A Study on Face Recognition System

Gajendra Jangid[1], Mr. Anil Dhankhar[2], Ms. Sunita kumar[3]

[1]Dept of MCA

[2]Associate Professor, HOD, Dept of MCA

[3]Assistant Professor, Dept of Business and Administration

[1, 2, 3] Rajasthan Institute of Engineering and Technology Jaipur

Abstract- *In present times, facial recognition has become one of the best methods of computer vision. Facial recognition, computer vision, lighting, lighting, faces, etc. areas has always been a very difficult task. Face recognition tracks the target object in live video images captured by the camera. In simple terms, it is an application for automatic recognition of people from still images or video frames. In this article, we propose an automatic face recognition system.*

Based on face detection, feature extraction and recognition algorithms, the application automatically detects the face when the person in front of the camera sees the face. We use KLT algorithm for face detection, Viola-Jones algorithm and Haar cascading classifier to detect faces, but the camera continuously detects faces in every frame and PCA algorithm is used for custom selection. We use a combination of patterns to match the geometric shape of the face.

Keywords- Face Recognition, Face Detection, PCA.

I. INTRODUCTION

Human faces also play an important role in applications such as security, credit and debit card authentication, and identification of public crime scenes. The main goal of the system is to create a facial recognition system that can mimic and eventually overcome this ability in humans. The system pays special attention to the people in the front. Various face recognition algorithms have been developed, each of which has its own advantages. Most of the time we look at a face and immediately recognize it if we already know it.

This innate ability is reasonable for real-life use, if possible. There were many face detection algorithms back then. The first is the face recognition system, which uses facial features to identify faces. The second method, or universal face recognition, uses the whole face to identify the person. The above two operations are completed one-on-one by another algorithm.

Neural Networks and their applications in science. Facial problems that develop over time. Indifference to these changes can easily identify the person. So the idea of pursuing these skills is that people can be useful.

II. RELATED WORK

2.1 Face Tracking

The objective of this algorithm is to detect object of face in real time and to keep tracking of the same object. Here we use the training samples images of other objects of your choice to be detect and track by training classifier. Face tracking is a part of face recognition system. Here we can use some system algorithms to pick out specific, distinctive details about a human's face.

2.2.Face Detection

In [1] This face detection process actually verifies the image is face image or not. Detection process actually works on Haar Cascade classifier. Object Detection using Haar feature- based classifiers is an effective object detection method proposed Paul Viola and Michael Jones. It is machine learning based approach where a cascade function is trained from images. It is used to detect objects in other images.

2.3.Haar Cascade Classifier Features

In [2] Here we calculated, the first feature selected seems to focus on the property that the region of the eyes in often darker than the region of the nose and cheeks. The second feature chosen is based on the eye is darker characteristics than the bridge of the nose. However, you do not need the same window that applies to your cheeks and other places.
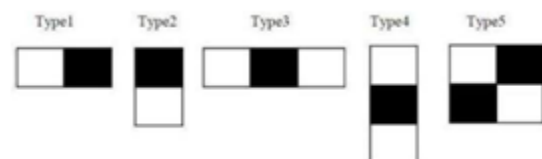

Figure 1: Haar Cascade Classifier

Face recognition system that does capturing the image of face feature detection, extraction, storing and matching. But the difficulty occurs to lay the transmission lines in the places where the topography is bad. The authors proposed a system based on real-time face recognition that is reliable, secure and fast, and requires improvement in different lighting conditions.

III. PROPOSED WORK

Design is the process of defining the architecture, components, modules, interfaces, and data requirements. Figure [2] Design can be seen as the application of process thinking in manufacturing. A face detection system that helps find human faces in digital photo and video frames. Object detection techniques are used, for example, to measure objects in images and videos. The concept of automatic identification system can be divided into five elements:

3.1.Image Capture

Cameras were placed at the entrances to view the faces of the students. An additional method is used to detect the face

3.2.Face Detection and Facial Features

Appropriate and valid face algorithms continue to improve face recognition. Various face algorithms such as face geometry, construction, face geometry-based method, feature invariant method,
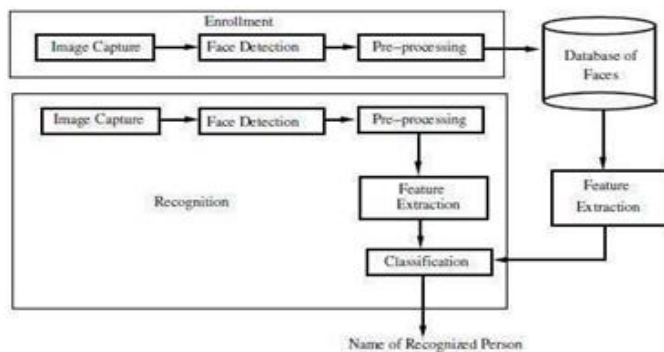

