

Recognition of Face Images Based on Feature Extraction

^[1] R.Mangaleswari, ^[2] Dr.R.Shenbagavalli^[1] M.Phil Computer Science, ^[2] Assistant Professor

Department of Computer Science, Rani Anna Government College for Women, Tirunelveli

Abstract: - Image processing method is to perform some operations on image in order to extract some useful information for developing a digital system. Pattern recognition is one of the significant techniques in image processing. In this paper, recognition of face images based on feature extraction was implemented. The image was segmented into nose, eyes, mouth and face using Viola-Jones method. Each segmented part was analyzed using three methods 1.Gabor method with 0°, 45°, 90°, 2. Local Binary Pattern method 3. Combination of both Gabor and Local Binary Pattern method. Statistical parameters like mean and Standard deviation are derived from the output image of Gabor and Local Binary Pattern. The result of statistical value is correlated with the statistical value derived from the query image using Euclidean Distance to retrieve the matched image. The combined method produces a better result than the individual method. Data set has been collected by capturing various Face images by a digital camera and stored in a database.

Keywords: Feature Extraction, Viola-Jones, LBP, Gabor, Euclidean Distance..

I. INTRODUCTION

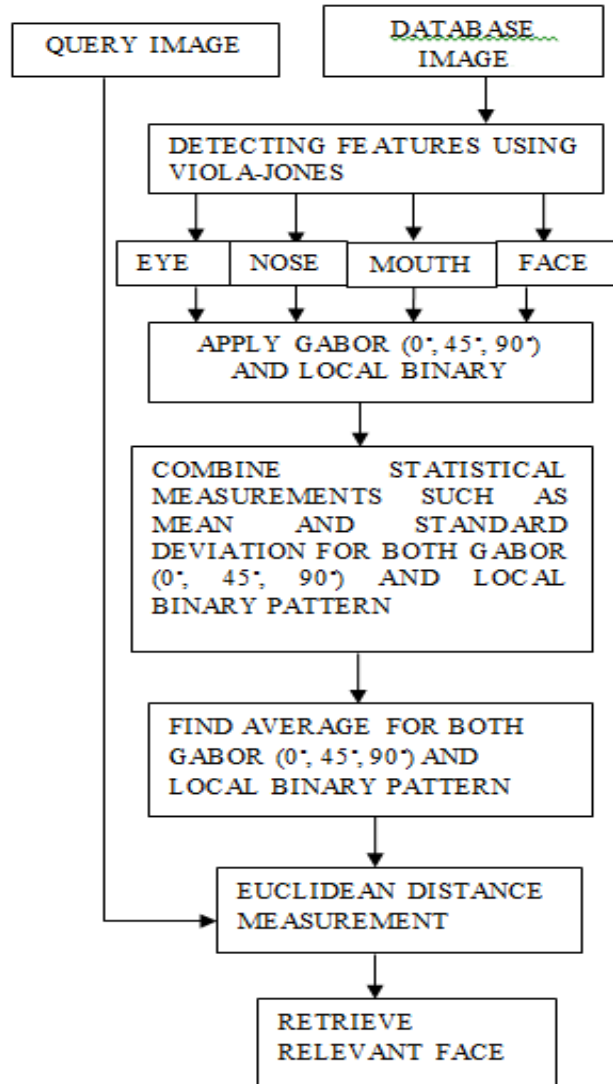
A facial recognition system is application for identifying or verifying a person. One way is to compare the selected facial features from the feature extracted from database image [1]. Face-detection algorithms focus on the detection of frontal human faces. It is a image detection in which person image is matched bit by bit. Image stored in database is matched with input image. Any facial feature changes in the database will invalidate the matching process. A reliable face-detection approach based on several techniques [2]. Segmentation is partition of an image into distinct regions containing each of pixels with similar attributes. Segmentation is first transforming a grey scale or color image into one or more other images [3]. Detecting faces across a given input image is done through Viola-Jones. Standard image processing approach would be to rescale the input image to different sizes and then run the fixed size detector through these images[4]. The LBP operator labels the pixels of an image with decimal numbers, called Local Binary Patterns or LBP codes, which encode the local structure around each pixel[5]. Gabor features, have been particularly successful in many computer vision and image processing applications[6]. Gabor features are among the top performers in face recognition and matching Face recognition is the first very important stage to start Face detection. For Identifying persons, their face images are localized.

