper eyelid to eyebrow distance 3. Inter-eyebrow distance 4. Upper eyelid 5. Top lip thickness 6. Lower lip thickness 7. Mouth width 8. Mouth Open. By using this feature our algorithm will decide the emotion of the face.
1. An eyebrow raises 2. Upper eyelid to eyebrow distance 3. Inter-eyebrow distance 4. Upper eyelid 5. Top lip thickness 6. Lower lip thickness 7. Mouth width 8. Mouth Open. By using this feature our algorithm will decide the emotion of the face.

1. Eyebrow raises 2. Upper eyelid to eyebrow distance 3. Inter-eyebrow distance 4. Upper eyelid 5. Top lip thickness 6. Lower lip thickness 7. Mouth width 8. Mouth Open. By using this feature our algorithm will decide the emotion of the face.

4. PROPOSED METHOD

A. Face Detection Algorithm.

The Haar-Cascade object detection is the earliest object recognition framework that offers concurrent object detection rates proposed.
Open CV's algorithm is currently using the subsequent Haar-like features which are the input to the basic:

1. Edge Feature.
2. Line Feature.
3. Four rectangles Feature.

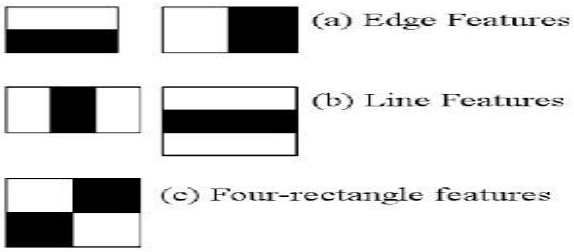

Fig-3: Features in the classifier

Step 1: Train Classifier By Providing Positive and Negative Images.

Step 2: Generate Vector File.
To build a vector output file of the positive samples
Create samples () is used. This vector file is used as the input
For the training function. The number of positive images that
Will be used in training is determined.

Step 3: Generate XML File From the vec file.
These xml files are directly used for object detection using

Haardetectobjects () function. It detects a sequence of objects. By using haarcascade.xml eye, face and mouth are Detected. By using Haarcascade-eye.xml we come to know That they are open or closed.

Step 4: Import xml file in project.

Step 5: Given Input Image.

Step 6: Returns the four coordinate as a rectangle area of face.

B. Emotion Detection Algorithm

The Emotion Detection Algorithm basically works on Face image.

Step 1: Take Students Face Image as input.

Step 2: Pre-processing the face image.

Step 3: Feature Extraction from the Face Image.

1. Nose Position.
2. Mouth Position.
3. Mouth Width.
4. Eye brows position.

Step 4: Send the feature to SVM Classifier.

Step5: SVM Train Data On the parameter (Extracted Feature).

Step 6: Return Smile Percent.

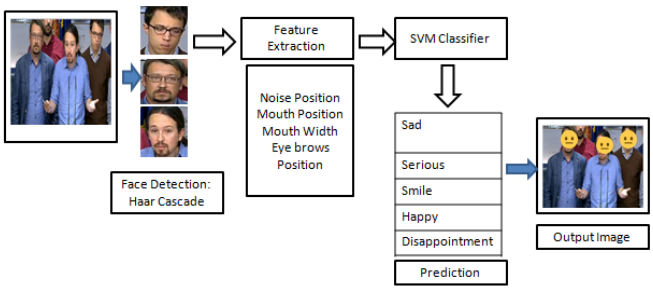

Fig-4: The resulting Classification

5. EXPERIMENTAL RESULT

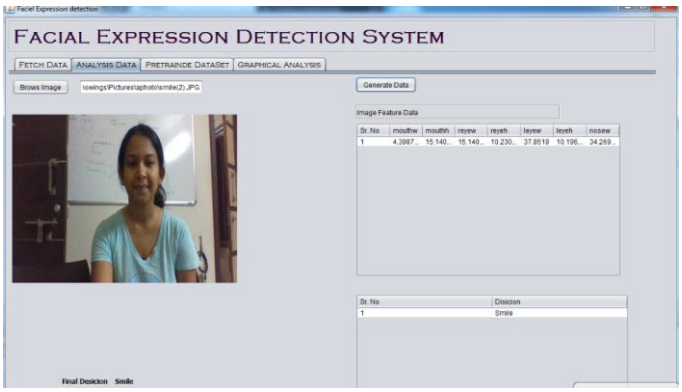

Fig-5: Expression Detection (Smile)

