Detection of Moles, scars and Deformed Faces

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Abstract- *A Face is the best way to reveal a person`s identity more accurately. This paper presents a mole detection and validation technique which helps to reduce the effect of illumination in face recognition. Using Principle component analysis to easily store and visualize the data and normalized cross co-relation method for feature extraction. This paper will increase the accuracy of the mole detection. And using "FEI" database increased accuracy is 94.56% by using MATLAB.*

Keywords- SIMILARITIES BETWEEN IMAGES, ENHANCED PERFORMENCE, FAST PROCESSING VIA FTM, STORATION OF DATA, ACCURACY.

I. INTRODUCTION

Basically, Face Recognition is an important technique for security, validation, and verification. If we talk about today`s environment then mostly actions are increasingly being handled by computers or we can say electronically, instead of manually or face to face. For example, if ATM or CREDITS cards are stolen or lost and it gets by an unauthorized person and he knows about the PIN number of your cards and all the important information then how you will stop him, so this problem of stolen cards may solve by Face Recognition technology.

In this paper, We Proposed a method to detect and validate the face with moles more accurately. And the procedure to detect the moles is illustrated. To improve the accuracy of the deformed faces with moles and scars. Using normalized cross-correlation method detects the scars and moles from the human face. Principle component analysis is using for easily storing and visualize the data. To find the local and global both texture constraints, using ENHANCE Active Shape Algorithms. And we are using a stereo vision system to estimate the actual distance of the camera from an object. And for analysis of facial marks, scars and moles 'FEI' Database is used.

II. FR & FD

Face recognition (FR) is an identification technology which is used to identifies the people with their various facial features. This technology is automatically recognized and tracks the face from the image by using a camera or any webcam application.

Face detection (FD) is used for pre-processing purposes, and which is used to detects the marks, scars, and marks out the dimensions of a human face.

In this paper, we have methods of feature extraction and many classifications what we`ll use for our project [2].

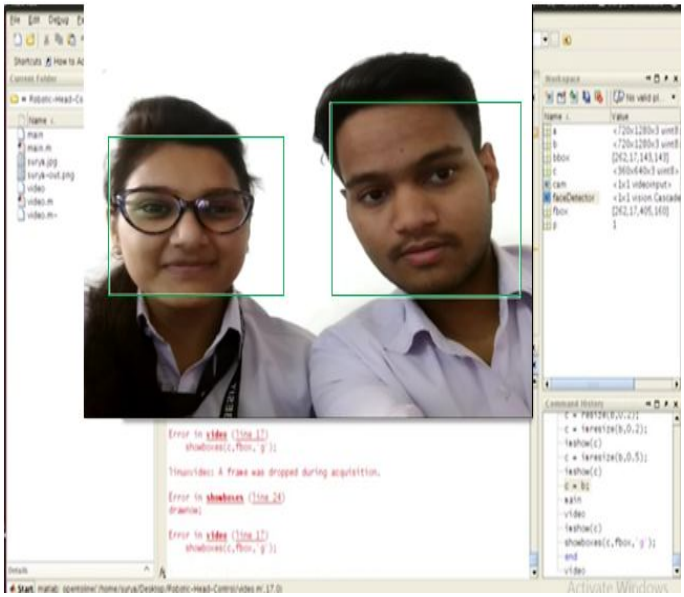

Figure 1. Face recognition and Detection

Feature Extraction

Firstly, we have methods of feature extraction, with the help of these methods we`ll visualize and store the data.

And we`ll use the algorithm from enhance active shape model to mark out the cells and position of human face.

III. PRINCIPLE COMPONENT ANALYSIS

Principle Component Analysis is basically used to visualize the data and to easily store data. It is the most popular method to deduct the number of variables in the technique of face recognition. It transfers the correlated variables into a smaller number of uncorrelated variables.[8]

It takes a big data or we can say at a time it takes a big amount of data and separates that data into small-small cells to easily visualize `the data and from separation, we can easily work on it.

And it is an unsupervised algorithm which will be used in our process to analyze the procedure and according to that analysis it will give the outcomes.

