Face Recognition Using PCA

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ABSTRACT: Image processing plays a vital role in aspects of all science and technology.In this image processing concepts have great impotance in application oriented research and project.The purpose of the proposed research work is develop a computer system that can recognize a personization by comparing the characteristices of face to those of known individual.Human face recognition is an effective means of authenticating a person.Principal Component Analysis(PCA)is a classical feature extraction and data representation technique widely used in pattern recognition.It is most successful techniques in face recognition. Prototype is designed to work with web cameras for the face detection and recognizing system based on visual 2010 C#, and OpenCV.The proposed method have been evaluated using the Microsoft cognitive service API with Azure API of databases.This system can implement a better security of computational time to detect and recognize the human faces with big database.

Keywords:-Face detection,face recognition,image processing,PCA,Local binary patterns histogram(LBPH) , Eigen faces, fisher faces,Emotion Recognition , C# ,visual studio,Face API.

1.INTRODUCTION:

When in this face recognition concepts we discuss various face recognition techniques and image processing concepts. In this we discuss different approaches in face recognition and various concepts used in face recognition. The goal is to implement the system for a particular face and distinguish it from a large number of stored faces with some real-time variations as well. Many techniques can be used for face recognition but Principle Component Analysis is mostly followed and good technique. The key idea of the PCA method is to transform the face images into a small set of characteristics feature images, called eigenfaces, which are the principal components of the initial training set of the face images.

2.BACKGROUND WORK

Face Recognition

A face recognition system is a computer application for automatically identifying or verifying a person from a digital image or a video frame.One of the ways to do this by comparing selected facial feature from the image and a facial database.

Face recognition is an effective means of authenticating a person the advantage of this approach is that,it enables us to detect changes in the face patterns of an individual to an appreciable extend the recognition system can tolerate local variations in the face expression of an individual. The characteristic features called "eigen faces" are extracted from the storage images using which the system is trained for subsequent recognition of new images.Face recognition can typically be used for verification or identification. In verification an individual is already enrolled in the reference database.

Image processing

Image processing is which the input is an image,such as a photo or video the output of image processing possibly will either be an image or a set of characteristics or parameters connected to the image.Image processing regularly refers to digital image processing,expert optical and analog image processing also are likely.

Face detection

Face detection is a computer technology being used in a variety of applications that identifies human faces in digital images.Face detection also refers to the psychologic process by which humans locate and attend to faces in a visual scene.Face detection can be regarded as a specific case of object-class detection.In object-class detection, the task is to find the locations and sizes of all objects in an image that belong to a given class.

Face-detection algorithm focus on the detection of frontal human faces.It analogous to image detection in which the image of a persona is matched bit by bit.Images matches with the image stores in database.Any facial feature changes in the database will invalidate the matching process.

Principle component analysis

Principle Component Analysis PCA is a classical feature extraction and data representation technique widely used in pattern recognition. It is one of the most successful techniques in face recognition. But it has drawback of high computational especially for big size database. This paper conducts a study to optimize the time complexity of PCA (eigenfaces) that does not affects the recognition performance. The authors minimize the participated eigenvectors which consequently decreases the computational time. A comparison is done to compare the differences between the recognition time in the original algorithm and in the enhanced algorithm.

Local Binary Pattern Histogram

Local Binary Pattern(LBP) is one of the exist several methods for extracting the most useful features from face images to perform face recognition.LBP is done by dividing an image into several small regions from which the features are extracted.LBP histograms are extracted and then concatenated into a single feature vector.This feature vector will further reduced the dimentionality scope by using the well established principle component analysis technique.

Eigen faces

Eigenfaces are a set of eigenvectors used in the computer visionproblem of human face recognition.The loom of using eigenfaces for recognition was developed by sirovich and kirbly(1987) and used by Mattew Turk and Alex Pentland in face classification.It is considered the first flourishing example of facial recognition technology.These eigenvectors are derived from the covariance matrix of the probability distribution of the high dimensional vector space of likely faces of human beings.
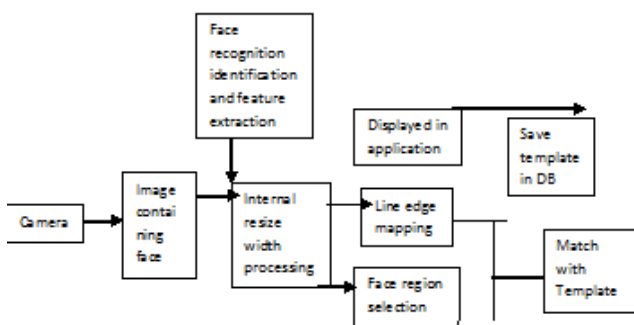