Figure 2: System Diagram

An approach from machine learning. Among all these methods, Viola and Jones proposed a framework with high detection rate and also fast. The Viola-Jones search algorithm is fast and powerful. Therefore, we chose the Viola-Jones face detection algorithm, which uses the Integral Image and AdaBoost learning algorithm as the classifier. We found that the algorithm performed better in various lighting conditions.

3.3.Pre-Processing

Removing facial features is called preprocessing. The first step involves specifying the face of the image and converting it to 100x100. Histogram equalization is the most commonly used histogram normalization technique. This increases the contrast of the image when it goes beyond the image's reference, making it more prominent and limited.

3.4.Database Development

When we choose the biometric system, everyone has to do it. This phase of database development involves taking photos and biometric extraction of each person, which are then developed and stored in the database using a predefined process.

3.5.Post-Processing

In the proposed system, after a face is recognized, its name is displayed in the video output. The results are generated by the current export in the database. These recordings can be watched live. This allows people whose faces are not recognized by the system to be registered in the database. So have them fix the system and make it stable and correct.

3.6.Proposed Algorithm

1. Capture the Person's Image.
2. Apply Face detection algorithms to detect face.
3. Use viola Jones and KLT Algorithm Extract the Region of interest in Rectangular Bounding Box.
4. Convert to Gray scale, apply histogram equalization and resize to 100x100 i.e., Apply pre-processing
5. if Enrolment Phase then Store in Database **else** Apply PCA (For feature Extraction) **end if**
6. **Post-processing**

IV. FEATURE SELECTION AND EXTRACTION

In recent years, many face recognition methods have been proposed and applied. Here are some methods described by researchers in various fields:
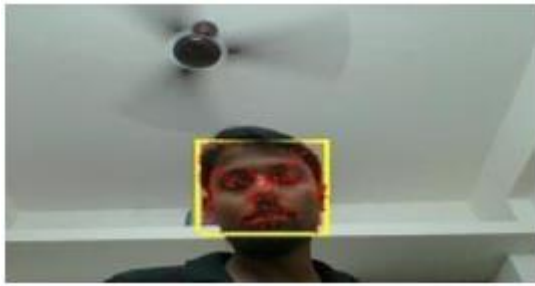
Figure 3: Extracting the face features

Create tags and categories. We can then calculate the feature vectors for each training and test image, take the inner product, and return the one with the highest product as a match.

4.1 Principal component analysis (PCA)

In [3] There are many underived works in The Smart Face. These include, for example, OpenCV-based face detection and Haar Cascades. The design was developed by Viola and Jones and then based on Gradient's histogram. PCA is used to describe facial images in terms of a set of basic functions or eigenfaces. Eigenfaces are defined in the early information problem.

PCA is a process, so the process does not depend on the class definition. Euclidean distance in our use of eigenvalues. Multivariate linear principal component analysis. However, face images and videos are multiline, and this vector means a 1-dimensional vector and a linear projection of the vector from the face image. I think adjusting the distribution of face pixels might help.

I decided to use eigenfaces to reduce the dimensionality of the eigenvalues and to use Fisher faces for feature extraction (linear discriminant analysis). There are many simple (not deep learning) available for face detection. These include, for example, OpenCV based face detection and Viola based on histograms of gradients and Jones' work Haar Cascades.
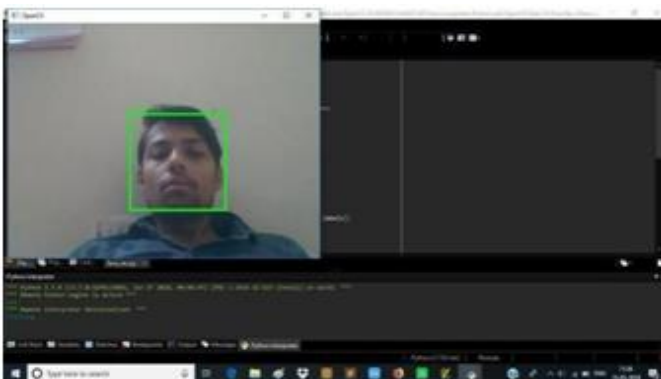

Figure 4: Check the face in the data base

4.2 Neural Networks

In [4], a machine learning approach to image recognition involves identifying and extracting important features from images and using them as inputs for machine learning models. Image Recognition is a machine learning process designed to mimic the way the human brain works.

