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HUMAN FACIAL EXPRESSION RECOGNIZATION

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Abstract—The objective of this paper is to apply Support Vector Machines to the problem of classifying emotion on images of human faces. We use facial expressions not only to express our own emotions, but also to provide important communicative during social interaction, such as our own level of interest; hence Facial expression is a major modality in human communication. In this paper, we propose to implement a real time approach to emotion recognition through facial expression. The proposed facial expression recognition system consists of Face Localization, Facial feature extraction, Classifier Training and Facial Expression Classification. We propose to use Support Vector Machines (SVM) method for classification stage. The system is capable of processing images rapidly and achieving high detection and recognition rates. The first is the person's face detection used as input for the second stage which is the recognition of the face of the person interacting and the third one is the tracking of this face along the time. The detection technique is based on SVM classifiers.

Keywords—Facial expression recognition; Facial expression interpretation; Emotion recognition; support vector machine.

I. INTRODUCTION

Human beings are naturally use facial expression as an important and powerful modality to communicate their emotions and to interact socially. There has been continued research interest in enabling computer systems to recognize expressions and to use the emotive information embedded in them in human-machine interfaces. This project presents the application of the machine learning system of support vector machines (SVMs) to the recognition and classification of facial expressions in both still images and live video. Facial expressions play an essential role in human communication. The most important technique is Human facial expression recognization is developed by using MATLAB.

Project Objective

To apply Support Vector Machine learning in the context of emotion classification through facial expression by designing, implementing and evaluating an application to recognize emotions expressed in face images.

I. Scope of project

Human beings naturally use facial expression as an important and powerful modality to communicate their emotions and to interact socially. There has been continued research interest in enabling computer systems to recognize expressions. This project presents an application of the machine learning system of support vector machines (SVMs) to the automatic recognition and classification of facial expressions in real time images.

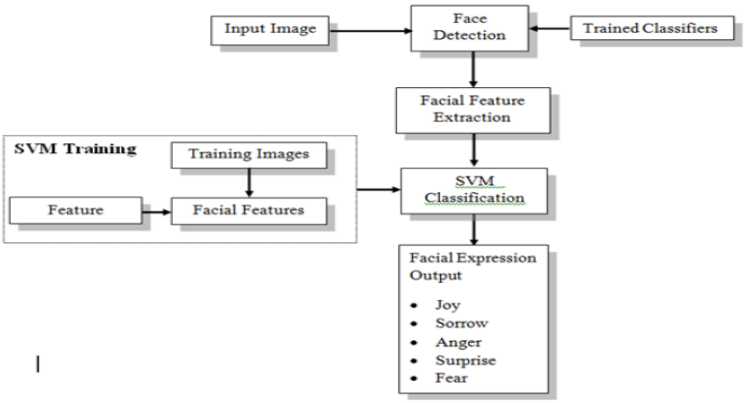


Figure:Block Diagram of facial expression recoganization

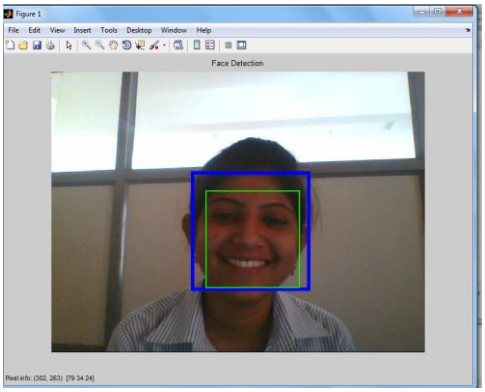
Description

Input image

A (digital) color image is a input image that includes color information for each pixel for visually acceptable results, it is necessary (and almost sufficient) to provide.

Face detection

Face detection is a computer technology that determines the locations and sizes of human faces in digital images. It detects face and ignores anything else, such as buildings, trees and bodies. Face detection can be regarded as a more general case of face localization. In face localization, the task is to find the locations and sizes of a known number of faces (usually one). In face detection, face is processed and matched bitwise with the underlying face image in the database



Feature extraction

In pattern recognition and in processing, feature extraction is a special form of reduction. When the input data to an algorithm is too large to be processed and it is suspected to be notoriously redundant (e.g. the same measurement in both feet and meters) then the input data will be transformed into a reduced representation set of features (also named features vector).Transforming the input data into the set of feature is called feature extraction.

