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IMPLEMENTING FACE RECOGNITION USING FEATURE EXTRACTION

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Abstract

Face Recognition has emerged as one of the important area of research in Computer Vision. The difficulty faced by the researchers is that the instances of Faces vary with both motion and appearance. Thus, in this paper a novel approach for recognizing various Faces is proposed where continuous video sequences of the Faces have been considered. The proposed system comprises of three stages: Pre-processing stage, Feature Extraction and Classification. Pre-processing stage includes skin filtering,. Eigen values and Eigen Vectors were considered for feature extraction stage and finally Eigen value weighted Euclidean distance is used to recognize the Face. It deals with bare hands, thus allowing the user to interact with the system in natural way. We have considered 10 different faces in the video sequences and attained a success rate of 71%.

INTRODUCTION

Face recognition systems are useful in law enforcement and justice solutions by staying one step ahead of the world's ever-advancing criminals. This includes acclaimed CABS-computerized arrest and booking system and the child base protection which is a software solution for global law enforcement agencies to help protect and recover missing children. It is also useful in the identification of known terrorists. It is also applicable in airport and other transportation terminal security. Face recognition software, can enhance the activeness of immigration and customs personnel. The financial services industry revolves around the concept of security. Face recognition software, can improve the security of the financial services industry, saving the institution time and money both through a reduction of fraud case and the administration expenses of dealing with forgotten passwords. Furthermore, biometric-based access control units can safeguard vaults, teller areas, and safety deposit boxes to protect against theft. The use of biometrics can also ensure that confidential information remains confidential while deterring identity theft, particularly as it relates to ATM terminals and card-not-present e-commerce transactions. It allows capturing, archiving, and retrieving identifying characteristics as tattoos, marks, or scars. It can also analyze scenes from either streaming or archived video, "looking" for out-of-the-

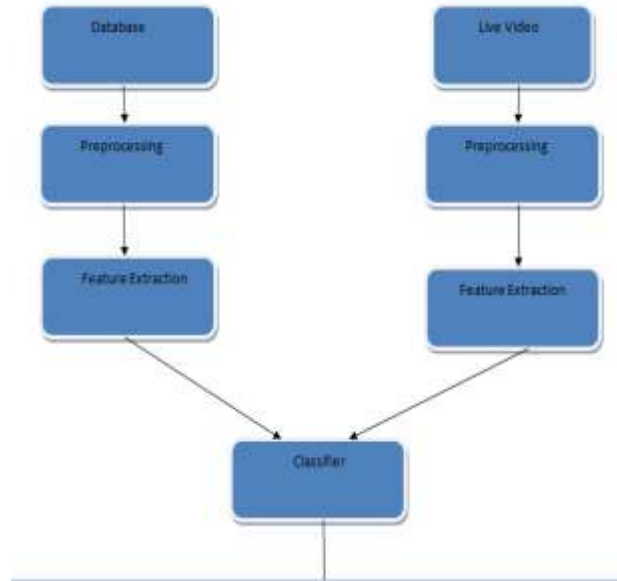
ordinary occurrences, the presence of certain vehicle, special faces, etc. This is beneficial and can save significant time and money to those individuals who spend hours, days, or weeks monitoring video streams (i.e. examining a bank's security in a criminal investigation).

SYSTEM OVERVIEW

Face recognition:

Face recognition is a computer technology that determines location and sizes of human faces in digital images. It detects only faces and ignores other things such as trees, bodies etc. Till now various techniques have been proposed like recognition as well as Classification. Face recognition is used for two primary tasks.

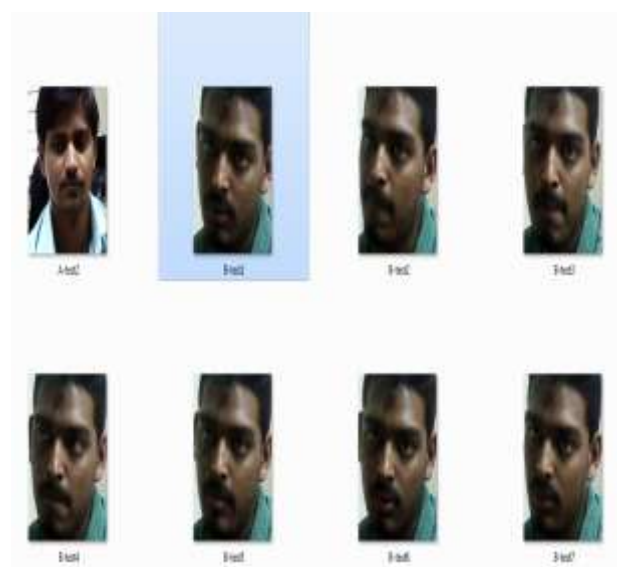
- 1) Identification: System compared the individual face with all other face which present in database.
- 2) Verification: Face image of an unknown individual along with a claim of identity to find individual is who he/she claims to be.



