IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

FACIAL BASED AUTHENTICATION USING EIGENFACE, FISHERFACE, AND LOCAL BINARY PATTERN HISTOGRAM

S.Saravanan[1] , Hemapriyadharshan J[2] ,Kamaludeen M[3] , Karthik N [4]

Assistant Professor[1] ,Student[2,3,4]

Department of Computer Science and Engineering

PERI INSTITUTE OF TECHNOLOGY

Abstract

The purpose of this proposed system is to review, compare, and improve face recognition algorithms.Facial recognition is different than facial detection, and in certain situations, can be much more important than facial detection. Facial detection is the ability for a machine to detect whether a face exists in a live test. It answers the yes/no question “is this a face” or “is there a face in the image”. Facial recognition is the ability for a machine to correctly label a face among a group different face. It answers the question “whose face”. Face recognition is important with regard to biometrics authentication. For security purposes, it is very important to correctly identify a person when attempting to authenticate. This can be necessary for door/area access, airport security and home security. In these situations, it can be imperative that the user presented is correctly identified and either granted access correctly or incorrectly. There are currently multiple applications available on both Android and iPhone that use facial recognition for both phone and application access as a means of additional security in the event that someone that is not authorized.

Introduction

The purpose of this proposed system is to review, compare, and improve face recognition algorithms. Facial recognition is different than facial detection, and in certain situations, can be much more important than facial detection. Facial detection is the ability for a machine to detect whether a face exists in a live test. It answers the yes/no question “is this a face” or “is there a face in the image”. Facial recognition is the ability for a machine to correctly label a face among a group different face. It answers the question “whose face”. Face recognition is important with regard to biometrics authentication. For security purposes, it is very important to correctly identify a person when attempting to authenticate. This can be necessary for door/area access, airport security and home security. In these situations, it can be

imperative that the user presented is correctly identified and either granted access correctly or incorrectly. There are currently multiple applications available on both Android and iPhone that use facial recognition for both phone and application access as a means of additional security in the event that someone that is not authorized has access to another individual's phone. This is especially critical in surveillance imagery where often only a low resolution video sequence of the face is available. If these low-resolution images are passed to a face recognition system, the performance is usually, unacceptable. Therefore, super-resolution techniques have been proposed for face recognition that attempt to obtain a high-resolution face image by combining the information from multiple low-resolution images. In general, super-resolution algorithms try to regularize the ill-possess of the problem using prior knowledge about the solution, such as smoothness or positivity.

Literature survey

Biometrics Person Authentication Using Proposed systemion-Based Face Recognition System in Verification Scenario, in International Conference on Bioinformatics and its Applications. Hong Kong, China, 2004, pp.207-213. There is tremendous need for personal verification and identification in internet security, electronic commerce and access control in recent years. Also, as the demands for security in many applications such as data protection and financial transaction become an increasingly relevant issues, the importance of biometrics technology is rapidly increasing. We explored face recognition system for person authentication applications by explicitly state the design decisions by introducing a generic modular PCA face recognition system. We designed implementations of each module, and evaluate the performance variations based on virtual galleries and probe sets. We perform various experiments and report results using equal error rates (EER) for verification scenario. In our experiment, we report performance results on 100 randomly generated image sets (galleries) of the same size.

Recognizing faces with PCA and ICA, Compute Vis Image Understand (Special Issue on Face Recognition) 91 (2003), 115137. Principle Component Analysis (PCA) technique is an important and well-developed area of image recognition and to date many linear discrimination methods have been put forward. Despite these efforts, there persist in the traditional PCA some weaknesses. In this paper, we propose a new PCA-based method that can overcome one drawback existed in the traditional PCA method. In face recognition where the training data are labeled, a proposed systemion is often required to emphasize the discrimination between the clusters. PCA may fail to accomplish this, no matter how easy the task is, as they are unsupervised techniques. The directions that maximize the scatter of the data might not be as adequate to discriminate between clusters. So, we proposed a new PCA-based scheme which can straightforwardly take into consideration data labeling, and makes the performance of recognition system better. Experiment results show our method achieves better performance in comparison with the traditional PCA method.

