Face Recognition System Genetic with PCA and LDA

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ABSTRACT

Face recognition is one of the most challenging aspects in the field of image analysis. Face recognition has been a topic of active research since the 1980's, proposing solutions to several practical problems. Face recognition is probably the biometric method that is used to identify people mainly from their faces. However, the recognition process used by the human brain for identifying faces is very challenging. In this paper, a Genetic Algorithm (GA) based approach is proposed for face recognition. The proposed algorithm recognizes an unknown image by comparing it with the known training images stored in the database and gives information regarding the person recognized. The proposed algorithm is then compared with other known face recognition algorithms viz: Principal Component Analysis (PCA) and Linear Discriminate Analysis (LDA) algorithms. It has been observed that the recognition rate of the proposed algorithm is better.

Keywords: Face Recognition; UMIST; ORL; PCA; LDA; Genetic Algorithm.

I. INTRODUCTION

Face recognition is a task of pattern recognition that is specifically performed on faces. In other words, it can be described as classifying a face either known or unknown by comparing a face with stored known individuals in the database. It is also desirable to have a system that has the ability of learning to recognize unknown faces. People have a good ability to recognize and distinguish between faces but recognizing human face automatically by Computer is very difficult. The main goal of face recognition technology is to match a given face image against the Stored database of images. Face recognition technique uses several other disciplines such as image processing, Computer vision, pattern recognition, neural networks and psychology. With the current perceived world security situations, governments as well as businesses require reliable methods to accurately identify individuals, without overly infringing on rights to privacy or requiring significant compliance on the part of the individual being recognized.

1.1. Framework for Face Recognition

Face recognition is a technique that takes the image of a person (query image) and compares it with the previously recorded images in the database. This is done by comparing the invariant features obtained from the techniques that capture the representative variability of the faces or the structure, the shape and the face attributes like distance between the eye centers and nose, upper outlines of the eyes, width of eyebrows, etc. Face recognition has the benefit of being a passive,

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Face Recognition System Using Pca Lda Jacobi Method:

Applications of Artificial Intelligence in Engineering Xiao-Zhi Gao,Rajesh Kumar,Sumit Srivastava,Bhanu Pratap Soni,2021-05-10 This book presents best selected papers presented at the First Global Conference on Artificial Intelligence and Applications GCAIA 2020 organized by the University of Engineering Management Jaipur India during 8 10 September 2020 The proceeding will be targeting the current research works in the domain of intelligent systems and artificial intelligence   Computer Vision Systems James Crowley,Justus Piater,Markus Vincze,Lucas Paletta,2003-07-01 This book constitutes the refereed proceedings of the Third International Conference on Computer Vision Systems ICVS 2003 held in Graz Austria in April 2003 The 51 revised full papers presented were carefully reviewed and selected from 109 submissions The papers are organized in topical sections on cognitive vision philosophical issues in cognitive vision cognitive vision and applications computer vision architectures performance evaluation implementation methods architecture and classical computer vision and video annotation   **Face Recognition Using Pca and Lda Algorithm** Taranpreet Singh Ruprah,2012-08 Over the last decades numerous face recognition methods have been proposed to overcome the problem limited by the current technology associated with face variations Among them the PCA LDA method has known to be one of the best face recognition methods In this thesis we implement a face recognition method using PCA LDA Algorithm and compare these both algorithms with respect to time memory and accuracy Face recognition has received substantial attention from researches in biometrics pattern recognition field and computer vision communities Face recognition can be applied in Security measure at Air ports Passport verification Criminals list verification in police department Visa processing Verification of Electoral identification and Card Security measure at ATM s   **Face Processing: Advanced Modeling and Methods** Wenyi Zhao,Rama Chellappa,2011-07-28 Major strides have been made in face processing in the last ten years due to the fast growing need for security in various locations around the globe A human eye can discern the details of a specific face with relative ease It is this level of detail that researchers are striving to create with ever evolving computer technologies that will become our perfect mechanical eyes The difficulty that confronts researchers stems from turning a 3D object into a 2D image That subject is covered in depth from several different perspectives in this volume Face Processing Advanced Modeling and Methods begins with a comprehensive introductory chapter for those who are new to the field A compendium of articles follows that is divided into three sections The first covers basic aspects of face processing from human to computer The second deals with face modeling from computational and physiological points of view The third tackles the advanced methods which include illumination pose expression and more Editors Zhao and Chellappa have compiled a concise and necessary text for industrial research scientists students and professionals working in the area of image and signal processing Contributions from over 35 leading experts in face detection recognition and image processing Over 150 informative images with 16 images in FULL COLOR illustrate and offer insight into the most up to date advanced

