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ANALYSIS OF FACIAL EXPRESSION RECOGNITION USING EUCLIDEAN CLASSIFIER AND SVM CLASSIFIER

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Abstract— Expression is non verbal type of communication. Recognizing facial expression is still having problem due to changes in features for same person. It is easy for a humans to identify the expression but for a system it is a tedious process. Different categorization technique is adopted for facial expression recognition. In this paper Phase congruency technique is used to extract features .The Analyzing of performance is done using Euclidean classifier and SVM (Support Vector Machine) classifier. The Performance of these classifiers is compared .The Input used for analyzing is taken as Real time video and the video is converted into frames. From the changed frame each expression is recognized. This process is done using the software called Matlab. The various types of expressions are recognized and analyzed.

Keywords: Face expression Recognition, Phase congruency, Real time video, SVM classifier, Euclidean classifier

I. INTRODUCTION

Facial expression recognition is the computer application technique that is used for automatically identifying or verifying a person from a digital image or video from a video source. Face Expression is the visible state of intention and personality of person .Facial expression recognition is done by comparing facial features with facial database. In most computer vision and pattern recognition problems, the large number of inputs, such as images and videos, are computationally thought-provoking to analyze. In such cases, it is necessary to reduce the dimensionality of the data while preserving the original information in the data distribution,. allowing for more proficient learning and inference. The reduction in dimension is achieved by feature extraction.

Phase Congruency is a feature operator which is invariant to illumination and scale. It assumes an image to be highly rich in information and very little redundancy. Phase congruency was applied to detect image features such as step edges, lines, or corners. The real time video is taken for image analyses (i.e.) face expression recognition. The paper is organized as follows. Section II illustrates the related work. Section III employs the proposed work and describes about classifier Section IV describes the experimental results. Section V provides the performance analysis of classifier. Section VIwill provide the conclusion and future work.

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II. RELATED WORK

In [1] the local directional pattern (LDN) method is used for recognizing face .LDN uses directional information that is more stable against noise than intensity, to code the different patterns from the face's textures.LDN uses the sign information of the directional numbers which allows it to distinguish similar texture's structures with different intensity transitions e.g., from dark to bright and vice versa. In [2] it describes Face, a new framework for face analysis including classification. Face improves accuracy performance compared to state-of-the-art methods, for uncontrolled settings when the image acquisition conditions are not optimal. Confidence in the system response is further assessed using SRR I and SRR II, two reliability indices based on the analysis of system responses in relation to the composition of the gallery. In [3]This work reports a study of how the usage of soft labels can help to improve a biometric system for challenging person recognition scenarios at a distance. These soft labels can be visually identified at a distance by humans (or an automatic system) and fused with hard biometrics (as e.g., face recognition).

III.PROPOSED WORK

The expressions of a person plays a vital role in nonverbal communication .The expressions speaks more than words. The expressions of a face occur due to the facial changes that occur due to internal emotional states.

The face expression analysis means the computer system should automatically analyse and recognize the motions of face that are derived from the visual information. There are various types of expressions like angry, happy, joy, sad, surprise, disgust. These expressions are recognized based on common features that are taken from the face.

There are various types features present in the face to express the different expressions. The features may be eyebrow, eyes, mouth. The eyebrow may vary for different persons. The eyebrow may be right corner up, left corner up, eyebrow may be middle up. Based on these the different shapes can be produced in the face. The values are normalized and it is used for recognizing. While considering mouth as one of the feature the feature vectors are taken based on whether the mouth is open or it is closed. Some only produce the meaningful expressions. The basic shapes in this is whether the corner is up, corner is down, normal. From this shapes of mouth the features are extracted.

The scope of this project is to extract the facial features using phase congruency (i.e.) training phase. The classifier used for training and testing is SVM (Support Vector machine) classifier and Euclidean classifier.

