

TRANSFORM- INVARIANT PCA: AUTOMATIC FACE RECOGNITION

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ABSTRACT: Human face recognition has drawn considerable attention from the researchers in recent years. Facial recognition system is a computer application for automatically identifying or verifying a person from a digital image or a video frame from a video source. The automatic face recognition system finds many applications in areas such as security control systems, model-based video coding and human-computer interfaces. It is used in security systems. In this work to used emgucv cross platform .Net wrapper to the opencv image processing library and C#.Net, these library's allow me capture and process image of a capture device in real time. The main goal of this project is show and explains the easiest way how implement a face detector and recognizer in real time for multiple persons using Principal Component Analysis (PCA) with eigenface for implement it in multiple fields.

The mathematical and metrical techniques are use to these image in raster mode (digital format) and then process and compare pixel by pixel using different methods for obtain a faster and reliable results, these results depend on the machine used to process this due to the huge computational power that these routines, functions and algorithms requires, these are the most popular techniques used to solve this modern problem.

Keywords: Automatic Face Recognition, PCA, Eigen Face , Face Detection, Transform Invariant.

I. INTRODUCTION

. Over the past few years **face recognition** has become a popular area of research in computer vision and one of the most successful applications of image analysis and understanding. **Face detection** is a computer technology that determines the locations and sizes of human faces in arbitrary (digital) images As one of the most successful applications of image analysis and understanding, it has recently gained

significant attention. It detects facial features and ignores anything else, such as bodies, trees and buildings. Face detection can be regarded as a more general case of face localization. In this case, the task is to find the locations and sizes of a known number of faces . In face detection, one does not have this additional information. Initially face-detection algorithms focused on the detection of frontal human faces, but newer algorithms attempt to solve the more general and difficult problem of multi-view face detection. Multi-view face detection is the detection of faces that are either rotated along the axis from the face to the observer or rotated along the vertical or left-right axis or both. The newer algorithms take into account variations in the image or video by factors such as face appearance, lighting, and the main goal of this project is show and explains the easiest way how implement a face detector and recognizer in real time for multiple persons using **Principal Component Analysis (PCA) with eigenface** for implement it in multiple fields

II. LITERATURE SURVEY

Bing-Kun Bao,Guangan liu,Changsheng xu,Shuicheng xu (aug 2012)Inductive Robust Principal Component Analysis . The main contributions of this work are: In this approach addressing the error correction problem used to uncover the low-dimensional subspace structure from high-dimensional observations which are corrupted errors possibly. The drawbacks of this paper RPCA suffers the problem of how to handle the new data.Ngoc-son Vu and Alice Caplier (mar 2012) have proposed An Enhanced patterns of oriented Edge Magnitudes for Image Matching and Face Recognition . The main contribution of this work is to be computationally inexpensive in both terms of time and storage requirement , Discriminant and robust. The drawback of this paper is performance coupled with low complex.

Jun-su jang and Jong-Hwan Kim (Oct 2011) have proposed An Fast and Robust Face Detection using Evolutionary pruning. The main contribution of this work is to specify a model having many parameters and then estimate their values from training data. The drawback of this paper is very difficult to find the optimal parameters if the models become Luciano Silva, moMauricio Pamplona Segundo, Olga Regina Perce Segmentation and Olga Regina Perce Segmentation x. The main contribution of this work is to extract entire face region by combining shape analysis, region clustering, and edge detection.

Di Huang, Kaifeng Shan, Mohsen Ardabilian, yunhong Wang, Liming Chen (Nov 2011) have proposed An Local Binary Patterns and Its Application to Facial Image Survey. The main contributions of this work is summarizes of local structures of images. The drawbacks of this paper are bad quality of camera sensors and poor user cooperation of capture condition.

To create the face database and recognize the face Neural network is used.

For each person a separate network is built. The input face is projected onto the eigenface space first and gets a new descriptor. Neural networks cannot be retrained. This is almost impossible to add to an existing network If you add data later. Handling of time series data in neural networks is a very

complicated. They require a large diversity of training for real-world operation.

DRAWBACKS OF EXISTING SYSTEMS

- To cover all possible views many example images are needed.
- It requires large diversity of training data.
- The pose problem is separated from the illumination problem.
- Over-Fitting problem occurs when performing face recognition on a large face data

III. PROPOSED SYSTEM

In Proposed System we used **Principal Component Analysis (PCA) with eigenface**; PCA is first applied to the data set to reduce its dimensionality. Bases which have high variance in data are to be found first. EmguCV Net wrapper to the OpenCV image processing library and C# .Net Eigen faces for recognition focused on detecting individual facial features and categorizing different faces by the position, size, and relationship of these features. This system performs face recognition in real time and also uses this method along with motion cues to segment faces out of images by discarding squares that are classified as non-face images.