Depending upon the image feature like mouth width, height etc. expression is detected. Figure 5 shows the smile expression depending upon the image feature.

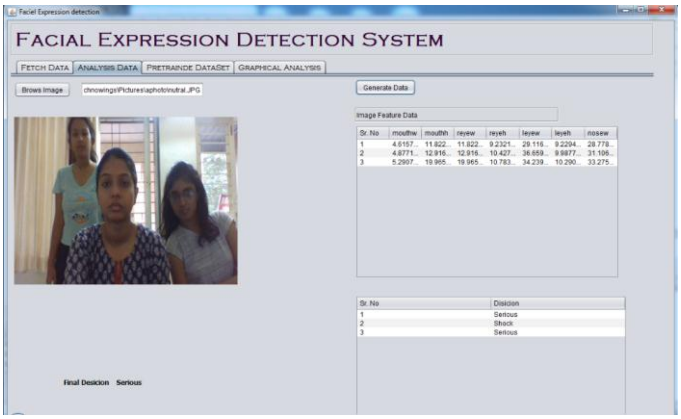

Fig-6: Expression Detection (Serious)

Figure 6 shows the serious expression depending upon the image feature.

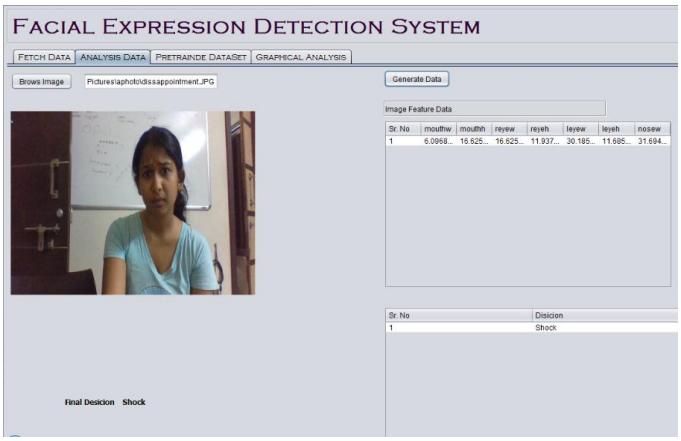

Fig-7: Expression Detection (Shock)

SVM is suitable for recognizing facial expressions from the single frame as there is no direct probability estimation in SVMs.

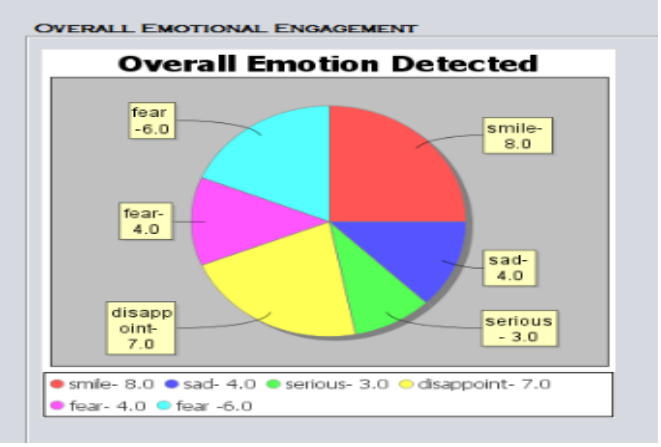

Fig-8: System Analysis

Here we first train the SVM by giving the features like Eyebrow raises, Upper eyelid to eyebrow distance, Upper eyelid, Top lip thickness, Lower lip thickness, Mouth width, Mouth Open for recognizing facial expressions. Then by giving the input image testing can be done to get the output. The table gives the predefined dataset which specifies the values of the features for detecting expressions.