Subspace Linear Discriminant Analysis for Face Recognition. Technical Report CAR-TR-914. Centre for Automation Research, University of Maryland, 1999. Face recognition has become a specialized applications area within the field of computer vision. Sophisticated commercial systems have been developed that achieve high recognition rates. The goal of this report is to compare three mathematical algorithms on the basis of a face recognition task. The first technique is principal component analysis (PCA), a well-known baseline for proposed systemion techniques. The second technique is independent component analysis (ICA), a newer method that produces spatially localized and statistically independent basis vectors. In the third technique i.e., LDA, the goal is to find an efficient and interesting way to represent the face vector space by taking into account the separate class statistics.

The FERET Evaluation Methodology for Face Recognition Algorithms, IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol.22, pp.1090-1104, 2000. Two of the most critical requirements in support of producing reliable face recognition systems are a large database of facial images and a testing procedure to evaluate systems. The Face Recognition Technology (FERET) program has addressed both issues through the FERET database of facial images and the establishment of the FERET tests. To date, 14,126 images from 1,199 individuals are included in the FERET database, which is divided into development and sequestered portions of the database. In September 1996, the FERET program administered the third in a series of FERET face-recognition tests. The primary objectives of the third test were to 1) assess the state of the art, 2) identify future areas of research, and 3) measure algorithm performance. 2.5 Discriminant eigen features for image retrieval.PAMI, 19(7):711720, 1997. Face recognition has been a very active research area in the past two decades. Many attempts have been made to understand the process of how human beings recognize human faces. It is widely accepted that face recognition may depend on both componential information (such as eyes, mouth and nose).

System architecture

A robot can be any computer that is capable of machine learning. There are a number of challenges that arise when a robot tries to learn new information. One such issue is developing a strong classifier. A weak classifier occurs when the robot has an error rate that is greater than 50% over any distribution. In order to develop a strong classifier, there must be a large enough training set of labeled sample images for the robot to develop what discriminative features to look for. If the training data is not large enough, the machine may develop false positives. False positives are objects that are detected by the robot that should not be. For example, given a robot that has been designed to detect a human face and given an image of trees, the machine will falsely detect a human face in the image of trees. However, the training data must not be too large, so as to avoid a low detection rate.

A dataset range is determined through trial and error, depending on the number of features in an image. If the robot has been taught to detect too many discriminative features, it might not be able to detect an image with some, but not most of, these features. For example, given a robot that has been designed to detect a human face and was given more images to learn from containing faces having either short hair, no glasses, or earrings, the robot might not be able to detect the same face having long hair, glasses, or no earrings.

These factors are especially important in facial identification. Another issue that can lead to false detections, especially in facial identification, is using training dataof subjects who look too similar. For example, if training data consists of multiple family members who share similar facial features, the robot may have a difficult time correctly identifying one subject over the other. This could mean a low identification rate between parent/child, siblings, or even cousins whose facial features are similar enough. Other factors also exist that can pose challenges to recognizing a face.

Module algorithm implementation

- Face Detection
- Preprocessing
- Feature Extraction
- Feature Matching using eigenface, fisherface, LBHP.

Face Detection The aim of face detection is localization of the face in a image. In the case of video input, it can be an advantage to track the face in between multiple frames, to reduce computational time and preserve the identity of a face (person) between frames. Methods used for face detection includes: Shape templates, neural networks and Active Appearance Models (AAM). Preprocessing The aim of the face pre-processing step is to normalize the coarse face detection, so that a robust feature extraction can be achieved. Depending of the application, face pre- processing includes: Alignment (translation, rotation, scaling) and light normalization/correlation.

Feature Extraction

The aim of feature extraction is to extract a compact set of interpersonal discriminating geometrical or/and photometrical features of the face. Methods for feature extraction include: PCA, FLDA and Locality Preserving Proposed systemions (LPP). Feature Matching Feature matching is the actual recognition process. The feature vector obtained from the feature extraction is matched to classes (persons) of facial images already enrolled in a database. The matching algorithms vary from the fairly obvious Nearest Neighbor to advanced schemes like Neural Networks. EIGEN FACES To generate a set of Eigenfaces, principal component analysis (PCA) must be applied on a set of images of different human

faces. This is done to "identify vectors which best account for the distribution of face images within" the image space.