IV.LITERARURE REFERENCE

TITLE	APPLIED TECHNIQUE	ADVANTAGE	DISADVANTAGE
Face detection :survey	Face Recognition and video coding techniques.	This model is used to extract facial features	Such as Dynamic objects and considering the changes in faces over time.
Based Learning for View - based human Face detection	Pattern Detection is using for light variation.	Special hand crafting techniques to parameterize face patterns and their various sources of variation.	The full power of our face detection approach by building a more comprehensive face detection system is not implemented.
Pca versus Lda	Discriminate analysis (LDA) , Fisher Discriminate analysis (FDA) and Principle component analysis (PCA).	The implies that in order to obtain good result with LDA.	When PCA outperforms LDA, the data sizes used previously by some researchers.
Discriminate analysis for recognition of human face images	Holistic template matching and Geometrical local features.	Automatic face recognition as well as by the real time process of research on automatic recognition of faces have become very active.	Face recognition and gender classification are presented, in which highly competitive recognition accuracies are achieved with a small number of features.
Application of the Karhunen-Lo&eProcedure for the characterization of Human Faces	WISARAD based on neural network principles.	The error, averaged was 3.68percent.the success that this/small error provider by the human eye.	The assemble have more accurate expansions than projections from outside.
DiscriminantEigen features for Image Retrieval	Pixel to pixel search, hierarchical coarse to fine search or genetic algorithm search.	The variations may well be irrelevant to how the classes are divide .Some major variations in the class, such as those due to lighting direction;.	Theus each image is considered as as ample point in this high-dimensional space.
Fusion of LDA and PCA for Face Verification	PCA and LDA.	These algorithms have been developed for face recognition and verification. The comparative advantages of such methods have been studied in detail for face recognition.	The problem is usually addressed by a template matching approach.

V.SYSTEM ARCHITECTURE:

