*Applied GIS*

ISSN: 1832-5505
Vol-4 Issue-04 Oct 2016

# Using Support Vector Machines and the Haar Classifier for Real-Time Feedback Analysis

Sanchaya Bonde1Jyotsna Rakshe2Akshada Jadhav3 Amar Pundir4
Savitribai Phule Pune University, Computer Science Department, Dr. Priya Pise, No. 5

***Abstract-*** Many different industries make use of computer vision techniques, from traffic management to event monitoring to advertising to quality control to military innovation, and so on. Appearance recognition is a subfield of computer vision. Computer vision techniques make it easy to recognize the outward manifestations of emotions including fear, contentment, happiness, suffering, and ferocity. In this study, we developed a system that can recognize six different facial expressions: confused, optimistic, unhappy, furious, ordinary, and impressed. The first stage of the framework involves locating and identifying human faces in an image. The second phase involves locating facial features like the eyes and the lips. One challenge in computer vision is recognizing emotions in people's faces. PC vision makes it easy to identify the outer manifestations of emotions such as surprise, delight, confusion, worry, and apathy. A kind of nonverbal communication, passionate facial expressions may be traced back to specific changes or locations in the underlying muscles. There are several ways to add emotion into a database. To assess face and emotion identification, we use a support vector machine (SVM) classifier using the Haar-Cascade face detection technique.

***Keywords:*** **Words like "Face Detection," "SVM," and "Haar Classifier" often pop up in discussions on "Facial Expression.**

## INTRODUCTION

The emotional tone of a message may make all the difference. Both verbal and nonverbal communication are used in the process of emotion recognition. The term "voice" refers to the audible mode of communication. Non-verbal communication includes things like facial expression, motion, body position, and gesture. Intelligence in interpersonal relationships includes the ability to comprehend spoken and written language, make sound decisions, and comprehend human behavior. Human-computer interaction (HCI), social robots, and alert systems all rely heavily on emotion detection, and so does the study of face expressions.

Nowadays, most people's days include some kind of interaction with a computer. However, computers are really blind to the full of feeling situations of their consumers and have no interest in them. A human-computer interface that doesn't account for emotions will miss out on valuable information. A significant portion of our genuine expressive behavior is revealed in public display. We communicate our emotional states and manage our relationships via our external looks. Moreover, it's simple for us to convey and interpret emotions via body language. Today's educators place a premium on students' dedication to their studies, seeing it as an end in itself. We look into methods for automatic recognition of dedication based on students' behavior. We investigated whether humans can accurately judge commitment from a person's face, mapped out the cues people use to do so, and then automated the process using AI. When it comes to image processing projects, machine learning algorithms play a crucial role in classifying and clustering similar images based on user-specified criteria or requirements and representing the results in a graphical user interface (GUI) that is easy to understand.Classifying data effectively may be accomplished using a number of machine learning methods.Aiming to capture the essence of a moment in time, Paraphrase aims to capture the essence of a moment in time via the use of facial expressions. Video frame capture provides necessary data for the program. Recognizing a student's emotional state by their facial expressions is one method for gathering a general impression of a lecture given in a school setting. As a result, adjustments may be made to existing methods of instruction, and novel approaches can be developed.

## OBJECTIVE

1. To generate feedback from student images.
2. To detect Student facial expression.
3. To achieve real time and generic lecture overview from student.
4. To monitor student engagement in class.

ISSN: 1832-5505
Vol-4 Issue-04 Oct 2016

## PROPOSED ALGORITHM

### 1. Support Vector Machine (SVM)

The concept of Support Vector Machines was firstly introduced by Vapnik et al [3], and presently, they are one of the most widely used methods for pattern classification. An SVM is a supervised learning model, because it uses labelled examples in its training process, examples which correspond to only two categories. This property makes the algorithm able to only tackle binary classification tasks.