Eigenfaces

In Eigenfaces we are using PCA. From 2D image we get to 1D vector it called feature vector. PCA performs as given below Let P={P1,P2,...,Pn} is random vector. 1. Find mean

2. Find Covariance Matrix

1. 3. Find eigenvector λi and eigenvalue bi of S: Sbi = λibi ,i=1,2,...,n 2. Sort all eigenvectors by their value and select the first k largest eigenvectors. So, the new observed vector is given by v = Wt (P – m) 3. where W = {b1,b2,..., ,bk} 2. LBPH 1. Take an input image and detect face from it. Then applying LBPH to recognize the face. 2. find LBP by the following formula: 3. Here,(xc,yc) is a center pixel, tc is the intensity of center pixel and tp the intensity of the neighboring pixel F(x)={1; x ≥ 0 , 0; x < 0}

Performace analysis

Results and theory description

All these systems propose super-resolution as a separate pre-processing block in front of a face recognition system. In other words, their main goal is to construct a high-resolution, visually improved face image that can later be passed to a face recognition system for improved performance. This is perfectly valid as long as computational complexity is not an issue. However, in a real-time surveillance scenario where the super resolution algorithm is expected to work on continuous video streams, computational complexity is usually a very critical issue. In this paper, we propose an efficient super-resolution method for face recognition that transfers the super-resolution problem from the pixel domain to a low dimensional face space. An efficient super-resolutin method for face recognition that transfers the super-resolution problem from the pixel domain to a low dimensional face space using eigen face, fisher face, LBHP.

Conclusion and future enchancement

In recent years face detection has achieved considerable attention from researchers in bio- metrics, pattern recognition, and computer vision groups. There is countless security, and forensic applications requiring the use of face recognition technologies. As you can see, face detection system is very important in our day-to-day life. Among the entire sorts of biometric, face detection and recognition system are the most accurate. In this article, we have presented a survey of face detection techniques. It is exciting to see face detection techniques be increasingly used in real-world applications and products. Applications and challenges of face detection also discussed which motivated us to do research in face detection. The most straightforward future direction is to further improve the face detection in presence of some problems like face occlusion and non-uniform illumination. Current research focuses in field of

face detection and recognition is the detection of faces in presence of occlusion and non-uniform illumination. A lot of work has been done in face detection, but not in presence of problem of presence of occlusion and non-uniform illumination. If it happens, it will help a lot to face recognition, face expression recognition etc.

Currently many companies providing facial biometric in mobile phone for purpose of access. In future it will be used for payments, security, healthcare, advertising, criminal identification etc.

References

1. H. Moon, "Biometrics Person Authentication Using Proposed systemion-Based Face Recognition System in Verification Scenario," in International Conference on Bioinformatics and its Applications. Hong Kong, China, 2004, pp.207-213.

2. B. Draper, K. Baek, M.S. Bartlett, and J.R. Beveridge, recognizing faces with PCA and ICA, Compute Vis Image Understand (Special Issue on Face Recognition) 91 (2003), 115137.

3. W.Zhao, R.Chelappa, and P.Philips. Subspace Linear Discriminant Analysis for Face Recognition. Technical Report CAR-TR-914. Centre for Automation Research, University of Maryland, 1999.

4. P. J. Phillips, H. Moon, P. J. Rauss, and S. A. Rizvi, "The FERET Evaluation Methodology for Face Recognition Algorithms," IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol.22, pp.1090-1104, 2000.

5. P.Belhumeur, J.Hespanha, and D.Kriegman.Using discriminant eigen features for image retrieval.PAMI, 19(7):711720, 1997.

6. Ç. Tırkaz and S. Albayrak, Face Recognition using Active Shape Model, SIU2009, Kayseri, Turkey, 2009.

7. F. Kahraman, B. Kurt and M. Gökmen, Face Recognition Based on Active Shape Model, SIU2005, Antalya, Turkey, 2005.

8. A. Özdemir, Recognition of Frontal Face Images by Applying the Wavelet Transform, M. S. Thesis, Kahramanmaraş Sütçü İmam University, Turkey, 2007.

9. B. Kepenekci and G. B. Akar, Face Classification with Support Vector Machines, SIU2004, Kuşadası, Turkey, 2004.

10. İ. Atalay and M. Gökmen, Face Recognition Using Eigenfaces, SIU1996, Antalya, Turkey, 151-156, 199.