System Development using Face Recognition

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Abstract—**Face Recognition is one of the most emerging technology nowadays by which different types of system can be implemented in our regular life. It has a great scope to make our lives easier, and comfortable. This technology is using in various field. In this paper, an experimental approach is introduced to make a system which is based on the technology. The system can detect human face in real time. At the same time it recognize faces. Hence, this work aims to develop a system that detect and recognize individual faces in real time.**

Keywords—Face Detection, Haar-Cascades, Face Recognition, PCA.

I. INTRODUCTION

Face Detection and Face Recognition of Image Processing are playing vital role over the last few decades. Due to the vast use of this technology it has been introduced as emerging field in almost every sphere of our life. National Security, Social Media, Surveillance, Banking, Media Equipment, Fraud Detection, e-commerce, retail, diagnosis, astronomy, physics, science, genetics, bioinformatics, security, internet of things, education, business all are the sector where different applications related to this field are widely used in this era. Face recognition plays an essential job in making applications for example, security framework, credit card verification, recognizing criminals in airport, boarder, railway stations and so on [1].

Face is considered as a fundamental element for identification of a person. It is not troublesome for a person to distinguish distinctive faces however it is troublesome for a machine to identify properly including various characteristics and then to recognize faces [2].

Moreover, it is very tough to perceive human face properly as it shows fluctuating behaviors of different things like expressions, motions, age, style or fashion, change in hair style, appearance of eye glass etc. time by time. [3].

However, making a system using face recognition technology is imperative and can be very much effective in all institutions including educational sectors for monitoring the performance of individuals. In most of the institutions, the attendance is physically taken by the utilization of participation sheets issued by the office heads as a component of control. Everyone sign in these sheets which are then filled or physically signed in to a PC for further analysis. This technique is dull, tedious and wrong as few individuals frequently sign for their missing associates. This technique makes it hard to follow the participation of individual in an extensive classroom environment [4].

The research aims to a build system on the emerging field of image processing. This work is accomplished following the technology face detection and face recognition, applying the approach to application domain it is set as an objective which is as following:

a. To design an approach towards face recognition to apply it in application domain.
b. To implement a system following the designed approach.

II. RELATED WORK

A research study [5], proposed a technique utilizing Belief Propagation Segmentation algorithm for face recognition which is focused on preprocessing of different facial images. The proposed methodology demonstrates that the segmentation has a constructive outcome for face recognition. Moreover, it is provided a recognition rate of 84% on ESSEX database which is figured it out.

Another study [6], proposed for face recognition system development by utilizing linear and nonlinear techniques for feature extraction. The K-nearest neighbor classifier with Euclidean distance is calculated in the characterization step to classify. The Kernel-PCA is spread out from PCA to highlight nonlinear mapping in a higher-dimensional component space. In [7], proposed an approach using SIFT-PCA technique for face recognition. And it has also used impact of segmentation algorithm so that it can impact recognition rate. Using SIFT and segmentation algorithm it is performed preprocessing of face images. The outcomes demonstrate that segmentation in blend with SIFT-PCA has a constructive outcome for face recognition. The study [8], proposed NP-hard issue for face recognition to find out the best subset of the extracted PCA which is solved by utilizing the differential equation calculation and is referred to as FS-DE. In the training data, the component subset is acquired by maximizing the class division. And furthermore displayed a group based for face recognition.

Another study [9] proposed a remarkable performance based face recognition approach using PCA and two dimensional PCA. It is tested and different weight is considered as non-trivial PC (Principal component) is assigned to the non-zero Eigen values which is very few related to eigenvectors for classification.

The paper [10], proposed a way to deal with perceive a face using PCA based Genetic Algorithm. Generally, the PCA is used to reduce the dimensionality and to extract different features with the help of covariance analysis to produce Eigen components from the digital images. Genetic algorithm provides the ideal arrangement from the produced expansive search space. The research study [11], proposed a different face recognition which is technique dependent on PCA and Directional Filter Bank reactions. By using DFB, directional pictures are made from the first time taken face picture and then they are changed into Eigen space by PCA, which can ideally classify individual facial expression. Recognition capacity of PCA is improved by giving directional pictures as inputs.

In [12], it demonstrated picture improvement based PCA strategy to manage facial recognition with single training picture of per individual. The technique consolidates the first time taken training picture with its reproduced picture using a low-frequency DCT coefficients. And after that it perform PCA on the upgraded informational index. This paper [13], proposed a technique of face recognition which is used a hybrid approach of the combination after joining PCA and DCT. The fundamental thought is to encode the underlying information to go to another space of dimensions that significantly more diminished while safeguarding valuable data. The global features derived by using PCA and the local features derived by using LBP (Local Binary Pattern) of multi scale block. For each facial picture a spatially upgraded, concatenated illustration was acquired by getting a histogram from every network of partitioned input picture. These histograms were projected to bring down lower dimensions by using PCA. The worldwide face representation is determined by anticipating a few pictures of the subject in to bring down lower dimensions using PCA.

Another study [14], proposed a study of modified and updated constructive training approach which is applied to face recognition applications for Multi-Layer Perceptron. The objective of this paper is to increase the yield neurons as output, at the same time increase the information pattern as input. The proposed calculation is applied in making classification. For the component extraction Perceived Facial Images is used.

III. PROPOSED METHOD

A. Dataset Creation

This study is using its own dataset by taking individuals facial image. It is created the dataset which is about 1800 in number of faces. Then the generated dataset for them in gray scale after resizing the images. This faces has taken after resizing the images as well as extracting the features with the help of PCA i.e. Principal Component Analysis.