Fig.1 The Block diagram of Face Recognition system

II. LITERATURE REVIEW

Principle Component Analysis

This section describes the eigenfaces approach [2]. This approach for face recognition aims to decompose face images into small set of characteristic feature images called eigenfaces which used to represent both existing and new faces.The performance of the original and the enhanced proposed algorithm is tested

III. PROBLEM STATEMENT

3.1 Existing system

The existing system of human face detection is to find the individual images .The human face recognition system identifies only static face images. When the current image captured almost exactly matches with one of the images which is stored in database then only the person is authorized.In this the facial feature detection is the process to detect the presence and location of feature like eyebrow,nose,eyes,lips, nostrils,mouth etc.

Disadvantages:

- The human faces of image processing has poor security for maintainess of face recognition system.
- It has high computational especially for big size database.
- The computational time is decreases.
- Facial expression does not calaculated in real time enhancement because of difficult to identify in each face in human.

3.2 PROPOSED SYSTEM

The idea is to establish it enables us to detect changes in the face pattern of an individual to an appreciable extent the recognition system can tolerate local variations in the face expressions of an individual.The Proposed system can tolerate some variation in the new face image.When the new image of a person varies from the image of that person stored in the database,the system will be able to recognize the new face and identify person.

In this the facial feature detection is the process to detect the presence and location of feature   like eyebrow,nose,eyes,lips,mouth,emotion,tag,computer vision,face size,pose, name, etc.The face recognition system has to identify the facial

features such as happiness,netural of each of individuals expression.The most of calculating the ages of the human face to detected with the skin color.The image processing is face API of face recognition system to uploading and stored the imges with big size database in high computational time.Also to find their human face of the gender to analysis this system.

3.2.2ADVANTAGES

- In proposed system,it has better security maintainance and Media empowering.
- It is better due to the use of facial feature rather than the entire image.
- It will directly upload the images with server to database in Azure API.
- The system has to increase the complexity performances.

IV. IMPLEMENTATION

We classify our project into four stages are:-

1)Face detection

2)Face recognition

3)Feature extraction

4)uploading to a cloud database

Feature extraction:

When the input data to an algorithm is too large to be processed and it is suspected to be notoriously redundant then the input data will be transformed into a reduced representation set of features.Transforming the input data into the set of features is called "feature extraction".If the feature extracted are carefully chosen it is expected that the features set will extract the relevant information from the input data in order

to perform the desired task using this reduced representation instead of the full size input.

Uploading to a Cloud Database

Face API is a cloud-based API, part of vision set of tools,that allows you to detect, identity, analyze, organize and tag faces in photos.The database to access the Microsoft face API with Azure API . Azure API is a server of cloud based connectivity.We have creating a Cognitive Services APIs Account,then we using the face API to detect the human faces.

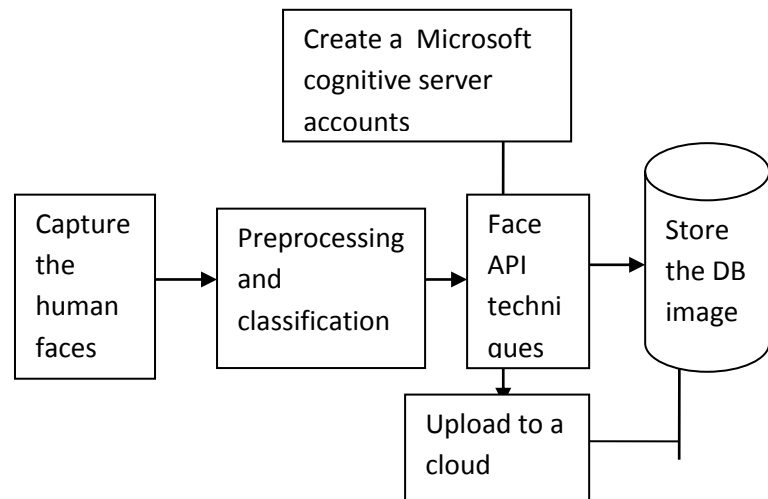Figure 2 Uploading a cloud database for face recognition system

4.3.1 Azure API

The Azure API in which first we have to create an API gateway and developer portal in minutes: Microsoft Azure API Management is a turnkey solution for publishing APIs to external and internal consumers.Quickly create consistent and modern API gateways for existing backend services hosted any where,secure and protect them from abuse and overuse and gain insights into usage and health.Plus,automate and scale developers on boarding to help get your API

programme up and running in to time. Connect to backend service anywhere:

- Client certificate authentication
- Azure VNETs
- Azure Express Route

4.3.2 Dot NET/.NET

- The .NET is a Microsoft web services strategy to connect information, people, system and devices through software , making it easier for users to share and use their information between multiple websites, programs and computers.Also, being a web service, .NET is also a programming model that enables software developers the ability to do rapid application development by bundling a collection of software in on package.For example,Microsoft Visual Studio .NET is part of the .NET programming model.