Figure 2. FEI database

IV. EASM

EASM is enhanced active shape model and it is an advanced model of Active Shape Model which is an algorithm, used to search the texture constraints. Enhance active shape model also has the advantage to search both kinds of texture constraints that can be local or also can be global texture constraints [5].

EASM covers all the local and global texture constraints around each and every landmark points at the time of searching the texture constraints from any model. This model is basically used to determine the shape of the model and with the help of enhance active shape model, it is dynamical models of the shape.

Moles

Moles occur when cells in the skin grow in a cluster instead of being spread throughout the skin. Moles are growths on the skin that are usually brown or black. Moles can appear anywhere on the skin, alone or in groups. The size, shape, and color of moles vary a lot and some raise irregularly and become large

Scars

Scars occur when a biological process happens and it reconstructs the skin, organs and the tissues of the body. A scar is a minor thing it can be caused by any disease and any accident.

Classification Methods

V. NCC

By using Normal Cross Correlation (NCC) to extracts the features from query images and to identify the similarities between image queries. Firstly, it breakdowns the big dimensional data into small dimensional data and then compares the similarities between that data of any database and then it detects the facial moles, scars on the human faces.

It can search along signal within a short time of period and in normal cross-correlation, there are two continuous function f and g, and with the help of these functions we can define the NCC as,[7].

$$(f \star g)(\tau) \stackrel{\text{def}}{=} \int_{-\infty}^{\infty} f^*(t)\, g(t+\tau)\, dt$$

Similarly, for discrete functions, the cross-correlation is defined as,

$$(f \star g)[n] \stackrel{\text{def}}{=} \sum_{m=-\infty}^{\infty} f^*[m]\, g[m+n].$$

VI. LDA

LDA is a landmark discriminant analysis which is used to find a linear combination of features what we have already extracted from normal cross correlation and it separates the objects or events into small classes to easily look on it [5][6].

Landmark discriminant analysis is used to improve the accuracy of the model, this method is a more useful method to make a project or improve the accuracy of any kind of model. It is not useful for regression it is used only to classify the different models into small dimensions.

Landmark discriminant analysis has a target variable which has some categories to find a linear combination of features from a human face. Landmark discriminant analysis is mostly same as principle component analysis and they both are best analyzer to explain any kind of data.

Landmark discriminant analysis is also known as landmark detection method and it is a more complex modern method and we`ll use it for complex types of data. And with the help of this analysis or this algorithm, we`ll improve the accuracy of our dataset.

Stereo-vision system

Stereo-vision system is the process to extracts the 3D information from multiple 2D views of an object. And basically, it is used to calculate the distance of an o from the webcam.

PRE-PROCESSING OF FACE IMAGES

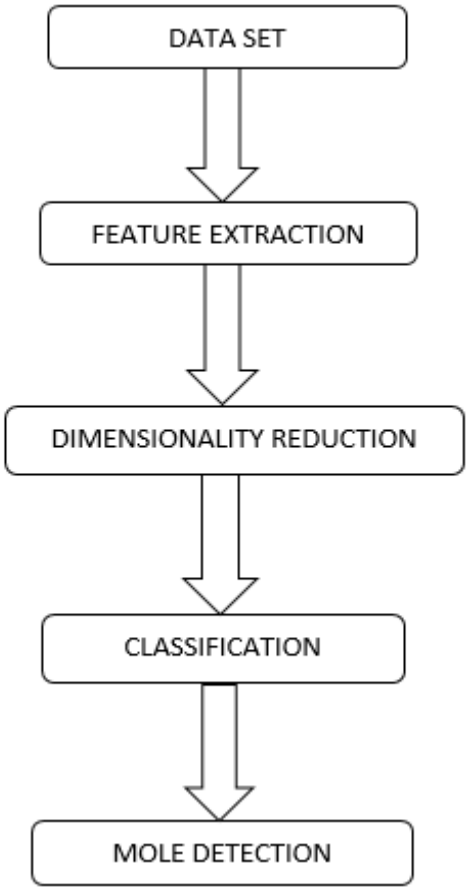

Figure 3.