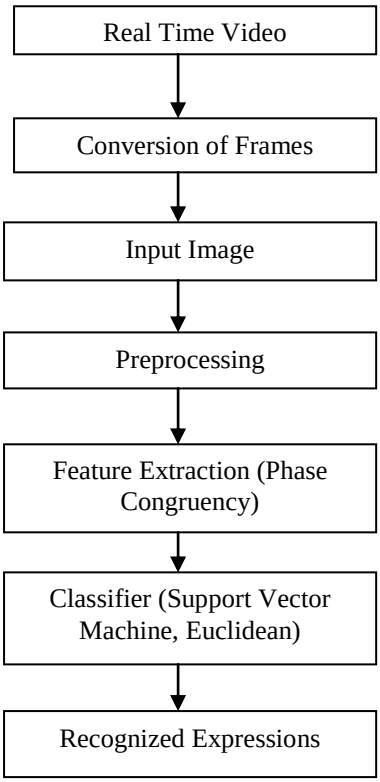

Fig.1.1 Block Diagram of Face Expression Recognition

The input taken is real time video. The video is converted into frames. The converted frames are taken for analysis.

Preprocessing is the basic step in an image processing. It is used to remove the unwanted noise that is present in the image. It is used to reduce the complexity for further process. The input image is converted into gray scale image. The histogram of an image is calculated .It is the graphical representation of gray level values in the x-axis and no of pixels in the y axis. Smoothing is the process of reducing sharp transitions .It is also used to reduce noise and blurring that are present in the image.

The images should be resized (i.e.) normalized in order to obtain the feature vectors easily. The feature vectors are based on the position and geometry of images. Feature extraction plays a vital role in pattern classification. The main aim of feature extraction is to minimize the dimensionality of data points for the purpose of data visualisation or discrimination. The features can be extracted as holistic and geometric basis. In the holistic type the whole face is taken into account .In the geometric type the entire face is not taken for analyses. There are various methods for extracting features.

In this paper, the Phase congruency technique used for extracting the features such as the lines, corners, edges in an image. Phase Congruency is the fundamental tool for analysing multi scale images. It allows using of threshold values that is applied to multi class images. It is used to extract the image in phase as well as in magnitude levels.

Classifier is used to find the regularities in patterns of empirical data (training data). There are various types of classifier. In this the SVM (Support Vector Machine) and Euclidean classifier is used for training and testing.

The features like eyebrow, eyes, mouth, and nose are considered this classifier is used because it can be trained in many ways and it provides classification. It constructs the hyper plane that is used for classification .In this positive support vectors and negative support vectors are used for categorizing the type of expression.

The Euclidean classifier is simple and the evaluation is quick. It is easy to understand. It assumes that the data is to be isotrophically Gaussian because it treats all features equally.

IV.RESULT

The simulated results used to verify the various types of expression shown by the human beings in their face.

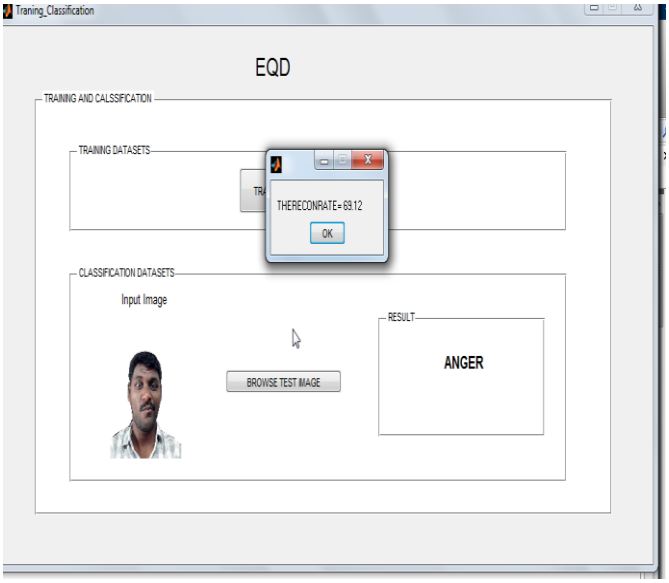

Fig 1.2 Expression indicating Anger using Euclidean classifier

This is the result that indicates the anger expression. In this

training and testing of images is done using the Euclidean classifier.

Fig 1.3 Expression indicating Anger using SVM classifier

This is the result indicating the expression using Support Vector Machine Classifier .

