

FACE RECOGNITION CHALLENGES USING MATLAB ENVIRONMENT

1.S.Saravanan, 2.Ranjith, 3.N.Thangamani

1. Assistant Professor & Head, Department of Electronics & Communication Systems

2. Assistant Professor, Department of Electronics & communication Systems

3. Assistant Professor, Department of Computer Science

AJK College of Arts & Science, Coimbatore.

Abstract

Automatic recognition of people is a challenging problem which has received much attention during recent years due to its many applications in different fields. Face recognition is one of those challenging problems and up to date, there is no technique that provides a robust solution to all situations. There are many techniques used for this purpose. Face recognition is an effective means of authenticating a person. In this paper, a face recognition system for personal identification and verification. Thereafter we represent the most recent face recognition techniques listing their advantages and disadvantages. Some techniques specified here also improve the efficiency of face recognition under various illumination and expression condition of face images.

Keywords: Face Recognition, Matlab, Challenges, Verification, Identification.

1. INTRODUCTION

Face recognition has turned into an exceptionally dynamic territory of research as of late principally because of expanding security requests and its potential business and law requirement applications. The most recent decade has demonstrated emotional advance around there, with accentuation on such applications as human-PC collaboration, biometric examination, content-based coding of pictures, recordings, and observation. Despite the fact that an inconsequential assignment for the human mind, face recognition has turned out to be to a great degree hard to mirror misleadingly, since in spite of the fact that shared characteristics do exist between faces, they differ impressively regarding age, skin, shading and sexual orientation. The issue is additionally entangled by varying picture characteristics, outward appearances, facial furniture, foundation, and enlightenment conditions. A bland portrayal of a face recognition framework is appeared in Fig 1.

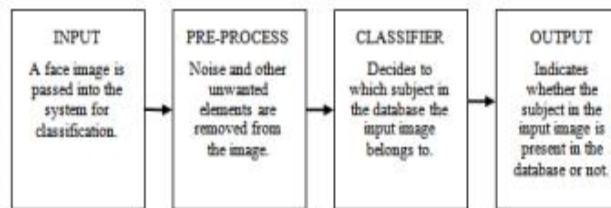


Figure 1: Generic representation of a face recognition system

When working with pictures in Matlab, there are numerous things to remember, for example,

stacking a picture, utilizing the correct organization, sparing the information as various information writes, how to show a picture, change between various picture designs, and so on. This worksheet shows a portion of the charges intended for these activities. The vast majority of these summons expect you to have the Image preparing tool stash introduced with Matlab. A computerized picture is made out of pixels which can be thought of as little spots on the screen. A computerized picture is a direction of how to shading every pixel. We will find in detail later on how this is done practically speaking. A commonplace size of a picture is 512-by-512 pixels. Since skin shading in people fluctuates by singular, investigate has uncovered that force instead of chrominance is the primary recognizing trademark. The recognition organize ordinarily utilizes a power (grayscale) portrayal of the picture packed by the 2D-DCT for additionally handling. This grayscale rendition contains force esteems for skin pixels. The picture preparing part comprises of Face picture securing methods and the second part comprises of the computerized reasoning which is created by PCA and Back Propagation Neural Network. Face picture obtained in the initial step by web cam, advanced camera or utilizing scanner is encouraged as a contribution to PCA, which changes over the info picture to low dimensional picture and ascertains its Euclidian separation.

Face recognition technique is a sort of biometric identification innovation that distinguishes individuals in light of their face highlights. The



innovation utilizes a camera or webcam to obtain pictures or video streams containing human faces, naturally identifies and tracks the face in the picture, and afterward performs face recognition. The face recognition framework is involved four sections: face picture securing and location, face picture pre-handling, facial component extraction, and face coordinating and recognition. Face discovery is for the most part utilized for pre-handling purposes, i.e. to precisely stamp out the position and measurements of a face. Face identification is utilized to select helpful bits of data to distinguish the nearness of a face.