Uses of facial marks in different ways

- According to the morphology, color and location of the image.
- According to the indexing of each and every element of human faces. And compare the images with filters.

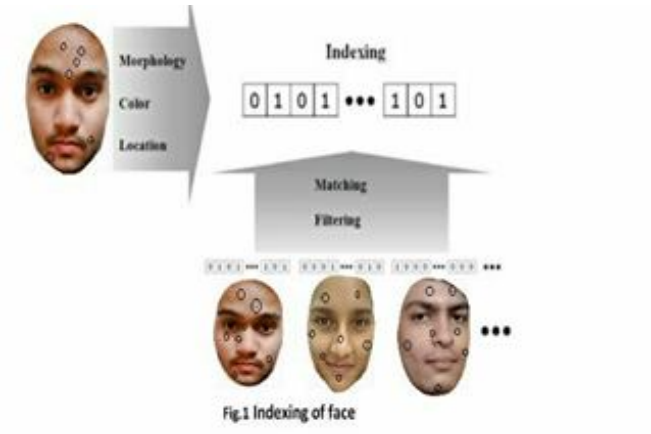

Figure 4. facial marks in different ways

It is a procedure to get outcomes from the methods what have already used above [1]. And this procedure gives an output in a mathematical form.

Procedure of this calculation is as follows: -

- Firstly, it finds response from the query images from 'FEI' database
- Then it calculates sum square deviation of given input image
- And then it compares the similarities between the query images by NCC method of feature extraction

(f*g)(T) ==def (with limit minus infinity to infinity & integration of) f*(t) g(t+T)dt[7]

f*g)[n] ==def (with limit minus infinity to infinity & summation of) f*[m] g[m+n].

- Then it gets the outcome from sum square deviation by using PCA[7][8]
- And then it displays the final result as an image by using MATLAB[9]

