A Simple Approach on Web Based Classification of Face Recognition Based on Individual Data using Internet on Things and its Applications

Dharamvir [1] , Dr. Poornima Nataraja [2]

[1]Associate Professor, Department of MCA, The Oxford College of Engineering , Bangalore -560068

[2]Professor & Head Department of MCA, Dayanand Sagar College of Engineering , Bangalore -560078

Abstract: This proposed research is a new methodology of recognizing face using Individual Eigen Subspaces and it's implemented in the field of Image Processing for Personnel verification or recognition using basic components and Data Applications of Internet on Things and its Applications. A major objective of this proposed work is to develop a tool for face recognition, which can help in quicker and effective analysis of a face from the face set, thus reducing false acceptance rate and false rejection rate. Face recognition has been widely explored in the past years. A lot of techniques have been applied in various applications. Robustness and reliability have become more and more important for these applications especially in security systems. In this proposed research , a variety of approaches for face recognition are reviewed first using Internet on Things with Data Classification methods . These approaches are classified according to three basic tasks: face representation, face detection, and face identification. An implementation of the appearance-based face recognition method, the eigenface recognition approach, is reported. This method utilizes the idea of the principal component analysis and decomposes face images into a small set of characteristic feature images called eigenfaces. This proposed work is intended to develop, multiple face Eigen subspaces. With each one is corresponding to one known subject privately, rather than all individuals sharing one universal subspace as in the traditional eigenface method.

Keywords : Face Recognition ,Image Processing , IoT Applications

1. Introduction

The proposed method also makes use of Fuzzy Logic rules along with necessary image processing procedure. Fuzzy logic serves as a front part of the face recognition especially defined for skin area detection within the image frame. The experiments strongly supports the proposed area in which an effective performance over the traditional "eigenface" has been observed when tested on the same face base. Most of the previous work dealt with an single pose of an individual. Some common techniques included single template matching and eigenfaces. These systems were not real-

time and not rotation invariant. Eigenfaces described in represented face images in low dimensional feature space using PCA. Initially face recognition systems focused only on single expression images. How ever during the previous research on face recognition system dealt with the recognition of many different views of a single image and still the recognition of the person when his expression varies is a great problem, the face recognition system is facing. Mostly in the previous researches, they use traditional eigen value method which makes the recognition very difficult as only a single image is formed from the calculated eigen values of a set of images. More over there are no implemented methods to identify the face from a real time image in the preprocessing stage when eigen face algorithm is used as the feature extraction method. The performance of the face recognition system significantly drops when there are a large number of poses. When illumination variation is also present the task of face recognition becomes even more difficult. Another main drawback is that it is extremely difficult to recognize the facial areas from a real time image.

The Proposed method will be trained to identify the individuals face with different expressions. The system identifies the person's image, no matter how the expression of the face is. Individual eigenface method is to be used rather than traditional eigenvalue method. So the drawback in the traditional eigen face method is overcome by using single eigenvalue method.

Here the calculation of eigenvalue for all the images in the database will be done and these eigen values are compared individually with the query images eigenvalue using Euclidean distance and the results are given. Hence the performance of the system greatly increases when the identification is done with a large number of expressions.

When a real time image is given as input, fuzzy logic is used for the identification of the facial areas from the image. This is done using the fuzzy inference system (FIS).The fuzzy logic rules are implemented in the FIS and the face areas are cropped from them. The eigen values are then calculated for these face areas and is recognized normally.

2. Literature Review

This is deals with literature survey on image processing recognition methods, has been studied for more than two decades. This survey has been conducted in order to establish a roadmap that is to forecast the future developments of image processing technology.[1]

In this proposed research , a novel method is proposed for discovering fuzzy rules and to detect faces under lighting and angle constraint. The thesis is organized into nine chapters. The first chapter is introductory in nature and the subsequent chapters discuss the proposed techniques in detail. The list o each chapter is provided here under.[2]

This part of System deals with data acquisition for face recognition. The training sets of images are acquired first. Ten

different face images are taken for every individual. By using Internet of Things and Data Applications can be compiles and works.[3]

It describes about the fuzzy logic rules which are implemented through the fuzzy inference system (FIS) in MATLAB. The process of fuzzy inference involves all of the pieces that are described in the previous sections: Membership Functions, Logical Operations, and If-Then Rules. [5]

In mathematical terms, this is equivalent to finding the principal components of the distribution of faces, or the eigenvectors of the covariance matrix of the set of face images, treating an image as a point (or vector) in a very high dimensional space. The eigenvectors are ordered, each one accounting for a different amount of the variation among the face images.

These eigenvectors can be thought of as a set of features, which together characterize the variation among face images. Each image contributes some amount to each eigenvector, so that each eigenvector formed from an ensemble of face images appears as a sort of ghostly face image, referred to as an *eigenface*. Each eigenface deviates from uniform gray where some facial feature differs among the set of training faces collectively, they map of the variations between faces.