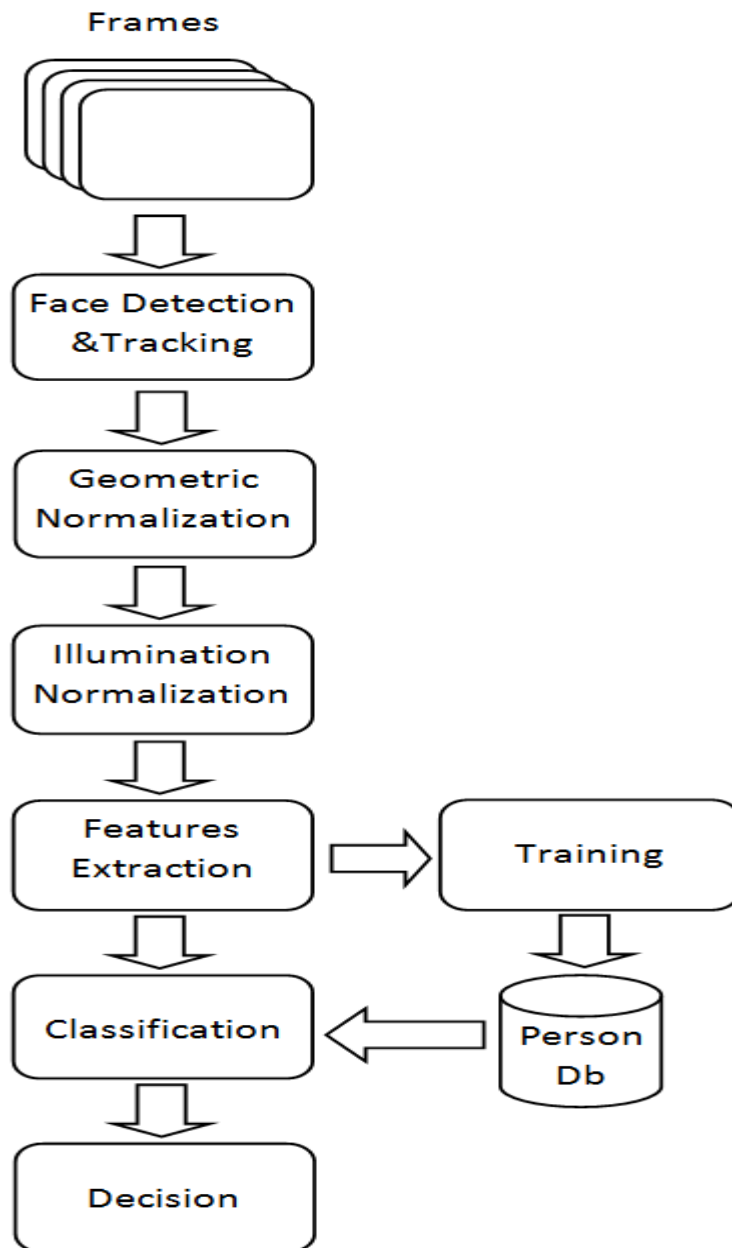


Figure: System architecture

VI. WORKFLOW DIAGRAM

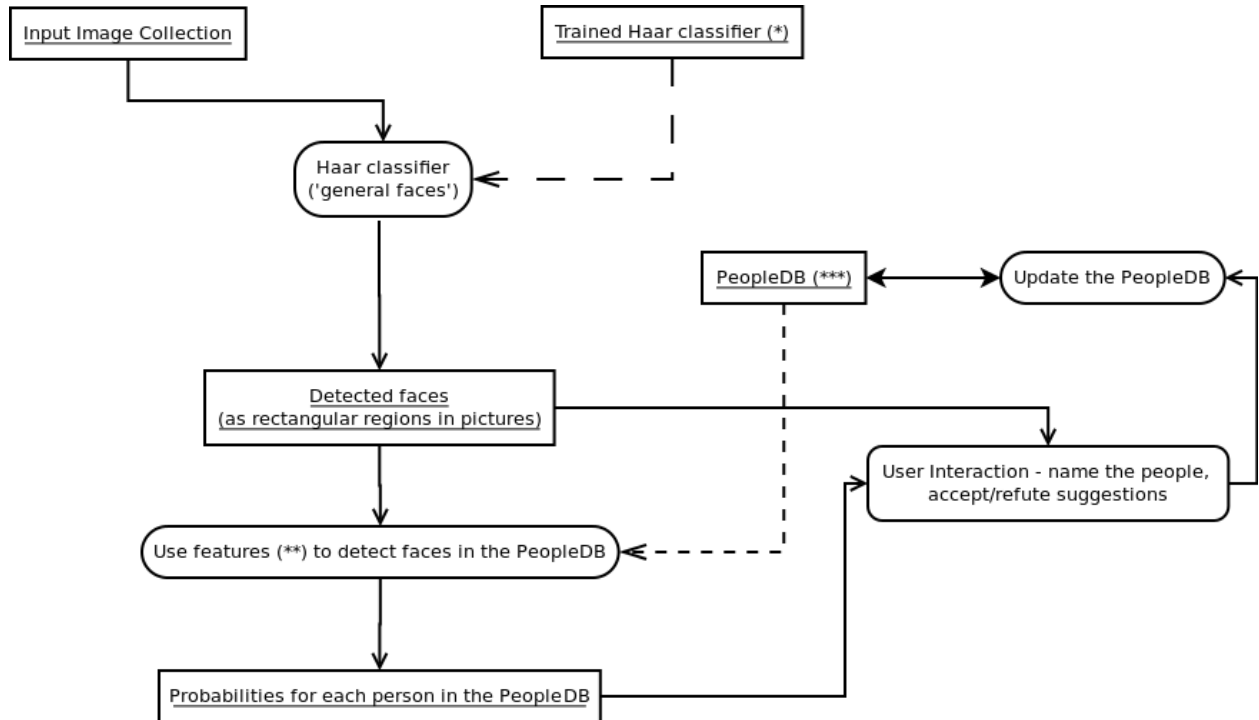


Figure: Workflow diagram

VII. MODULE DESCRIPTION

LOAD DRIVERS :

A webcam is a device that feeds its images in real time to a computer often via USB. Camera is a device used for capturing the images. It takes an image from a web camera continuously. It shows to an Emgucv image box for viewing this image. Finally application should start When "Start" button is pressed and pause when it is again pressed ("pause and resume" the streaming video).

DETECTING THE FRAMES:

I am using the Haar cascade Algorithm. The digital image features used in object recognition are Haar-like features. A

Haar-like feature considers adjacent rectangular regions at a specific location in a detection window. It is used for detecting the shape of eyes, nose, cheekbones and jaws etc. Frame Grabber in which video frames are captured in digital form and then stored, displayed or transmitted in raw or compressed digital form and convert it to Gray scale.

VIII. TECHNIQUES USED

PCA ALGORITHM:

PCA is first applied to the data set to reduce its dimensionality. Find bases which has high variance in data **Principal component analysis (PCA)** is a mathematical procedure that uses an orthogonal transformation to convert a set of observations of possibly correlated

variables into a set of values of linearly uncorrelated variables called **principal components**. the number of original variables is more than or equal to the number of principal components. This transformation is defined in such a way that the first principal component has the largest possible variance and each succeeding component in turn has the highest variance possible under the constraint that it be orthogonal to (i.e., uncorrelated with) the preceding components.

PRUNING ALGORITHM:

The pruning algorithm is a technique used in digital image processing based on mathematical morphology. The pruning algorithm is used as a complement to the skeleton and thinning algorithms to remove unwanted parasitic components. In this case 'parasitic' components refer to branches of a line which are not key to the overall shape of the line and should be removed. The edge detection algorithms or digitisation is often used to create the components.

IX.CONCLUSION

In this project, we have proposed a methodology for putting dissimilar emphasis on different components of face images based on the human knowledge about the human face, which results in dimensionality reduction or coarse-level feature extraction in the first stage. In the second stage, dimensionalities are further reduced by using artificial neural network where only trained networks weights need to be stored to recognize the face in data base, thus it further reduces dimensionality. The proposed methodology therefore extracts face features by combining the human knowledge about the discriminating features in human face and the statistical results drawn from the training data. This combination is necessary and useful because neither the current human knowledge about what the discriminating face features are nor the limited number of training data can be fully trusted. Therefore, it is not a surprise that the recognition accuracy is consistently improved by the merge of the human knowledge and the knowledge drawn from the training data. Indeed, the experiments on the large face data base show the consistent accuracy improvement of the proposed approach for different resolution of face futures and different neural networks.

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