International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 04 | Apr 2020 www.irjet.net p-ISSN: 2395-0072

Face Recognition with Feature Points Detection using MATLAB

Girish Belani[1]

[1]*Student, Dept. of Electronics and Telecommunication Engineering, Government Engineering College, Bilaspur, Chhattisgarh, India*

Abstract – *Face Recognition using Image Processing and Computer Vision Toolbox in MATLAB is the one of the most useful application which has essential role across different industries nowadays such as security companies, retail and marketing, attendance tracking in schools and colleges, immigration checkpoints, identify people on social media platforms etc. Face recognition technique used for the verification of faces gives advantages in variety of ways like unlock phones, prevent retail crime, smarter advertising, find missing persons, protect schools from threats, facilitate secure transactions, control access to sensitive areas etc. This paper is based on the Viola Jones algorithm for face detection and the Speeded-Up Robust Features (SURF) algorithm to find blob features which helps in face recognition. Feature extraction and matching the descriptors from pixels surrounding an interest point. These pixels describe and match features specified by a single-point location. This features and algorithms can be used to identify an individual person based on the registered image of face and compare with the test image of a person or from a group image. Face recognition includes both face identification and face verification (also called authentication). On one hand, face verification is concerned with validating a claimed identity based on the image of a face, and either accepting or rejecting the identity claim (one-to-one matching). On the other hand, the goal of face identification is to identify a person based on the image of a face. This face image has to be compared with all the registered persons (one-to-many matching).*

Key Words: **Image Processing, Viola Jones algorithm, Speeded-Up Robust Features, Feature extraction, face identification, face verification.**

1. INTRODUCTION

Face recognition is the process of identifying one or more people in images or videos by analyzing and comparing patterns. Algorithms for face recognition typically extract facial features and compare them to a database to find the best match. Face recognition is an important part of many biometric, security, and surveillance systems, as well as image and video indexing systems. Research shows that even face can speak and it has different words for different emotions. It plays a very crucial role for interacting with people in the society. It coveys people's identity, so it can be used as a key for security solutions in many organizations.

Today, we are inundated with data of all kinds, but the overabundance of photo and video data available provides the dataset required to make facial recognition technology work. Facial recognition systems analyze the visual data and millions of images and videos created by high-quality Closed-Circuit Television (CCTV) cameras installed in our cities for security, smart phones, social media, and other online activity.

One of the major advantages of facial recognition technology is safety and security. Law enforcement agencies use the technology to uncover criminals or to find missing children or seniors. The biggest drawback for facial recognition technology in most people's opinions is the threat to an individual's privacy.

Robust face recognition requires the ability to recognize identity in spite of many variations in appearance that the face can have in a scene. Also, the output of the detection and recognition system has to be accurate. The recognition system has to associate an identity for each face it comes across by matching it to a large database of individuals.

For face recognition extraction of feature points and their matching is important. Features matched with maximum threshold gives the better location of the face and also required for the best match. The implementation of Viola Jones algorithm for Face detection and SURF algorithm for finding the feature points and feature extraction are discussed below.

2. METHODS

The method used for face recognition is explained in the following points:

1. Face Detection.

2. SURF Feature Detection and Extraction.

3. Matching Feature Points.

4. Face Recognition.

2.1 Proposed Model

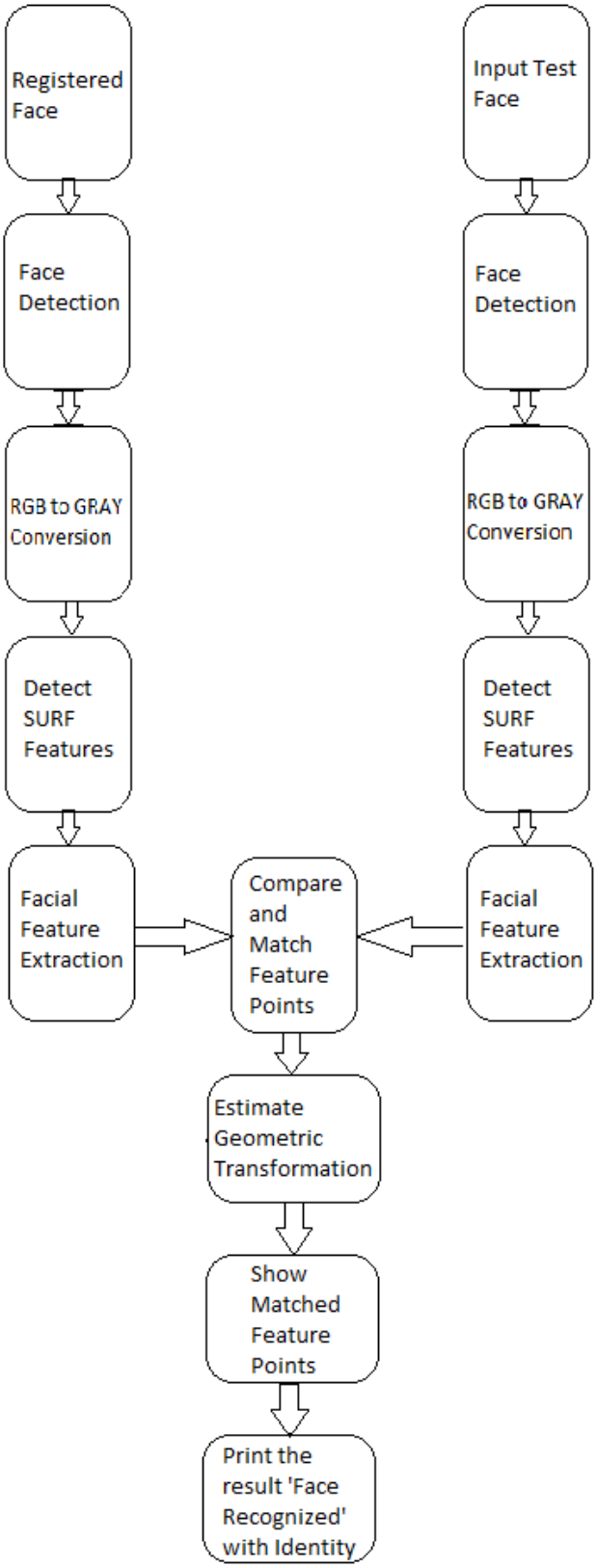

Fig -1: Face Recognition Process Flowchart

2.2 Face Detection

Viola Jones algorithm can be used for face detection as it is an effective way to detect face. This process separates the facial area from the rest of the background image. In the case of video streams, faces can be tracked using a face tracking component. However Viola Jones algorithm does not work accurate as in some cases many non-facial and overlapping elements are detected as face in this algorithm. But can be reduce the error percentage by fixing the threshold points.

Fig -2: Face Detection

2.3 SURF Feature Detection and Extraction

RGB to GRAY scale conversion. Color increases the complexity of the model. It is relatively easier to deal with a single color channel than multiple color channels. Therefore gray scale images are used in proposed model.

The features are detected using the 'detectSURFFeatures' function in MATLAB and extracted using the 'extractFeatures' function with the input image and the detected interest points as arguments. After detecting the facial feature points, the facial feature points are extracted from the input test face and the registered face. Then the features of the face are compared with that of the features of the surroundings and all the features are plotted.

Fig -3, 4: Feature points detection and extraction of both the faces

2.4 Matching Feature Points

By estimating the geometric transform, the matched face features in the input test image is obtained by eliminating the outlier points of the surrounding features.

The estimated transformation is obtained by using 'vision.GeometricTransformEstimator' with the matched face feature and the surrounding non-facial features as arguments. Once the transformation is estimated, all matching points in the input test image are projected to the registered face image if the face is identified.

After feature extraction, the feature points of the images are matched with the inliers by using 'showMatchedFeatures' and visualize the matched points in projection.

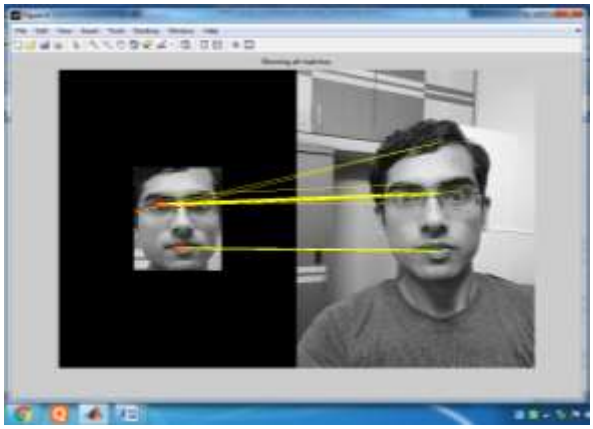

Fig -5: Feature points matched

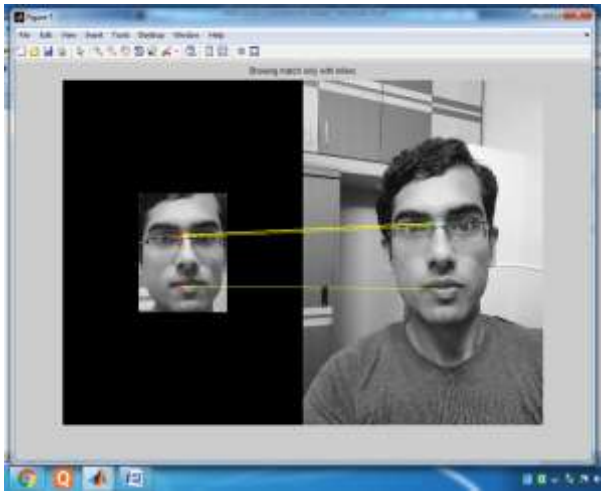

Fig -6: Strongest Feature Points matched

2.5 Face Recognition

After feature extraction and matching the strongest feature points of both the faces, the face gets recognized with the registered image if the percentage of matched points is greater than the fixed threshold otherwise unregistered face result is shown.