The model analyses the training examples and tries to derive a boundary that will linearly separate the data points into their corresponding classes. One of the most important feature of this method, is that it does not only look for a separation boundary,but for the 'best boundary'. This is done by maximizing the margin, which is the width by which the separation boundary can be increased until it hits a data point. The difference between separating data with any border and separating it with SVM's optimal boundary is shown in Figure 5.9

As depicted in Figure 5.9b, the linear classifier that separates the data has the following mathematical form: (equation adapted from Figure 5.7 of [4])

$$f(x) = w \mid x + b \quad (5.4)$$

Where w is the normal to the separation hyperplane, known as the weigh vector, b is the bias and xis the vector of training examples, corresponding to the classes y= {1, -1}.

The goal is finding the best values for w and b that correspond to the maximum-margin boundary,such that each training example xi can be described as: (equations adapted from Eq.5.43 of [4])

$$xi \cdot w + b \geq +1 \text{ if } yi = +1$$
$$xi \cdot w + b \leq -1 \text{ if } yi = -1$$

Finding such function is not trivial because most of the time, the data is simply not linearly separable. For this, SVM uses something called 'kernels', which can be regarded as complicated functions,

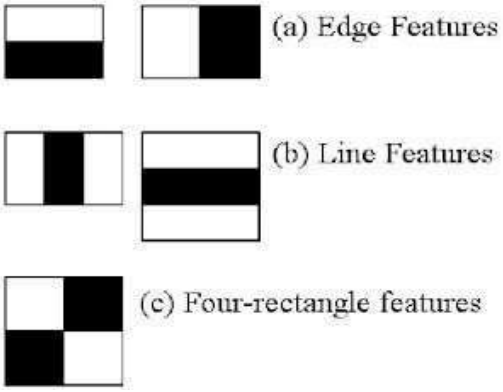
which map the data points into a higher dimensional space, where eventually, a hyperplane would be able to separate the examples. The chosen kernel can be: a polynomial kernel or a radial basis function.

### 2. Haar Cascade Classifier

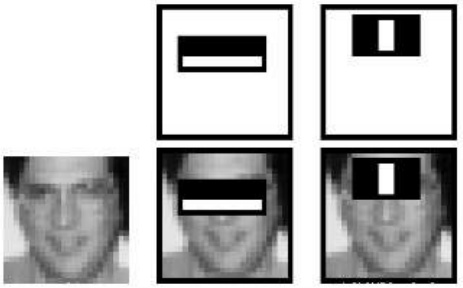
Using Haar include based course classifiers we can recognize the articles and this is a successful object identification strategy proposed by Paul Viola and Michael Jones in their paper, "Quick Object Detection utilizing a Boosted Cascade of Simple Features and statement; in 2001. It is an AI based methodology where a course work is prepared from a ton of positive pictures and negative pictures. It is then used to recognize protests in second pictures [2].

Here we will work with face identification. At first, the calculation needs a great deal of positive (pictures of countenances) what's more, negative (pictures without countenances) to prepare the haar classifier. At that point we have to extricate highlights from haar classifier. For this, haar highlights appeared underneath picture are utilized. They are much the same as our convolutional piece. Each component is a solitary esteem acquired by subtracting whole of pixels under white square shape from aggregate of pixels under dark square shape in haar classifier.

ISSN: 1832-5505
Vol-4 Issue-04 Oct 2016




(a) The 5 types of Haar-like templates; the value of each rectangle feature is computed by subtracting the sum of the black area, from the white area.[5]



(b) Method of applying the rectangle features on the 24x24 pixels image of the face.[5]

Presently all conceivable sizes and areas of every piece is utilized to compute a lot of highlights. (Simply envision what amount of calculation it needs? Indeed, even a 24x24 window results more than 160000 highlights). For each component count, we have to discover total of the considerable number of pixels under white and dark square shapes. To settle this, they presented the vital pictures. It disentangles computation of entirety of the considerable number of pixels, how substantial might be the quantity of pixels, to a task including only four pixels. Pleasant, would it say it isn't? It makes things super-quick [2].