2. Literature Survey

L. Sirovich and M. Kirby proposed to Principal Component Analysis is additionally utilized by to effectively speak to pictures of faces. They characterized that a face pictures could be roughly remade utilizing a little accumulation of weights for each face and a standard face picture. The weights portraying each face are gotten by anticipating the face picture onto the eigenpicture. Belhumeur et al proposed both key segment investigation and direct discriminant examination which deliver a subspace projection grid, comparative as utilized as a part of the eigenface strategy. In any case, the fisherface strategy can exploit inside class data, limiting variety inside each class, yet as yet amplifying class partition. Like the eigenface development process, the initial step of the fisherface technique is take each (N×M) picture cluster and reshape into a ((N×M)×1) vector. Fisherface is like Eigenface however with improvement of better grouping of various classes picture. With FLD, one can group the preparation set to manage diverse individuals and distinctive outward appearance. We have preferred precision in outward appearance over Eigen face approach. Moreover, Fisherface expels the initial three foremost parts which are in charge of light force transforms; it is more invariant to light power. Karungaruet al. utilizes layout based hereditary calculation and uncovered distinctive outcomes on target picture by altering the measure of the format as preprocessing. The edge discovery and YIQ shading layouts are abused. The outcomes are taken around the separation measure face recognition approach and examination is performed with existing techniques. Anlonget al. the creator takes a shot at the lattice to develop dependable and legitimate framework. This strategy is very viable for bigger databases that take care of the issue of face recognition under sensible

computational cost. Sao and Yegnanarayana a calculation is proposed for individual verification utilizing format based face recognition technique. Basically, the restlessness based face portrayal is computed to process one dimensional pictures. The framework is by one means or another related with Neural Networks to test the pictures under changing stance and enlightenment conditions. Wang and Yang a face identification calculation is proposed as opposed to face recognition calculation as preprocessing steps. Presently the favorable position is taken from format based calculation for face identification by building a general casing work for various leveled face recognition. The highlights are separated utilizing PCA from 2D pictures. Toward the end, it infers that it regards utilize layout calculations for face identification since it gives most noteworthy recognition rate. Basavaraj and Nagaraj proposed a geometrical model for facial element extraction. The essential procedure incorporates change of frontal face pictures including ears and jaw and furthermore of potential highlights since it upgrades the advancement of strategies in face recognition process. The face show proposed by the capacity to recognize is isolated into four stages. The beginning advance is pre-preparing. The principle point of this progression is to decrease the commotion and the information picture is changed over into a parallel one. The second step contains marking of facial highlights and after that finding the starting point of these named highlights. At last, it ascertains the assessed separate utilized for coordinating reason.

3. Challenges in Face Recognition

Posture, Illumination, Facial appearance, Image condition, Face estimate. A. Arrangement of Face Recognition Face recognition situations can be characterized into two sorts in particular called as Face verification (or validation) and Face identification (or recognition).

1) Face verification:

It is a balanced match that looks at a question face picture against a layout face picture whose character is being guaranteed. To assess the verification execution, the verification rate (the rate, at which true blue clients are allowed get to) versus false acknowledges rate (the rate at which frauds are allowed get to) is plotted, called ROC bend. A decent verification framework should adjust these two rates in light of operational needs.

2) Face identification:

It is a one-to-numerous matching procedure that looks at a question face picture against all the layout pictures in a face database to determine the character of the inquiry face. The identification of the test picture is finished by locating the picture in the database that has the most astounding comparability with the test picture. The identification procedure is a "shut" test, which implies the sensor takes a perception of an individual that is known to be in the database. The guinea pig's (standardized) highlights are contrasted with alternate highlights in the framework's database and a likeness score is found for every examination. These comparability scores are then numerically positioned in a descending request. The level of times that the most astounding likeness score is the right counterpart for all individuals is alluded to as the "best match score". Fig 2 spoke to into stream diagram of face recognition. It consistence of two stages A) Training B) Testing.