V. RESULT

With this approach, computers are taught to understand images by relying on big data and seeing new patterns to describe the content contained within. You can return "no match" if the similarity is below the threshold.

The application of neural networks for face recognition has emerged and we can see a partial learning method proposal for face recognition using vector machines. Controlling the system is easy and effective.

The performance of the method has been compared with other existing face recognition methods and it has been shown that the proposed method can provide better recognition. Face recognition uses the KLT algorithm[5] and the combination of PCA and recognition plays an important role in many applications. Applications that require a high level of personal identity this.

The system has created the file itself and then you can use your rectangle to show the face like this:
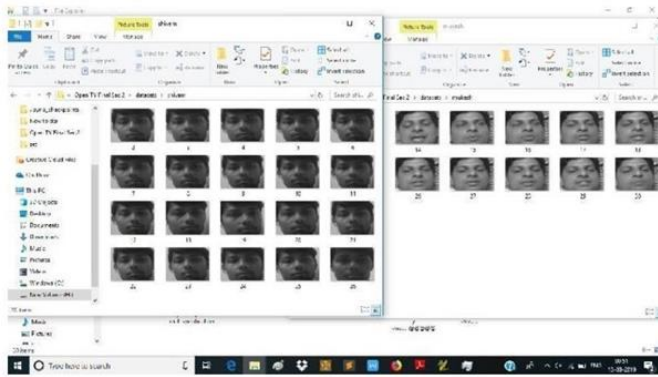
Figure 6: Training Database

Figure 8: Calculate the number of Components

VI. CONCLUSIONS

In this article, after trying many ideas, they all work well for facial recognition. Face recognition system is based on face recognition. The system can be used to detect unknown persons. In real-time situations, PCA outperforms other algorithms. Future work is the analysis of algorithms.

In [10], the system is designed by specifying only the 30-degree angle change that needs improvement. Gait recognition can be combined with face recognition. Poor lighting. Our system may work well, but it is not the best solution.

That is, it can be said that if you add the required features (face) in the right set, you can create a picture of the original face from your own interface. Each face only represents some aspect of the human face that may not be present in the original image.
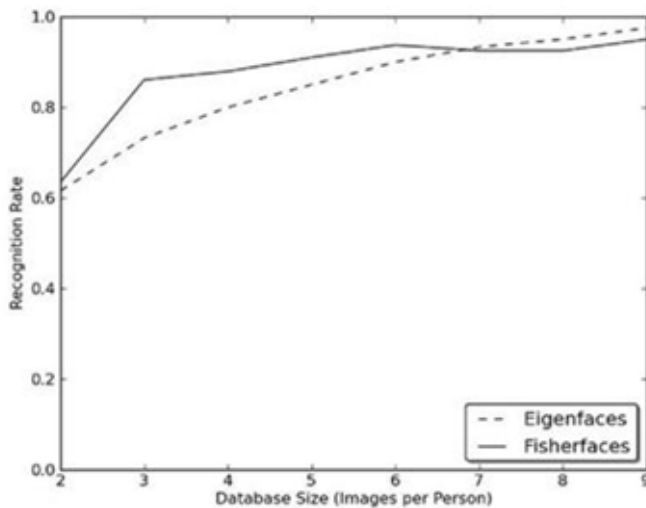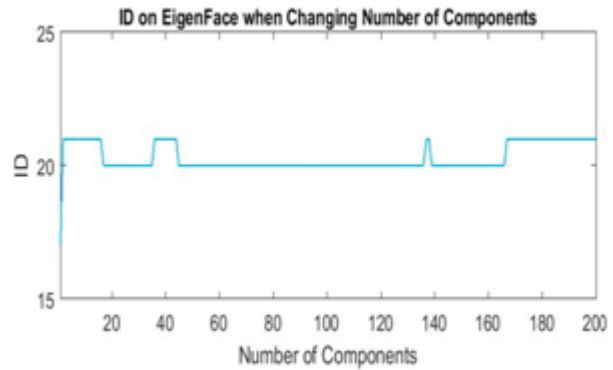

Figure 7: Database Size and Recognize Rate

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Demonstration of different vision systems

- Face detection using Haar-Cascades

database contains a distinct image. Face recognition using eigenface and LBP pattern histogram[8].

Face recognition using Eigenface face recognizer

- Face recognition using Local binary pattern histograms

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