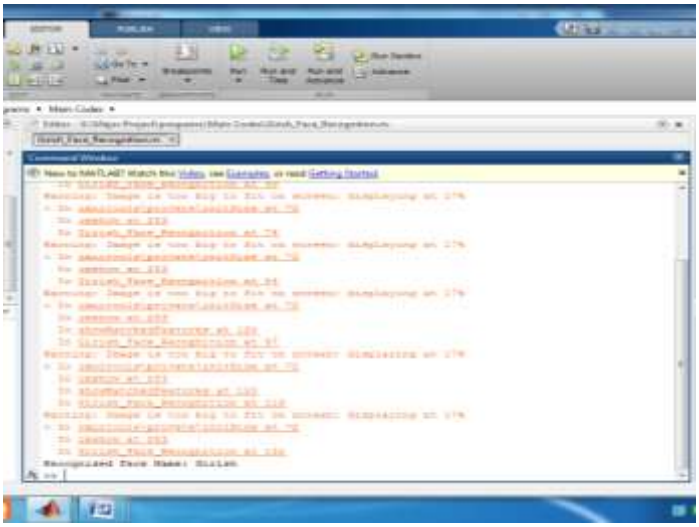

Fig -7: Face Recognized with name

3. RESULT

The result shows the location of strongest feature points matched which is surrounded by a polygon represents the recognition of the face.

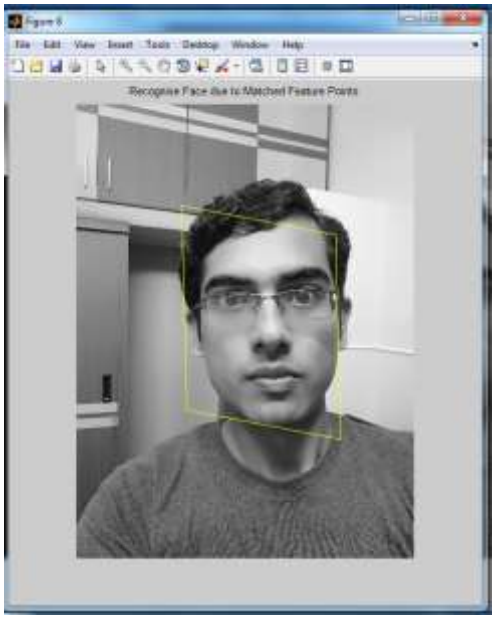

Fig -8: Polygon shows the recognized face

4. CONCLUSION

The complete system is implemented in MATLAB 2013a version. This system shows the implementation of facial recognition techniques. Implementation of the project is developed as in accordance with the proposed block diagram. In this paper, the robustness of the SURF detector was tested under varying conditions of the input image

which promises the reliability of its implementation in any camera based system. In future, the work will be extended to android platform with optimized algorithm, which will replace the traditional cameras and processors.

REFERENCES

[1] Divyarajsinh N. Parmar, Brijesh B. Mehta "Face Recognition Methods & Applications", Divyarajsinh N Parmar et al ,Int.J.Computer Technology & Applications,Vol 4 (1),84-86.

[2] Bahajathul Fathema, Alamuri Dedeepya Lakshmi, Raja Rajeswari Dokku, Bandlamudi Ravali "Real Time Face Detection Using Matlab (Using Viola-Jones Algorithm)", Vol. 7 Issue 02, February-2018

[3] Smriti Tikoo, Nitin Malik, " Detection, segmentation and recognition of Face and its features using neural network"

[4] Jomon Joseph, K. P. Zacharia, "Automatic Attendance Management System Using Face Recognition", IJSR, ISSN (Online): 2319-7064, Volume 2 Issue 11, November 2013, Paper ID: 2013482

[5] Ramya.C N, Anusha.B E, Lakshmi.V, Lalitha.S, Abhilasha.A S, "ATTENDANCE MONITORING USING REAL TIME FACE RECOGNITION IN MATLAB",*Volume 5, Issue 5, May 2016*

[6] Real Time Classroom Attendance Management System, Department of Computer Science and Engineering, BRAC University

[7] Preeti Mehta, Dr. Pankaj Tomar, "An Efficient Attendance Management Sytem based on Face Recognition using Matlab and Raspberry Pi 2", Volume 3, Issue 5 May 2016

[8] Sinan Sameer Mahmood Al-Dabbagh, Nawaf Hazim Barnouti, Wael Esam Matti, Mustafa Abdul Sahib Naser, "Face Detection and Recognition Using Viola-Jones with PCA-LDA and Square Euclidean Distance" Vol. 7, No. 5, 2016

[9] Raúl Cid Carro, Roberto Morales-Caporal, Federico Ramirez, "Face recognition using SURF", Conference Paper · August 2015

[10] Fei Su, Anni Cai, "Face recognition using SURF features", The International Society for Optical Engineering · October 2009

BIOGRAPHY

Girish Belani
Student of Electronics and Telecommunication Engineering, Government Engineering College, Bilaspur, Chhattisgarh