Accuracy in different places

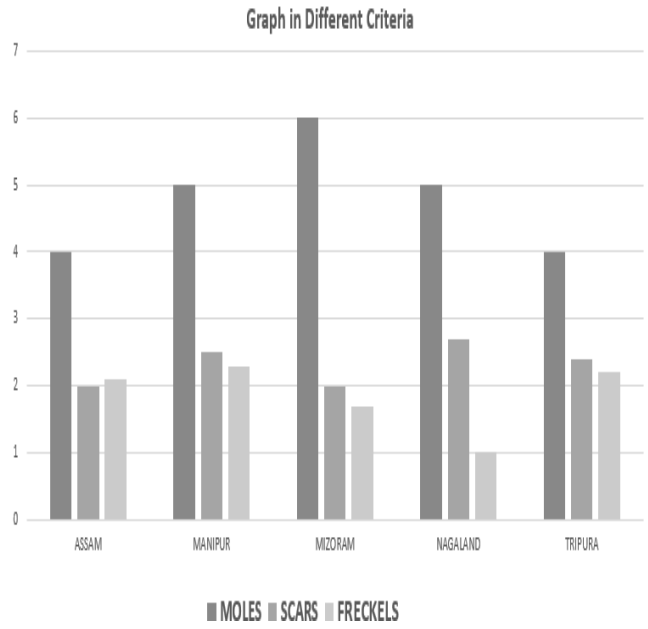

Figure 5. Detection Process Of Moles, Scars and Freckles

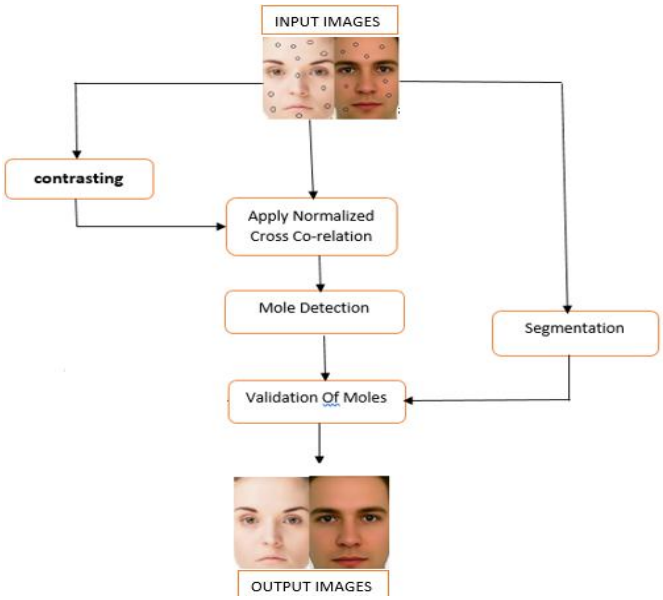

Figure 6. Status and no. of person in different states

- Firstly, we have an input image
- if input can break into segments then apply segmentation directly and then if it exists then validate the moles of candidate`s face and then get an output as an image
- Else apply contrasting on input for illumination
- And apply normal cross correlation to extract the features
- Detects the moles
- validate the moles
- And then display the output as an image.

VII. FEI FACE DATABASE

FEI database consists of 85 face images which has both kind of faces with mole and without moles faces. And this database has 90.50% accuracy with 7% false negative and 2.5% false positive. This false negativity is just because of the color and size of candidates which has moles on their face [3].

EXPERIMENTAL RESULTS:

FEI Face Database: Total 100 face images (of 100 subjects) with mole and without mole, with scars and without scars are taken from FEI face database 16 for performance evaluation. The required parameters for measuring performance are listed in Table 1. The proposed system has accuracy rate 90.58% with 7.1% false negative and 2.4% false positives.

The false negative is due to the colour, size and saliency of the mole candidates. The proposed method is a template based technique for which the template used to detect one mole may not be successful to detect another mole.

Table 1. comparison of experimental results

FEI DATABASE		
	State of the art	**Proposed**
Total Face Images	85	100
TP	59	78
TN	6	5
FP	18	16
FN	2	1
Computation Time (in sec)	2-3	0.5-1.5

VIII. LIMITATIONS OF PREVIOUS DIFFERENT PROCESS OF DETECTION

Years	Name Of Paper	Used Methods	Author's Name	Limitations
2015	Implementation Of Face Recognition	Principle Component Analysis , Landmark Discriminent Analysis	Mr. Virendra Kadyan	It did not support color images.
2015	Facial Mole Detection	Normalized Cross Correlation , Principle Component Analysis	Miss Usha Rani Gogoi	Output with more errors
2015	Human Face Recognition	Principle Component Analysis , Euclidean Distance	Mr. Jageshwar K. Keche	Less accuracy 66.07%
2013	Facial Mark Detection	Active Appearance Model	Er. Jaspreet Singh	Support components one by one(nose , lips etc)
2013	Biometric Security	Adaptive Median Filter , Active Shape model , Active Appearance Model	Mr. K. M. Mehata , Mr. Ziaul Haque Choudhury	No reliable mark detection
2011	Face Finder	Active Shape Model , Landmark Discriminent Analysis	Mr. Jimmy Voss	Less efficient and poor accuracy
2010	Template Based Mole Detection	Normalized Cross Correlation	Mr. L . M. Patnaik	Work with minimum one mole at a time
2009	Facial Marks : Soft Biometric	Active Appearance Model	Mr. Anil K. Jain	Supports only local texture constraint

Figure 7.

IX. CONCLUSION

The implemental result of FEI database reveals that the system works very well for the query images who`s faces have moles, scars and some deformity. This face detection technique will help to work for low illumination problem with more accuracy.

X. FUTURE WORK

It will be able to recognize face with more accuracy. Will help insurances companies in claim settlement, warzone or identify the identity of our or enemy soldier. And it will also decrease the error ratio. The experimental results of 'FEI' database reveal that the system works extremely well for the images whose face are full, upright and taken under varying illumination conditions. The scheme may be used with other primary features to identify a person more accurately.

XI. ACKNOWLEDGMENT

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