• **PROCESSING OF FACE RECOGNITION**

DATA ACQUISITION

The first step for our proposed system is the capturing of the video using webcam where different faces were taken into consideration. 10 different faces were considered for testing from 20 people. Some of the continuous video frames captured are given in Figure.



• **Feature extraction**

Feature extraction was performed to the input video frames for detection of faces. It was done so that

the required face could be extracted from the background. Feature extraction involves reducing amount of resources required to describe large set of data.

In our system we are using PCA algorithm for feature extraction.

PRINCIPAL COMPONENT ANALYSIS:

The proposed system uses Principal Component analysis for feature extraction and various distance classifiers such as the Euclidian distance, the Manhattan distance and the Mahalanobis distance. The technique used here involves generating the 'Eigen faces' then projecting training data into face-space to be used with a predetermined classification method and evaluation of a projected test element by projecting it into face space and comparing to training data.

• **CLASSIFIER**

K-NEAREST NEIGHBORS ALGORITHM

In face recognition the k- nearest neighbour algorithm is non parametric method used for classification and regression. In both case the input consists of the k closest training examples in the feature space. The output depends on whether k-NN is used for classification

In KNN classification, the output is a class membership. An object is classified by a majority vote of its neighbors, with the object being assigned to the class most common among its k nearest neighbors (k is a positive integer typically small). If k=1 then the object is simply assigned to class of the single nearest neighbor.

In k-NN regression, the output is the property value for the object. This value is average of the values of its k nearest neighbors.

• **SOFTWARE & COMPONENTS USED**

Matlab: MATLAB (matrix laboratory) is a multiparalism numerical computing in environment and fourth generation programming language by math works, MATLAB allows matrix manipulations, plotting the functions and data implementation of algorithm creation of user interface with program written in other languages including c, c++, java and fortran.

COMPONENTS: WEB CAMERA

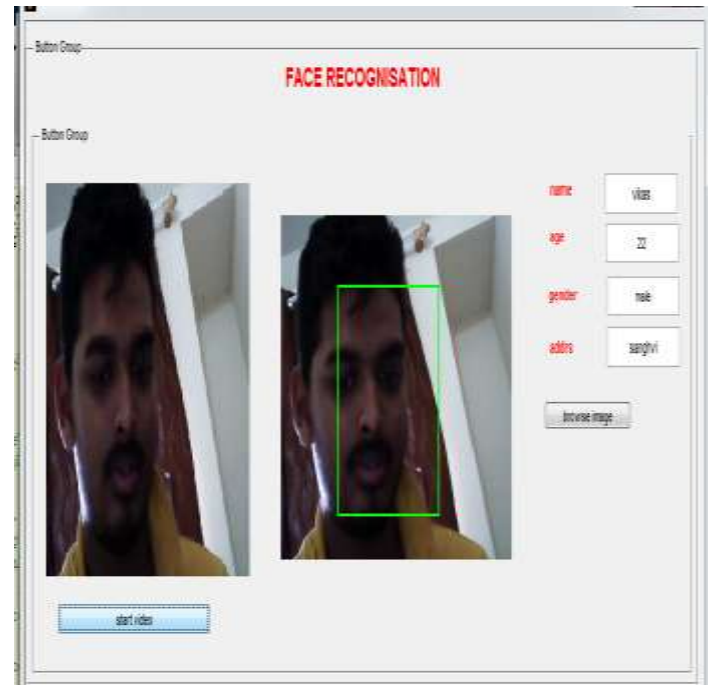
The webcam is used to capture the image which is the input to the proposed system. The images have been captured using a 8 Mega Pixel Canon Power Shot S3 IS. The captured images are of resolution 640x480.

PC

A personal computer will be needed to implement the algorithm for the proposed system. The specification involves are, Intel core i5 running at 3.00 GHz processor machine, Windows 7 Home basic (64 bit), 4GB RAM.

EXPERIMENTAL RESULT

Different images were tested and found that the new technique of classification was found to show 70% accuracy. In this project we have successfully create the database for image. With the help camera we had captured images from video and subtracted those images with background image. Now using pca for feature extraction, we have successfully differentiate between back ground image and facial part. The data set used for training the recognition system consisted of 5 Faces for 6 people. Thus a total of 30 images were stored in database. One parameter was considered in our system i.e. the threshold „n“ which is the number of frames it has to check for similarity to determine whether it was a Face or not.



- **ADVANTAGES:**

1. Identify terrorist, criminals etc.
2. Prevent voter fraud.
3. In public places can identify individual among the crowd.

- **DISADVANTAGES**

1. Project can't be implemented without camera and pc.
2. Can't detect face with glasses or long hairs.

- **APPLICATION:**

1. Investigation.
2. Verification of individuals.
3. Biometric system.

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