Fig 1.4 Expression indicating Disgust using Euclidean classifier

This Figure represents that the categorization of expression is Disgust. and the classification is done using the Euclidean classifier.

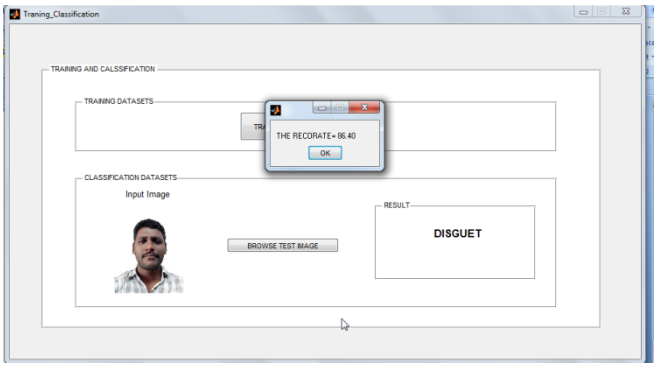

Fig 1.5 Expression Indicating Disgust using SVM classifier

The above figure shows Disgust expression. The training Phase is the one in which the system is trained with expression. SVM is used for classifying the expression the given image which is converted as frames from running video

Fig 1.4 Expression indicating Fear using Euclidean classifier

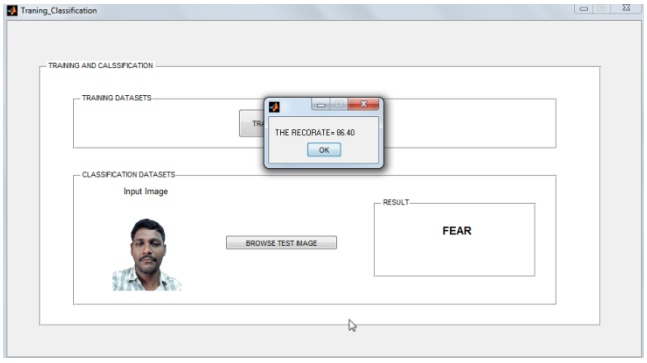

Fig 1.5 Expression indicating Fear using SVM classifier

The simulated result indicates the indication of fear expression using the classifier.

Fig 1.6 Expression indicating Surprise using Euclidean classifier

Fig 1.5 Expression indicating Surprise using SVM classifier

V. PERFORMANCE ANALYSIS

The Performance analysis is used to determine how well the classifier works. The performance varies for each classifier .In this paper the recognition rate of Euclidean classifier is 69.12% and the recognition rate of SVM (support vector machine) classifier is 86.40%

S.NO	TYPE OF CLASSIFIER	RECOGNITION RATE
1.	EUCLIDEAN	69.12%
2.	SVM	86.40%

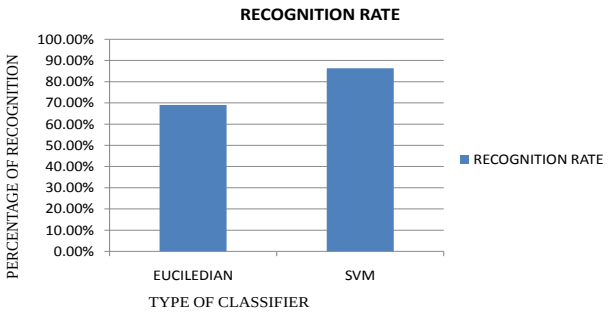

Fig 1.6 GRAPH REPRESENTING RECONITION RATE OF CLASSIFIERS

VI. CONCLUSION AND FUTUREWORK

Faces are the projector of the basic mechanism that governs our emotions. The simulation results display various expressions of human beings that is used for authentication purposes. Monitoring the facial expressions provide important information to lawyers, police, and intelligence agents.

In this the SVM (Support Vector Machine) classifier and the Euclidean classifier performance is analyzed. In this the performance of SVM is high compared to that of Euclidean classifier. So the categorization of expression is done effectively in SVM classifier. The future work includes using of alternate algorithm for feature extraction, alternate classifier for recognizing and using of various databases.

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