Be that as it may, among every one of these highlights we determined, the greater part of them are irrelevant. For instance, consider the picture beneath. Top line indicates two great highlights. The main element chose appears to concentrate on the property that the locale of the eyes and brow is frequently darker than the district of the nose and cheeks. The second component chose rely upon the property that the eyes are darker than the extension of the nose. In any case, similar windows applying on cheeks or some other spot is irrelevant.

For this, we apply every single component on all the preparation pictures. For each component, it discovers doorstep which will order the appearances to positive and negative. Be that as it may, clearly, there will be mistakes or misclassifications. We select the highlights with less blunder rate, which implies they are the highlights that best groups the face and non-face pictures. (The procedure isn't as straightforward as this. Each picture is given an equivalent load initially. After every grouping, loads of misclassified pictures are expanded. On the other hand same procedure is finished. New mistake rates are determined. The procedure is proceeded until required exactness or blunder rate is accomplished or required number of highlights are found in classifier).

ISSN: 1832-5505
Vol-4 Issue-04 Oct 2016

## I. PROPOSED AND IMPLEMENTED SYSTEM ARCHITECTURE

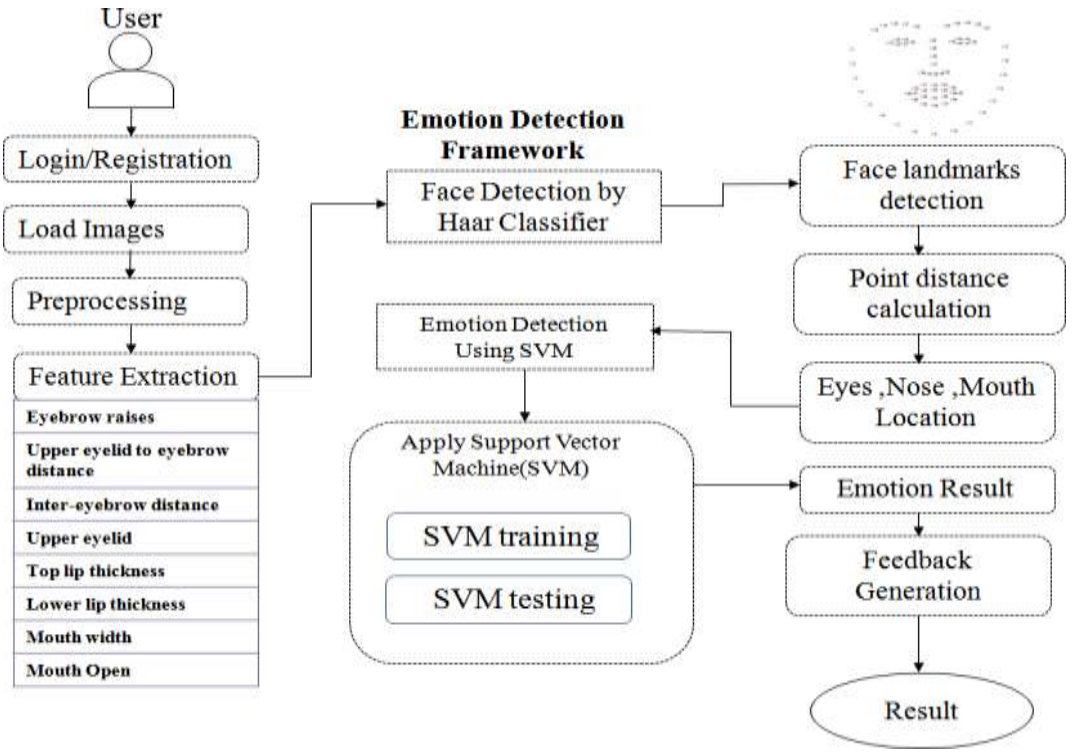



Fig.1: System Architecture

Facial expression recognition involves three steps Face detection, feature extraction and expression classification. The pre-processing step for recognizing facial expressions is face detection. The steps involved in converting a image to a normalized pure facial image for feature extraction is detecting feature points, rotating to line up, locating and cropping the face region using a rectangle, according to the face model. Expression classification is performed by a classifier, which often consists of models of pattern distribution, coupled to a decision procedure.