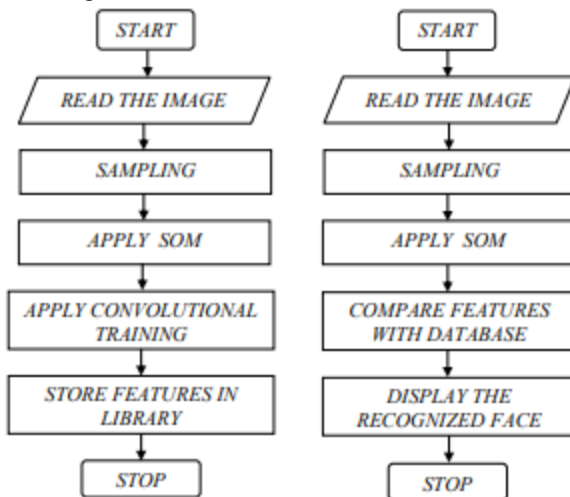


Figure 2: Flow Chart of Face Recognition

4. Overview of the Matlab Environment

The name MATLAB remains for grid research facility, originally written to give simple access to network software created by the LINPACK and EISPACK ventures. Today, MATLAB engines incorporate the LAPACK and BLAS libraries, embedding the best in class in software for grid calculation. MATLAB is an interactive, lattice based framework for logical and engineering numeric calculation and perception. Its fundamental information component is an exhibit that does not require dimensioning. It is utilized to tackle numerous specialized computing issues, particularly those with lattice and vector detailing, in a small amount of the time it would take to compose a

program in a scalar non interactive dialect, for example, C or FORTRON.

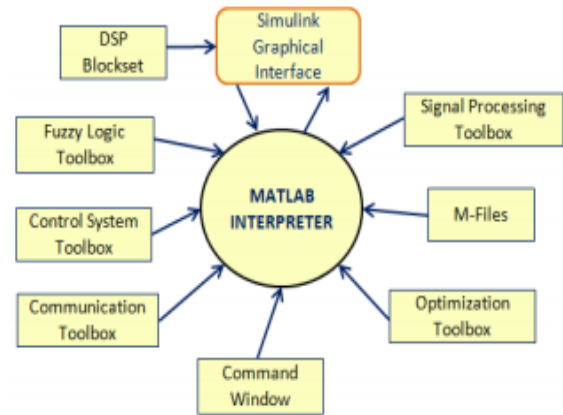


Figure 3: Matlab Environment

4.1 Working Formmts in Matlab

In the event that a picture is put away as a JPEG-picture on your plate we first read it into Matlab. Be that as it may, keeping in mind the end goal to begin working with a picture, for instance play out a wavelet change on the picture, we should change over it into an alternate configuration. This area explains four regular arrangements.

4.1.1 Intensity image (gray scale image)

This is the proportional to a "gray scale image" and this is the image we will for the most part work with in this course. It speaks to an image as a framework where each component has an esteem corresponding to how splendid/dim the pixel at the corresponding position ought to be shaded. There are two approaches to speak to the number that speaks to the splendor of the pixel: The twofold class (or information compose). This doles out a floating number ("a number with decimals") in the vicinity of 0 and 1 to every pixel. The esteem 0 relates to dark and the esteem 1 compares to white. The other class is called unit8 which allots an integer in the vicinity of 0 and 255 to speak to the brilliance of a pixel. The esteem 0 compares to dark and 255 to white. The class unit8 just requires around 1/8 of the capacity contrasted with the class twofold. Then again, numerous mathematical capacities must be connected to the twofold class. We will see later how to change over amongst twofold and uint8.

4.1.2 Binary image

This image arrange additionally stores an image as a framework however can just shading a pixel dark or



white (and nothing in the middle). It appoints a 0 for dark and a 1 for white.

4.1.3 Indexed image

This is a viable method for representing shading images. (In this course we will for the most part work with gray scale images yet once you have figured out how to function with a gray scale image you will likewise know the principle how to function with shading images.) An indexed image stores an image as two frameworks. The principal grid has an indistinguishable size from the image and one number for every pixel. The second framework is known as the shading guide and its size might be not quite the same as the image. The numbers in the principal network is an instruction of what number to use in the shading map framework.

4.1.4 RGB image

This is another organization for shading images. It speaks to an image with three networks of sizes matching the image arrange. Every network compares to one of the hues red, green or blue and gives an instruction of the amount of every one of these hues a certain pixel should utilize.