3. Objective of Proposed Research

The face images captured has to converted into gray scale format for the easy accessing of the image in the calculation of Eigen values. The size of the images is also converted to a standard format before accessing them for the feature extraction. The images are resized to 92×112 matrix size and all images of any format like JPEG, BMP, and PGM are converted into PGM format.

Each individual face image can be represented exactly in terms of a linear combination of the eigenfaces. Each face can also be approximated using only the "best" eigenfaces those that have the largest eigenvalues, and which therefore account for the most variation within the set of face images. The best *M* eigenfaces span an *M*-dimensional subspace face space of the space of all possible images. Because eigenfaces will be an orthonormal vector set, the projection of a face image into face space is analogous to the well-known Fourier transform. In the FT, an image or signal is projected onto an orthonormal basis set of sinusoids at varying frequencies and phase. Each location of the transformed signal represents the projection onto a particular sinusoid. The original signal or image can be reconstructed exactly by a linear combination of the basis set of signals, weighted by the corresponding component of the transformed signal. If the components of the transform are modified, the reconstruction will be approximate and will correspond to linearly filtering the original signal.

4. Study Area and Methodology

In the proposed research work the images must be first added to a text file for easy retrieval and processing. So a database

text file is created and all the images are stored in it. Now, every image is taken from the database and the mean value is calculated from the image matrix.

Our system will be trained to identify the individuals face with different expressions. The system identifies the person's image, no matter how the expression of the face is. We use individual eigenface method rather than traditional eigenvalue method. So the drawback in the traditional Eigen face method is overcome by using single eigenvalue method.

Here we calculate the eigenvalue for all the images in the database and these Eigen values are compared individually with the query images eigenvalue using Euclidean distance and the results are given. Hence the performance of the system greatly increases when the identification is done with a large number of expressions.

When a real time image is given as input, we use fuzzy logic for the identification of the facial areas from the image. This is done using the fuzzy inference system (FIS).The fuzzy logic rules are implemented in the FIS and the face areas are cropped from them. The Eigen values are then calculated for these face areas and are recognized normally.

5. Expected Outcomes

Design is essentially the bridge between requirement specification and final solution for satisfying requirements. System has to be designed in various aspects such as the input, output. There may be many correct possible designs. The goal of the design process is not simply to produce a design for the system. Instead the goal is to find the best possible design within the limitations imposed by the requirements and the physical and social environment in which the system will operate.

Modularization is breaking the project into different smaller units. Modularization helps n debugging of modules involved in the project and also helps in reuse of code. This helps in faster development, implementation and maintenance of software.

The training sets of images are acquired first. Ten different face images with different face expressions of the same person are taken for every individual. Five individuals' images with ten different expressions for each individual are taken with a total of 50 images. These face images are in RGB format with a matrix size of 256×256. The image has to be converted into gray scale format for the easy accessing of the image in the calculation of Eigen values. The size of the images is also converted to a standard format before accessing them for the feature extraction. The images are resized to 92×112 matrix size and all images of any format like JPEG,BMP,PGM are converted into PGM format with a file extension of *.pgm. The images are given a filename and file type for accessing them in Eigen value calculation. This happens in the first module. The working of subsequent modules is explained below.

The images must be first added to a text file for easy retrieval and processing. So a database text file is created and all the images are stored in it. Now, every image is taken from the database and the mean value is calculated from the image matrix. The difference between the image matrix and the mean value is calculated and the covariance of the matrix is evaluated by squaring this difference value. Then the Eigen value is calculated for the image from the obtained covariance value. The result will be obtained as two matrices. The second matrix is taken and the diagonal values are sorted and stored in a array. This vector stored in the array is the value taken for further processing. This generally consists of 92 values as the images taken for processing are 92×112 format .In the same way, the Eigen value is calculated for every image in the database.

5. References

[1] Anagnostopoulos C, *Vergados D.,* Loumos V., Kayafas E.," A Probabilistic Neural Network for Human Face Identification based on Fuzzy Logic Chromatic Rules",Vol.22 No.1,2017.

[2] C. P. Papageorgiou, M. Oren ,and T. Poggio,A general framework for object detection, Proceedings of international Conference on Computer Vision (2017) 555{562}

[3] Costen N, Craw I, Robertson G, Akamatsu S (2015). "Automatic Face Recognition: What Representation?", 4th European Conference on Computer Proceedings, Springer-Verlag, Berlin, Germany, pp. 504-513

[4] Olivier de Vel and Stefan Aeberhard "Line-Based Face Recognition under Varying Pose" IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, Vol. 21, No. 10, OCTOBER 2014

[5] Reisfeld D, Yeshurun Y (2013)."Preprocessing of Face Images: Detection of Features and Pose Normalization", Computer Vision and Image Understanding.

[6] Soirovich, Kerby: *Low-dimensional procedure for the characterization of human faces*. Opt. Soc. Am. A, 87

[7] Yang ,M.H and Ahuja.N.,"Detecting Human Faces in Color Images",Proceedings of IEEE International conference on Image processing,Vlo.1,pp128-30