ISSN: 1832-5505
Vol-4 Issue-04 Oct 2016

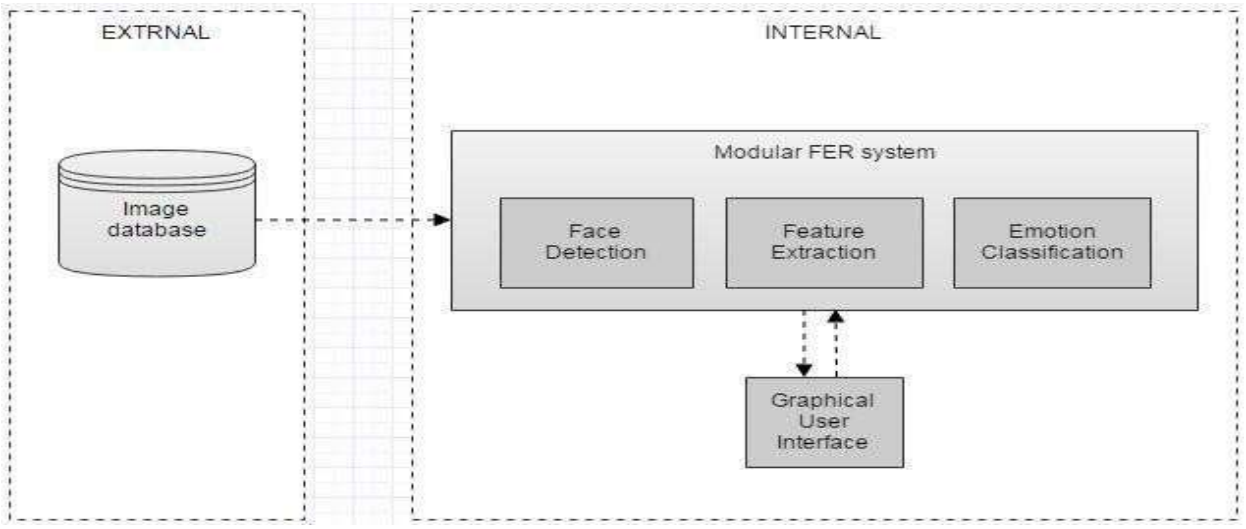



Fig.2: Internal and External Components of the system

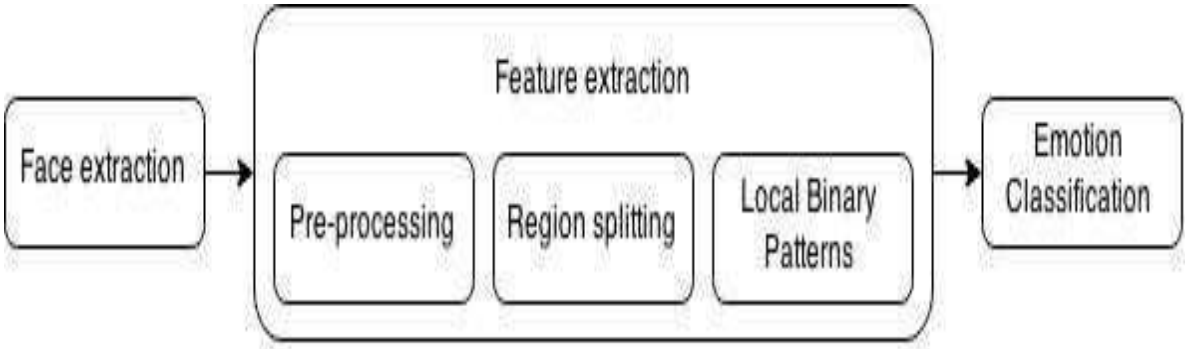



Fig.3: The constituent modules of the system

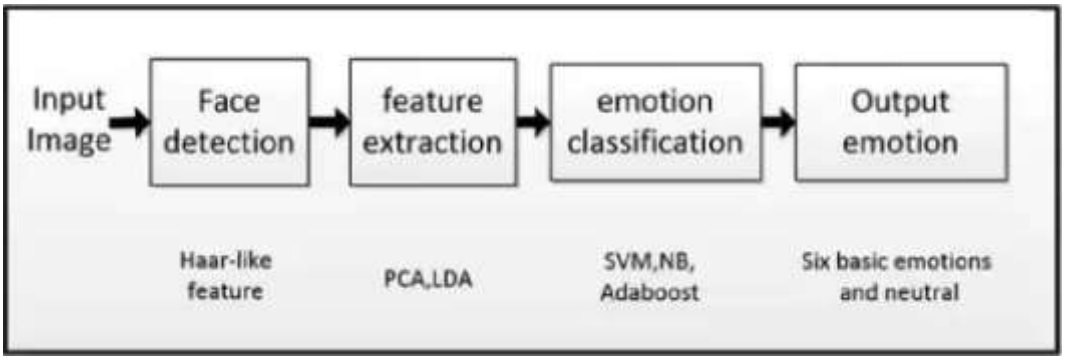


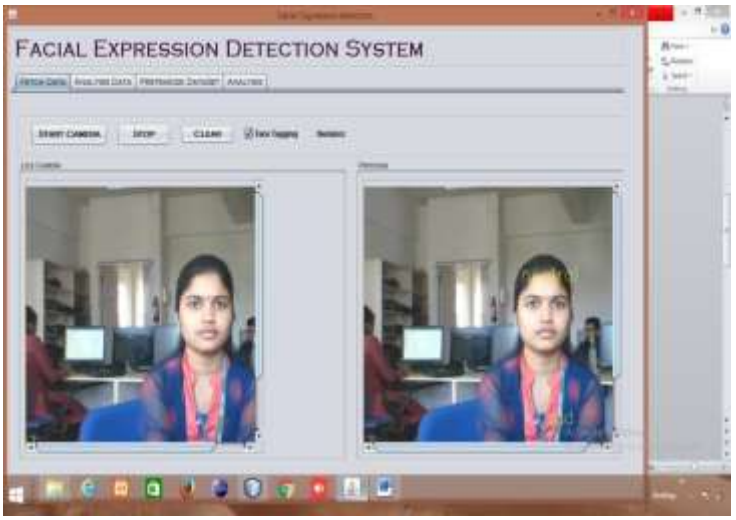

Fig.4: Work Flow

## II. RESULTS

1. Happy

2.Neutral

ISSN: 1832-5505
Vol-4 Issue-04 Oct 2016


3. Surprised


4. Emotions


## III. CONCLUSION

Here we have developed an application for educational institutes that can be used for monitoring student's engagement in a lecture by detecting the facial expression of the student. It can be used for taking overview of lecture those are conducted in educational institutes. Haar cascade is used for face detection. Haar cascade has high performance as compared Naïve Bayse and KNN performance which is not easily estimated. Haar cascade has a good solution as a compared Adaboost algorithm.The SVM classifier is used for detection of emotions.In this, we achieved real time feedback from student images by detecting their facial expressions. We have monitored students engagement in class by using Harr cascade classifier and support vector machines(SVM) .

## Reference

[1] Dolly Reney,Dr.NeetaTripaathi,"An Efficient Method to Face and Emotion Detection",2015 FifthInternational Conference on Communication Systems and Network Technologies.

[2] Wikipedia, Wikipedia. "Viola–Jones object

[3] Corinna Cortes and

ISSN: 1832-5505
Vol-4 Issue-04 Oct 2016

Vladimir Vapnik. Support-vector networks. Machine Learning,20(3):273–297, 1995.

[4] Andrew R. Webb and Keith D. Copsey. Statistical Pattern Recognition. Wiley,2011.

[5] Paul Viola and MichaelJ. Jones. Robust real-time face detection. International Journal of ComputerVision, 57(2):137–154, 2004.