4.1.5 Multiframe image

In a few applications we need to ponder an arrangement of images. This is extremely regular in natural and medicinal imaging where you may think about a grouping of cuts of a cell. For these cases, the multiframe organize is a helpful method for working with a grouping of images. On the off chance that you work with organic imaging later on in this course, you may utilize this organization.

4.2 Image convert between different formats

The following table demonstrates to convert between the different formats given above. Every one of these charges require the Image processing tool stash.

Operation	Matlab command
Convert between intensity/indexed/RGB format to binary format	dither()
Convert between intensity format to indexed format	gray2ind()
Convert between indexed format to intensity format	ind2gray()
Convert between indexed format to RGB format	ind2rgb()

Convert a regular matrix to intensity format by scaling	mat2gray()
Convert between RGB format to intensity format	rgb2gray()
Convert between RGB format to indexed format	rgb2ind()

Table 1: Matlab converting commands

Conclusion

Face recognition is a challenging issue in the field of image processing and PC vision. As a result of bunches of utilization in different fields the face recognition has gotten incredible consideration. In this paper we have given ideas of face recognition techniques in MATLAB. The examination demonstrates that the face recognition framework using PCA for include extraction and BPNN for image order and recognition gives a high precision rate and quick calculation. By choosing PCA as the component determination strategy, the space measurement can be decreased. PCA combined with BPNN works superior to the individual PCA, done based on the execution of the framework which is estimated by varying the quantity of faces of each subject in the training and test faces. The recognition execution increases because of the increase in face images in the training set. This is on account of more example images can portray the classes of the subjects better in the face space.

References:

- [1] Jigar M. Pandya, Devang Rathod, Jigna J. Jadav, "A Survey of Face Recognition approach", International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com Vol. 3, Issue 1, January - February 2013, pp.632- 635
- [2] Jyoti S. Bedre ,Shubhangi Sapkal, "Comparative Study of Face Recognition Techniques: A Review", Emerging Trends in Computer Science and Information Technology – 2012(ETCSIT2012) Proceedings published in International Journal of Computer Applications@ (IJCA) 12
- [3] A. S. Tolba, A.H. El-Baz, and A.A. El-Harby, " Face Recognition: A Literature Review", International Journal of Signal Processing 2:2 2006
- [4] Sushma Jaiswal, Dr. (Smt.) Sarita Singh Bhadauria, Dr. Rakesh Singh Jadon, " COMPARISON BETWEEN FACE RECOGNITION ALGORITHM-EIGENFACES, FISHERFACES AND ELASTIC BUNCH GRAPH MATCHING", Volume 2, No. 7, July 2011 Journal of Global Research in Computer Science
- [5] Ming-Hsuan Yang, David J. Kriegman and Narendra Ahuja, "Detecting Faces in Images: A Survey," IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, VOL. 24, NO. 1, JANUARY 2002



- [6] KIRBY, M. AND SIROVICH, L. 1990. "Application of the Karhunen-Loeve procedure for the characterization of human faces". IEEE Trans. Patt. Anal. Mach. Intell. 12
- [7] Li X. and Areibi S.,—"A Hardware/Software codesign approach for Face Recognition", The 16th,International Conference on Microelectronics, Tunisia,2004
- [8] Lin-Lin Huang, Akinobu Shimizu, Yoshihiro Hagihara, Hidefumi Kobatake ,"Face detection from cluttered images using a polynomial neural network", Elsevier Science 2002
- [9] U. KreQel, J. SchRurmann, "Pattern classification techniques based on function approximation, in: H.Bunke, P.S.P. Wang (Eds.), Handbook of Character Recognition and Document Image Analysis", World Scienti5c, Singapore, 1997, pp. 49–78.
- [10] Yue Ming, Qiuqi Ruan, Xiaoli Li, Meiru Mu, " Efficient Kernel Discriminate Spectral Regression for 3D Face Recognition", Proceedings Of ICSP 2010
- [11] Mohammed Javed, Bhaskar Gupta, "Performance Comparison of Various Face Detection Techniques" ,International Journal of Scientific Research Engineering & Technology (IJSRET) Volume 2 Issue1 pp 019-0027 April 2013 www.ijsret.org ISSN 2278 – 0882 IJSRET @ 2013