II. LITERATURE REVIEW

1. Walaa Mohamed, Mohamed Heshmat, Proposed "A new Method for Face Recognition Using Variance Estimation and Feature Extraction". In this paper face detection approaches is through Viola and Jones for extracting face regions from images. Viola and Jones's algorithm first converting image to grayscale and finally applying face detection method. To detect candidate regions such as Eyes, Nose and Mouth, and apply dimensions for each region on several other faces with the same size[7]. Timo Ahonen, Matte Pietikainen, Proposed "Face Description with Local Binary Patterns: Application to Face Recognition". In this paper Local Binary Pattern (LBP) texture features is used for facial image representation. There are some parameters for performing LBP operator, for division of images into regions selecting the distance measure for nearest neighbor classifier and finding weight for weighted X2Statistic[8]. "Kathirvalavakumar, Thangairulappan", proposed "Face Representation Using Combined Method of Gabor Filters" Gabor features is effective for face recognition. [9].

III. METHODOLOGY AND DATASET

V. EXISTING METHODOLOGY



A. DATA SET



A. FEATURE EXTRACTION

Transforming input data into a set of features to represent the input data is Feature Extraction. It is a process for extracting relevant information from an image. If the features extracted are carefully chosen, it is expected that the features set will perform the desired task using the reduced representation. Once images are detected, some valuable information is extracted from the images which are used in next step for identifying the image. Feature Extraction which is applied to get features that will be useful in classifying and recognition of images. Feature Extraction techniques are helpful in various image processing applications.[10]

B. VIOLA-JONES METHOD

Viola-Jones uses the face detector for face regions extraction from experimental images. Face detection method is based on Viola and Jones's algorithm for converting image into grayscale and applying face detection method. In this portion of our work, we have collected around 50 images and detect the face parts such as Eyes, Nose, Mouth and Face the detection is done through method Viola-Jones. Using Viola-Jones Detection we detect the features of images and values of Detected images are displayed. Figure1 shows the detected images using viola-jones. Table1 shows the distance measurements of viola-Jones.

Figure1 Extracted Features using Viola-Jones Method.



Table1 Representation of Features Extracted with Distance Measure

Feature	Distance Measure			
Eyes	37	74	99	24
Face	33	49	101	115
Nose	66	96	36	30
Mouth	64	123	40	24

**International Journal of Engineering Research in Computer Science and Engineering
(IJERCSE)**

Vol 5, Issue 3, March 2018

C. LOCAL BINARY PATTERN:

The Local Binary Pattern operator transforms image into an array. The local binary pattern operator works in a 3×3 pixel block of an image. The Collected 50 images are converted into 3×3 pixel block of an image using local binary pattern. The pixel blocks are combined to form a whole image. Once pixels are combined Feature Extraction such as Mean and Standard Deviation are found for the images. Local Binary Pattern was applied to each features detected from viola-jones is shown in figure2 and figure3. The statistical measurements are shown in table2 and table3.