4.3.3 CSharp/C#

- C# is a general object-oriented programming(OOP) language for networking and web development.C# is specified as a common language infrastructure(CLI) language.In January 1990 , Dutch software engineer Anders Hejlsberg formed a team to develop C# as a complement to Microsoft's NET framework.Initially,C# was developed as C-Like Object Oriented Language(Cool).

4.3.5 MICROSOFT COGNITIVE SERVICES

In Microsoft's cognitive services to gives some talks about Cognitive Services around the country.Cognitive Services used to be called Microsoft Project Oxford.This is a suite of

intelligent APIs that work cross-platform to provide intelligent data such as facial recognition in images .State-of the-art image processing algorithms help you moderate content automatically and build more personalized apps by returning smart insights about faces, images and emotions.

There are three visions have make the face recognition system:

- Computer Vision API
- Face API
- Emotion API

4.3.5.1 Computer Vision API:

The cloud-based computer vision API provides developers with access to advanced algorithms for processing images and returning information.By uploading an image or specifying an image URL, Microsoft computer vision algorithms can analyze visual content in different ways based on inputs and users choices.

4.3.5.2 Face API:

Detect human faces and compare similar ones, organize people into groups according to visual similarity, and identify previously tagged people in images.

i. Face Detection

ii. Face Verification

iii. Face Identification

iv. Similare Face Searching

v. Face Grouping

4.3.5.3 Emotion API

Analyze faces to detect a range of feelings and personalize your app's response.

Recognize Emotion in Images:

The Emotion API for Video recognizes the facial expressions of people in a images,and returns a summary of their emotions.you can use this API to track how a person or a crowd responds to your content over time.The emotions detected are anger, contempt, disgust, fear, happiness, neutral, sadness, and surprise.

V. RESULT

Face recognition result

The input image was given to program for recognition. The input images have different positions.
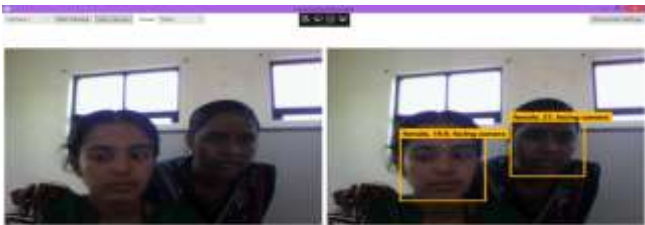

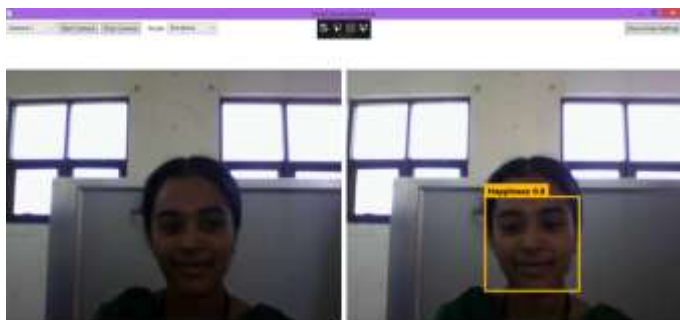Fig 2 Input images captures for face recognition processing

Fig 3 Facial expression for Face recognition processing

Fig 4 Computer vision for face recognition processing

VI. CONCLUSION

This work illustrates the use of Principle Component Analysis for face detection,which gives the improved result as compared to conventional face recognition methods.The main limitation of the available face recognition system is that they only detect upright face looking at the camera.In our system are successfully executed in human faces can capture the age,gender,emotion and facing camera and computer vision.The individual person images are captured , when ever the name will be entered on the particular image can be upload.The eyes of person must be open and without glass.If such obstacles are on the face of person,the feature detection is complicated.The face features are detected using PCA.The featue face formed is Eigen face.Due to eigen face,calculations in the specific face features are not required.The images can be stored on big size database and computational time are increasing at realtime environments.As we big challenging of all the six emotional expression are difficult to calculated.Becauses of less number of range can not acceptable to our environments.In adavanced may be detect faces in open-door techniques.We can use Azure API in based on cloud is more secure and store the large number of data are successfully generated.

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