Training and Classification

The vector of displacements of each example expression together with a user-supplied label is used as input to the SVM training stage. The classifier is re-trained each time a new example expression is

added. The SVM subsequently assigns unseen expressions the label of the target expression that has the most similar displacement pattern.

Support Vector Machines (SVMs)

Support vectors are defined as the data points that lie closest to the decision boundary. SVMs can be extended to multiclass problems by two methods - One versus All and One vs One classifiers. In the latter method, SVMs are trained for each combination of classes and the final class label is decided using majority voting. We use both methods for classification. We use a novel way of choosing the final class in the One versus All case. If a feature vector is classified in multiple classes, we choose the class with the maximum margin from the decision boundary. If a feature vector is classified no single class, we take the class that has the minimum margin from the decision boundary. This results in a significant improvement over the One vs. one case.

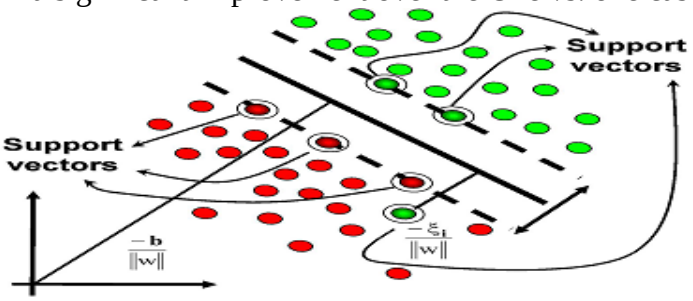


Figure:Support Vector Machine

Expression Classification Schemes:

There are two main schemes according to which emotions are classified in expression analysis systems in the literature. The most widely used scheme was originally proposed by Ekman. He posits that there are six basic emotions, namely anger, disgust, fear, joy, sorrow and surprise, from which more complex combinations can be constructed and which are easily identified (by humans) in facial expressions.

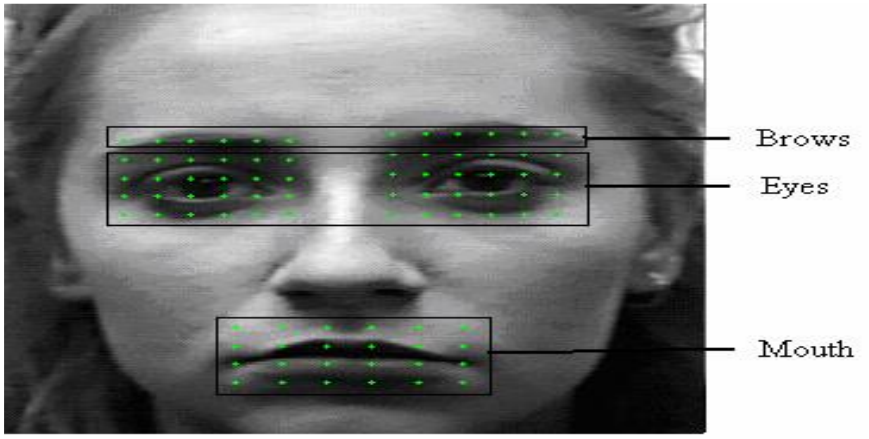


Figure:The feature points used for the recognition of action units in the brows, the eyes, and the mouth.

SYSTEM DEVELOPMENT

Viola-Jones object detection framework:
A widely used method for real-time object detection. Training is slow, but detection is very fast.

A. Three main contributions:

a) Integral Images
b) Adaboost
c) Classifiers in a cascade structure

a) **Integral Image :**

The integral image is defined as the summation of the pixel values of the original image. The value at any location (x, y) of the integral image is the sum of the image‟s pixels above and to the left of location (x, y). “Fig. 1” illustrates the integral image generation.