Algorithm Comparision				
Sr.No	Algorithms	No Of Images	Accurate Answer	% Accuracy
1	SVM Classifier	150	146	0.9733333
2	Naïve Bayse	150	120	0.8
3	KNN	150	133	0.8866667

Table-2: Algorithm Comparison

We are using SVM which increase the accuracy near about 97% compare with other methods like Naïve Bayes and KNN. Below table gives the comparison.

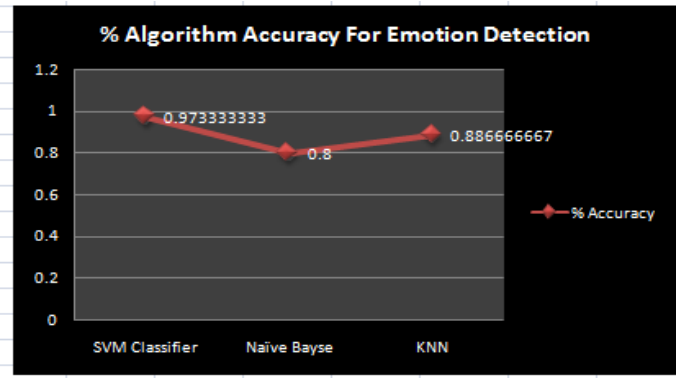

Fig-9: Plot of Algorithm Comparison

6. CONCLUSION

The goal of this project was to implement real-time facial emotion recognition for student feedback system. Haar cascade is used for face detection. Haar cascade has high performance as compared Naïve Bayes and KNN performance which is not easily estimated. Haar cascade has a good solution as a compared Adaboost algorithm. The SVM classifier used for detection of emotions.

REFERENCES

[1] Lei Zhang, Quanxue Gao and David Zhang,"Block IndependentComponent Analysis for Face Recognition", 14th International Conference on Image Analysis and Processing, 2007.

[2] Hsieh C., Lai S., and Chen Y., "An Optical Flow-Based Approach to Robust Face Recognition under Expression Variations," IEEE Transaction on Image Processing, vol. 19, no. 1, pp. 233-240, 2010.

[3] Marryam Murtaza, Muhammad Sharif,"Analysis of Face Recognition under Varying Facial Expression: A Survey ",The International Arab Journal of Information Tech nology, Vol. 10, No. 4, July 2013.

[4] Mahesh Kumbhar , Ashish Jadhav , and Man a si Patil"Facial Expression Rec ognition Based on Image Feature",International Journal of Computer and Communication Engineering, Vol. 1, No. 2, July 2012.

[5] Y. Zhan and G. Zhou, "Facial Expression Recognition Based on Hybrid Features and Fusing Discrete HMMs, " School of Computer Science and Telecommunication Engineering, Jiangsu University, Zhenjiang 212013, Jiangsu, China , 2005.

[6] "EMOTION RECOGNITION FROM FACIAL EXPRESSION BASED ON BEZIER CURVE" ,Shruti Bansal,International Journal of Advanced Information Technology (IJAIT) Vol. 5, No. 3/4/5/6, December 2015.

[7] Anurag De a , A shim Saha,"A Human Facial Expression Reco gnition Model based on Eigen Face Approach"nternational Conference on Advanced Computing Technologies and Applications (ICACTA - 2015).

[8] I. Coh en, " Emotion Recognition from Facial Expressions using Multilevel HMM" in the proceeding of NIPS Workshop on Affective Computing, (2000) .

[9] Chakraborty, " Emotion recognition from facial expressions and its control using fuzzy logic" in the proceeding of IEEE Transactions on Systems, Man, and Cybernetics - Part A: Systems and Humans, (2009).