Figure3. Detection of Nose and Mouth in image using Local Binary Pattern

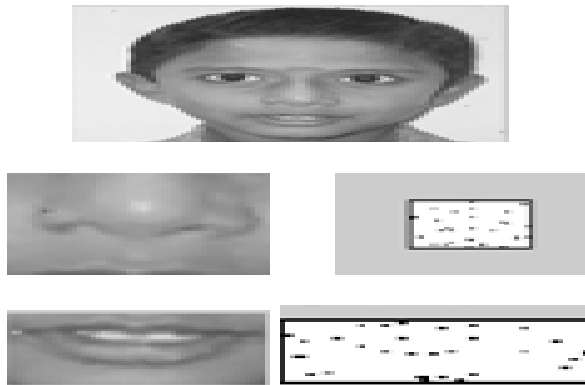


Table 2: Mean and Standard Deviation for the Mouth and Nose using local Binary pattern

Features	Distance Measure	
	Mean	Std Dev
Nose	101.7	83.98
Mouth	103.2	99.6

Figure3. Detection of Eyes and Face in image using Local Binary Pattern

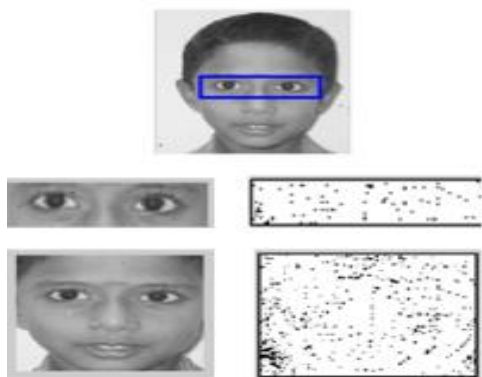


Table 3: Mean and Standard Deviation for the Eyes and Face using local Binary pattern

Features	Distance Measure	
	Mean	Std Dev
Eyes	95.70	89.70
Face	110.2	89.96

D.GABOR METHOD:

Gabor features are used to represent the face images. To extract features from a face image, a set of Gabor filters with different frequencies and orientations are required. Gabor filters and the wavelet transformation are applied on the input patterns to extract the important features and reduce the dimension. Figure 4,5,6,7 shows the Gabor orientations for extracted features of viola-Jones. Table 4,5,6,7 represents the statistical measurements of Gabor Figure4. Extraction using Viola-Jones Method in image using Gabor with orientation $0^\circ, 45^\circ, 90^\circ$

Table 4 Mean and Standard Deviation through Gabor with orientation $0^\circ, 45^\circ, 90^\circ$

Eyes Features	Gabor 0°	Gabor 45°	Gabor 90°
Mean	-0.006	0.0033	0.0891
Std Dev	0.2245	0.0871	0.4747

Figure5. Detection of Nose represent Extraction

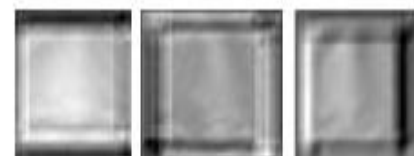
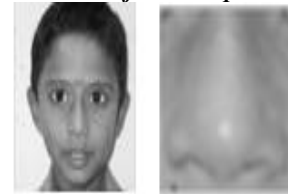


Table 5 Mean and Standard Deviation through Gabor with orientation $0^\circ, 45^\circ, 90^\circ$.

Nose Feature	Gabor 0°	Gabor 45°	Gabor 90°
Mean	0.010	-4.837	0.121
StdDev	0.1904	0.0647	0.458

**International Journal of Engineering Research in Computer Science and Engineering
(IJERCSE)**

Vol 5, Issue 3, March 2018

Figure6. Mouth Extraction image using Gabor with orientation 0°,45°,90°

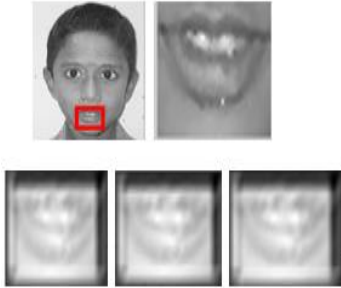
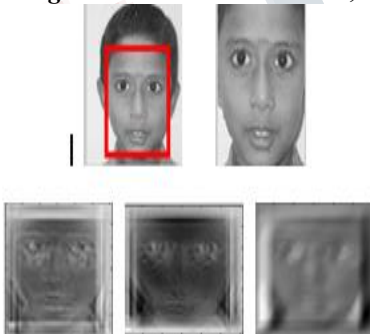


Table 6 Mean and Standard Deviation through Gabor with orientation 0°,45°,90°.