face processing methods and techniques Extensive detail makes this a need to own book for all involved with image and signal processing   *Педагогическая практика в школе по физическому воспитанию* Юрий Александрович Янсон,1962   Comparison of PCA and LDA Based Face Recognition Under Non Ideal Illumination Conditions Mohammad Rebhi Alwawi,Doğu Akdeniz Üniversitesi,2005   **Face Recognition** Miloš Oravec,2010-04-01 This book aims to bring together selected recent advances applications and original results in the area of biometric face recognition They can be useful for researchers engineers graduate and postgraduate students experts in this area and hopefully also for people interested generally in computer science security machine learning and artificial intelligence Various methods approaches and algorithms for recognition of human faces are used by authors of the chapters of this book e g PCA LDA artificial neural networks wavelets curvelets kernel methods Gabor filters active appearance models 2D and 3D representations optical correlation hidden Markov models and others Also a broad range of problems is covered feature extraction and dimensionality reduction chapters 1 4 2D face recognition from the point of view of full system proposal chapters 5 10 illumination and pose problems chapters 11 13 eye movement chapter 14 3D face recognition chapters 15 19 and hardware issues chapters 19 20   **3D Face Recognition Using PCA** Yagnesh Parmar,2012-04 This book describes a face recognition system that overcomes the problem of changes in gesture and mimics in three dimensional 3D range images Here we propose a local variation detection and restoration method based on the two dimensional 2D principal component analysis PCA The depth map of a 3D facial image is first smoothed using median filter to minimize the local variation The detected face shape is cropped normalized to a standard image size of 101x101 pixels and the forefront nose point is selected to be the image center Facial depth values are scaled between 0 and 255 for translation and scaling invariant identification The preprocessed face image is smoothed to minimize the local variations The 2DPCA is applied to the resultant range data and the corresponding principal or eigen images are used as the characteristic feature vectors of the subject to find his her identity in the database of pre recorded faces The system s performance is tested against the GavabDB facial databases Experimental results show that the proposed method is able to identify subjects with different gesture and mimics in the presence of noise in their 3D facial images   Face Detection and Recognition Asit Kumar Datta,Madhura Datta,Pradipta Kumar Banerjee,2015-10-28 Face detection and recognition are the nonintrusive biometrics of choice in many security applications Examples of their use include border control driver s license issuance law enforcement investigations and physical access control Face Detection and Recognition Theory and Practice elaborates on and explains the theory and practice of face de   **Face Recognition in Ideal and Noisy Conditions Using Support Vector Machines, PCA and LDA** Milos Oravec,2010 Face Recognition in Ideal and Noisy Conditions Using Support Vector Machines PCA and LDA   Performance Evaluation of Face Recognition Algorithms Amal Dandashi,2012   **Recent Advances in Face Recognition** Kresimir Delac,Mislav Grgic,Sonja Grgic,2008-12-01 The main idea and the driver of further research in the

area of face recognition are security applications and human computer interaction Face recognition represents an intuitive and non intrusive method of recognizing people and this is why it became one of three identification methods used in e passports and a biometric of choice for many other security applications This goal of this book is to provide the reader with the most up to date research performed in automatic face recognition The chapters presented use innovative approaches to deal with a wide variety of unsolved issues   *Efficient 3D face recognition based on PCA* Yagnesh Parmar,2012-11-05 Project Report from the year 2012 in the subject Engineering Computer Engineering Gujarat University course Electronics and communication language English abstract This thesis describes a face recognition system that overcomes the problem of changes in gesture and mimics in three dimensional 3D range images Here we propose a local variation detection and restoration method based on the two dimensional 2D principal component analysis PCA The depth map of a 3D facial image is first smoothed using median filter to minimize the local variation The detected face shape is cropped normalized to a standard image size of 101x101 pixels and the forefront nose point is selected to be the image center Facial depthvalues are scaled between 0 and 255 for translation and scaling invariant identification The preprocessed face image is smoothed to minimize the local variations The 2DPCA is applied to the resultant range data and the corresponding principal or eigen images are used as the characteristic feature vectors of the subject to find his her identity in the database of pre recorded faces The system s performance is tested against the GavabDB facial databases Experimental results show that the proposed method is able to identify subjects with different gesture and mimics in the presence of noise in their 3D facial image