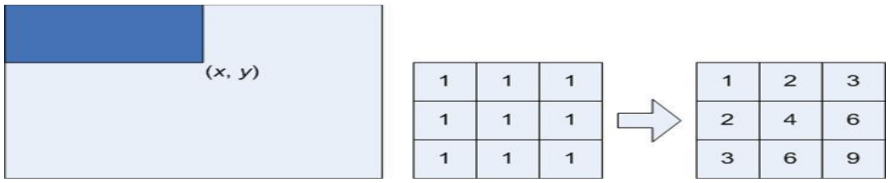
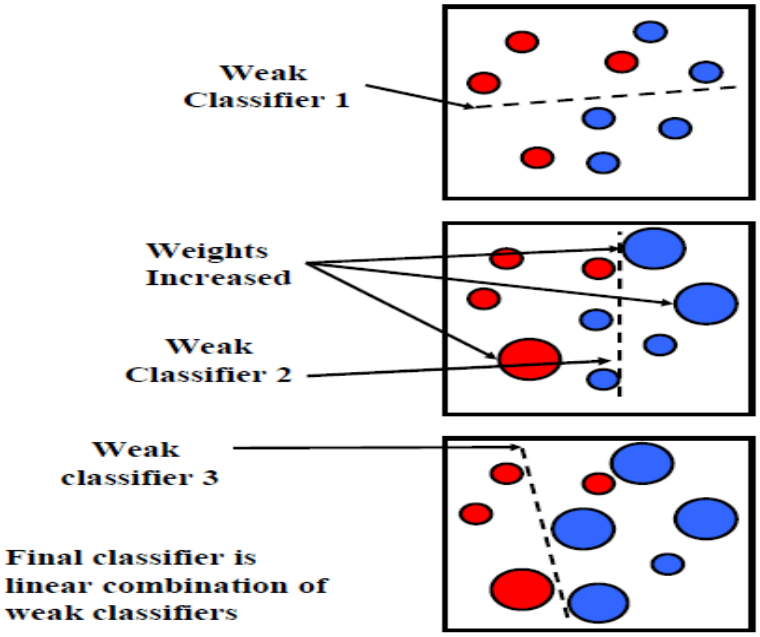


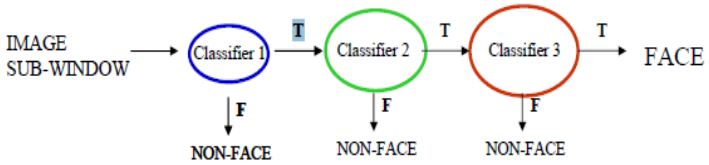
Figure:.Integral image generation.representation.

b) AdaBoos:t



• Features = Weak Classifiers
• Each round selects the optimal feature
given:
– Previous selected features
– Exponential Loss

c) Classifiers in a cascade structure:

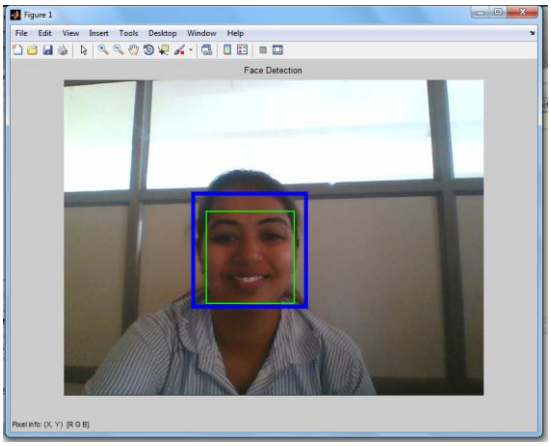


CONCLUSION

A Support Vector Machine learning system correlate well with the constraints placed on recognition accuracy and speed by a real time environment. We evaluated our system in terms of accuracy for a variety of interaction scenarios and try to finding the results for controlled experiments to compare favorably to previous approaches to expression recognition

RESULT

Facial expression detection:



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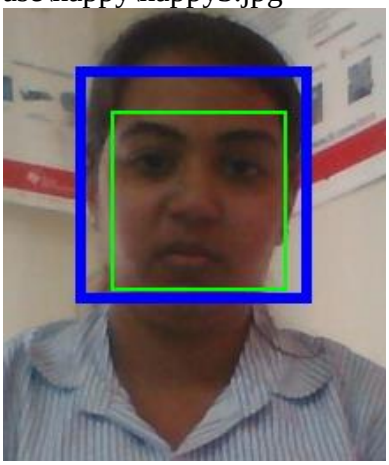
identified_expression =happy
Matched image is :expression database\happy\happy3.jpg



SelectedImage =
expression database\sad\sad4.jpg
identified_expression =sad
Matched image is :expression database\sad\sad4.jpg

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