This dataset will be used as training image which will further use to identify the faces to extract the correct information based on the testing data it provide and the training data it has. Comparing the both dataset it will further recognize the face properly to identify the correct individual with the help of different descriptor as recognizer. In this system it is used cascade classifier as recognizer which will

take Haar cascade frontal face xml file that is kept there previously.

B. Face Detection

As it is already created dataset, based on the dataset it is going to detect the faces to according to the needs. First step of the system is to detect any face which comes to the webcam to work for next step. In this system it is going to detect all the faces which are in the frame. The objective of this work is to include all the faces into the dataset. So initially it is going to take all the faces as a frame. It can be any face of in between the training data or it can be testing data. Moreover it can be outside of this two.

Fig. 1. Face Detection in Diagram.

C. Viola Jones algorithm

Viola Jones algorithm is widely used for face detection that has mainly four parts as follows:

a. Haar Features
b. Integral Image
c. Ada boost training
d. Cascade classifier

Because of having the characteristics of robustness, real time oriented and distinguishable faces from non-faces this is the algorithm is considered as the good one. This algorithm employs Ada Boost to choose the best features and to train the classifier.

Haar like features are rectangular pattern in information. A cascade is a progression of "Haar-like features" that are joined to shape a classifier. A Haar wavelet is a scientific capacity that produces square wave output.

D. Face Recognition

The faces it has already taken to create the dataset is now is going to train. So, with the help of recognizer it is going to compare the input face with the previously taken faces as enrollment which is created and then stored as dataset. If it is entirely matched with any of the face from dataset then it retrieves that name through the ID from the dataset associated with the input face.

Fig. 2. Face Recognition in Diagram.

E. Principal Component Analysis

PCA is basically used for dimensionality reduction in existence of high dimensional data. The main principle of this algorithm is to transform the first originate data into a linearly independent data. With the help of linear transformation it is

done which is used further to extract the principal components of the data. Most of the cases of face recognition problem, the feature dimension is much higher than the number of samples. For the solution of this problem this algorithm can be used.

F. System Architecture

This paper is working focusing system development that has mainly two parts. That is as follows:

a. Training model
b. Sample testing

Training the model can provide expected accuracy regarding the technology. Therefore, the dataset is trained through the model whenever dataset has been processed completely.

In next phase, testing is done taking faces as new sample set. The higher the trained dataset remains in testing sample set the higher the accuracy rate appears in return as a result.
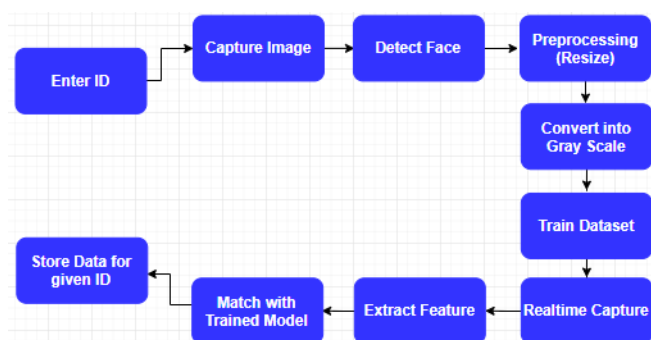

Fig. 3. Block Diagram for the proposed System.

IV. RESULT

A graphical interface has been designed and developed to visualize the system properly. For making the Graphical User Interface tkinter has been included in the Anaconda distribution.

There is no requirement for particular equipment for introducing the framework as it just uses a PC and a camera. The camera assumes a significant job in the working of the framework. Consequently the images captured by webcam of the machine and preprocessed with the help of proposed model. Eventually it detects faces of individuals and record the recognized faces in frame also in excel sheet.

It can generate daily basis report about recognized faces. The quality of image is not required high definition. In fact, this system can work in low light and with low quality picture. The framework is worked from a live camera feed. The framework can likewise be utilized in consent based frameworks and secure access verification (limited offices) for access the executives, home video observation frameworks for individual security or law implementation. From the general productivity of the framework i.e. 83.1% human mediation could be called upon to make the framework idiot proof. A module could therefore be incorporated which records all the unidentified countenances and the instructor can physically address them.
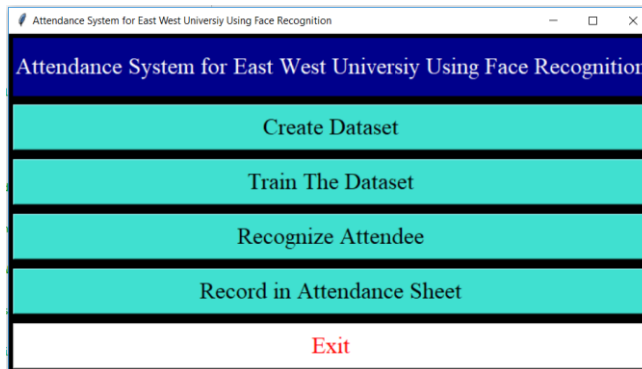

Fig. 4. GUI of the System.

V. CONCLUSION

This system is concentrated on making the things faster, time saving and automated for the institutions that maintains regular records of persons in different activities, different events. The system is mainly designed focused on the known dataset and made for closed institutions like university. It represents a system of automated attendance using face recognition technique. It is very well may be inferred that a solid, secure, quick and an effective class participation system. This face identification and acknowledgement system will save time, diminish the measure of work done by the organization & effective material as of now being used with effectively existent electronic hardware.

Future work could likewise incorporate including a few all around organized participation registers for each class and the capacity to create month to month participation reports and consequently email them to the proper staff for survey. This work will be expanded for the unknown dataset and all the institutions and outside of the perspective to cope up the system with any kind of environment.

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