Face Recognition with Multi-stage Matching Algorithms Xianming Chen,2015 For every face recognition method the primary goal is to achieve higher recognition accuracy and spend less computational costs However as the gallery size increases especially when one probe image corresponds to only one training image face recognition becomes more and more challenging First a larger gallery size requires more computational costs and memory usage Meanwhile that the large gallery sizes degrade the recognition accuracy becomes an even more significant problem to be solved A coarse parallel algorithm that equally divides training images and probe images into multiple processors is proposed to deal with the large computational costs and huge memory usage of the Non Graph Matching NGM feature based method First each processor finishes its own training workload and stores the extracted feature information respectively And then each processor simultaneously carries out the matching process for their own probe images by communicating their own stored feature information with each other Finally one processor collects the recognition result from the other processors Due to the well balanced workload the speedup increases with the number of processors and thus the efficiency is excellently maintained Moreover the memory usage on each processor also evidently reduces as the number of processors increases In sum the parallel algorithm simultaneously brings less running time and memory usage for one processor To solve the recognition degradation problem a set of multi stage matching algorithms that determine the recognition result step by step are

proposed Each step picks a small proportion of the best similar candidates for the next step and removes the others The behavior of picking and removing repeats until the number of remaining candidates is small enough to produce the final recognition result Three multi stage matching algorithms nary elimination divide and conquer and two stage hybrid are introduced to the matching process of traditional face recognition methods including Principal Component Analysis PCA Linear Discriminant Analysis LDA and Non graph Matching NGM N ary elimination accomplishes the multi stage matching from the global perspective by ranking the similarities and picking the best candidates Divide and conquer implements the multistage matching from the local perspective by dividing the candidates into groups and selecting the best one of each group For two stage hybrid it uses a holistic method to choose a small amount of candidates and then utilizes a feature based method to find out the final recognition result from them From the experimental results three conclusions can be drawn First with the multi stage matching algorithms higher recognition accuracy can be achieved Second the larger the gallery size the greater the improved accuracy brought by the multi stage matching algorithms Finally the multi stage matching algorithms achieve little extra computational costs Page ii **Face Recognition** Miloš Oravec,2010-04-01 This book aims to bring together selected recent advances applications and original results in the area of biometric face recognition They can be useful for researchers engineers graduate and postgraduate students experts in this area and hopefully also for people interested generally in computer science security machine learning and artificial intelligence Various methods approaches and algorithms for recognition of human faces are used by authors of the chapters of this book e g PCA LDA artificial neural networks wavelets curvelets kernel methods Gabor filters active appearance models 2D and 3D representations optical correlation hidden Markov models and others Also a broad range of problems is covered feature extraction and dimensionality reduction chapters 1 4 2D face recognition from the point of view of full system proposal chapters 5 10 illumination and pose problems chapters 11 13 eye movement chapter 14 3D face recognition chapters 15 19 and hardware issues chapters 19 20 **Kernel Learning Algorithms for Face Recognition** Jun-Bao Li,Shu-Chuan Chu,Jeng-Shyang Pan,2013-09-07 Kernel Learning Algorithms for Face Recognition covers the framework of kernel based face recognition This book discusses the advanced kernel learning algorithms and its application on face recognition This book also focuses on the theoretical deviation the system framework and experiments involving kernel based face recognition Included within are algorithms of kernel based face recognition and also the feasibility of the kernel based face recognition method This book provides researchers in pattern recognition and machine learning area with advanced face recognition methods and its newest applications **Face Recognition Using PCA Implemented on Raspberry PI** Ibrahim Majid Mohammed,2019 The objectives of this project are as follows i To implement facial recognition in an embedded system based on a Raspberry Pi ii To reduce feature dimensions using a principal component analysis algorithm iii To evaluate the perfomance of the propose method using the ORL dataset *Comparison of the PCA Eigenfaces, LDA Fisherfaces, NMF, and Deepface Facial*

Recognition Algorithms with Four Face Databases Sheng Zhang,2021   **PCA and LDA Based Neural Networks for Human Face Recognition** Alaa Eleyan,Hasan Demirel,2007 5 1 Training and Testing of Neural Networks Two neural networks one for PCA based classification and the other for LDA based classification are prepared ORL face database is used for training and testing The training is performed by n poses from each subject and the performance testing is performed by 10 n poses of the same subjects After calculating the eigenfaces using PCA the projection vectors are calculated for the training set and then used to train the neural network This architecture is called PCA NN Similarly after calculation of the fisherfaces using the LDA projection vectors are calculated for the training set Therefore the second neural network is trained by these vectors This architecture is called LDA NN Eleyan Demirel 2005 2006 Figure 9 shows the schematic diagram for the neural network training phase   **Enhancing Performance of Real-time Face Recognition System Using PCA** Behzad Nazarbakhsh,2014

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