Mouth Feature	Gabor 0°	Gabor 45°	Gabor 90°
Mean	0.003	0.0021	0.0073
Std Dev	0.036	0.0212	0.073

Figure7. Detection of Face represent Extraction in image using Gabor with orientation 0°,45°,90°



The Table 7 Mean and Standard Deviation through Gabor with orientation 0°,45°,90°

Face Feature	Gabor 0°	Gabor 45°	Gabor 90°
Mean	-.0376	.0031	0.0114
StdDev	0.3771	0.2724	0.5578

V.PROPOSED METHODOLOGY

A. COMBINE OF GABOR AND LOCAL BINARY PATTERN

The Final Result is obtained through combination of both Gabor and Local Binary Pattern. The combined value

gives more accuracy than separate methods. The Images are extracted correctly by using the features Mean and standard deviation for both the methods. The Exact images are detected while using these features to these Methods. The Average is found for the features mean and standard deviation for both the methods and combined average of two methods produces good accuracy.

The Combine distance measurements are shown in Tablee8.

Table 8: The Gabor and Local Binary Pattern for Feature as Mean and Standard Deviation for image.

Features	Gabor	Local Binary Pattern
Eyes	0.118892321	103.4114
Nose	0.143162375	99.01184
Mouth	0.251168141	113.0096
Face	0.166978658	106.6802

VI. EXPERIMENT RESULT

In this paper, face recognition method is based on variance estimation and facial feature cut is proposed. The proposed algorithm the results showed that it is able to recognize a variety of different faces by testing using a database faces. In the proposed method the total number of distance calculations is done, and face images having close variance value to input face image is matched and relevant image is displayed, then the distance computation is performed only on those images.

Test image	Similar images		Test image	Match Image	Image Locn
	Gabor	LBP			
	27,31 45,13	11,13 27 35			27
	18,32, 25,1	18,45 ,2515			18
	23,30 38,5	23,15 , 35,28			23
	43,32, 11,23	43,35 , 22,39			43
	44,25, 10,33	44,15 35,29			44

VII.CONCLUSION

In this paper, a new method of face detection and recognition based on feature extraction was proposed. Viola-Jones method has been used to detect face features

**International Journal of Engineering Research in Computer Science and Engineering
(IJERCSE)****Vol 5, Issue 3, March 2018**

such as Face, Mouth, Nose and Eyes. In each features, Local Binary Pattern and Gabor with $0^\circ, 45^\circ, 90^\circ$ is applied to analyze face texture and face in different angle . The texture feature such as mean and Standard deviation were extracted. Accuracy in face detection and recognition is more when combine both Local Binary Pattern and Gabor with $0^\circ, 45^\circ, 90^\circ$. In future, the work can be extended with more Dataset. Face recognition establish authorized person than just checking valid identification or personal identification as numbers or passwords. To eliminate duplicates in a nationwide voter registration system where the same person assigned more than one identification number. The face recognition system is used.

REFERENCES

1. https://en.wikipedia.org/wiki/Facial_recognition_System.
2. https://en.wikipedia.org/wiki/Face_detection.
3. https://en.wikipedia.org/wiki/Image_segmentation.
4. <https://pdfs.semanticscholar.org/40b1/0e330a5511a6a45f42c8b86da222504c717f.pdf>
5. <http://liris.cnrs.fr/Documents/Liris-5004.pdf>
6. <http://vision.cs.tut.fi/data/publications/ipta2012.pdf>
7. https://www.igi-global.com/dictionary/feature_extraction/10960
8. https://www.ripublication.com/ijcir17/ijcirv13n5_05.pdf
9. https://www.ripublication.com/acst17/acstv10n5_47.pdf
10. <http://liris.cnrs.fr/Documents/Liris-5004.pdf>