iJRASET
International Journal For Research in Applied Science and Engineering Technology

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

**Volume:** 8 **Issue:** V **Month of publication:** May 2020

**DOI:** http://doi.org/10.22214/ijraset.2020.5467

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429*
*Volume 8 Issue V May 2020- Available at www.ijraset.com*

# A Novel Algorithm for Fingerprint Matching in Forensic Research

Aradhana Desai[1], Aniket Deshmukh[2], Raj Kadus[3], Prof. Sunil. L. Tade[4]
[1, 2, 3]*E&TC Engineering Department, Pimpri Chinchwad College of Engineering*
[4]*Assistant Professor, E&TC Engineering Department, Pimpri Chinchwad College of Engineering*

***Abstract:*** ***A novel fingerprint matching algorithm will be the best and fastest method for fingerprint Identification and recognition. Fingerprints are secure to use because, they are unique for every person and do not change in one's lifetime. This system would be useful in recognizing the criminals based on the fingerprints on paper, water bottle, tiffin box, crime scene, chair etc. These are the places where evidences would be found. This would be helpful in getting the evidence as early as possible. This is the major concern in the field of forensic research. Everyday new crimes are held. To handle them more effectively our system will be a solution for it. In this the features are extracted from the fingerprints.***
***The features considered while extracting are ridges, corner points, minutiae etc. The algorithm used is descriptor algorithm. This algorithm works on the features of the input. The recognition of whose fingerprint it was. It is possible through the process. The images captured are then compared with the images from the database. Database is already created in the system. So, considering the time used and accuracy of the image procured. These all work is considered in the system. The output would display whether the match is possible or not. From the given results it would be a plus point in fast crime solving issue.***
***Keywords: Fingerprint Recognition, Database, processing, matching, comparison, histogram equalization, orientation, descriptor algorithm, forensic research, image.***

## I. INTRODUCTION

What we have observed that in many criminal cases fingerprints are key factors to identify the identity of criminal by using traces of fingerprints on objects. The prints taken on the paper is very difficult to get results. Getting the results through hard copies is a bit difficult task. Generate an algorithm which would do it with ease for mankind. That would be a boon for forensic researchers. So, designing an algorithm which can verify their identity just by recognizing their fingerprints will reduce the man-work and also introduce a time-saving mechanism with better operating capabilities we can even make it a lot faster and get some personal information of the person also using online databases.
This would have the accessibility in adding more images if needed. It's our responsibility to get the correct information through the system. So, we have decreased the finger-print matching time just by using an inherent online database, it means we need not have a very large database just the required member's data will be there. The future of this project is to get easy access in finding the criminals.

## II. METHODOLOGY

### *A. Block Diagram*

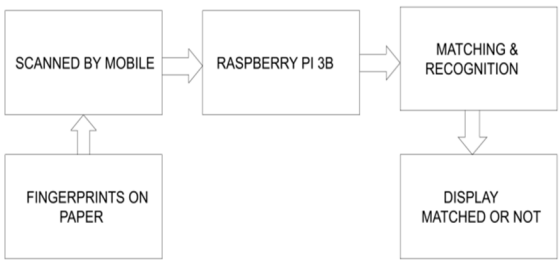



Figure 1 Block Diagram of the system

©IJRASET: All Rights are Reserved

The fingerprint recognition process includes the following steps:

*1)* Fingerprint Scan
*2)* Processing in Raspberry pi 3b+
*3)* Comparison with prints from the database.

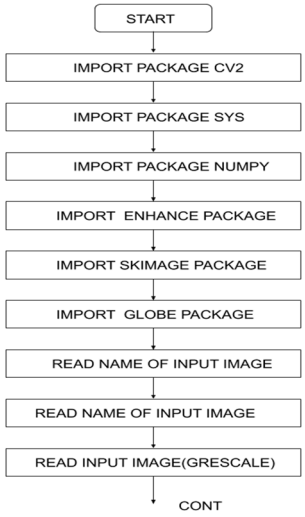
The overall performance of the above system is shown in the figure 1. First, the inputs of the fingerprints are taken on a blank paper. These images are taken to create database. These inputs are then scanned by the mobile. The prints are necessary for the execution of the system. Save the prints in the different files. Creation of database based on their name, address, job as we require. The database we created consists of 50 different samples which are then compared.

Secondly, after the database creation is done. Compute the descriptor algorithm. This algorithm is used for matching the different prints. The images are compared with the images from the base. The result is based on whether it is matched or not. If the match is not done, accordingly the result would be displayed.

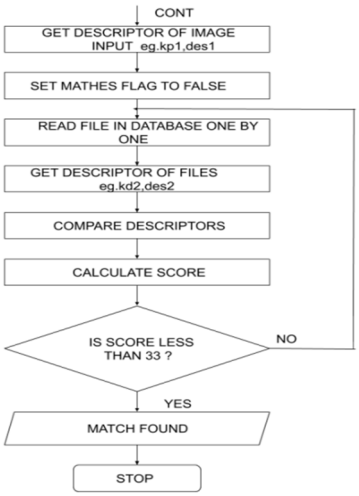
Finally, the system displays if the match is done or not. Final stage is used to display the output accordingly. Finally we get the desired output. Those are dependent on the desire for expected output.

### *B. Algorithm Used*

The flowchart of the algorithm is explained. That would give complete idea about the software algorithm




(a)




(b)

Figure 2 (a) Flowchart of software (b) Flowchart of software

©IJRASET: All Rights are Reserved

The steps followed for above flowchart are as follows.

1) *Step 1:* Start the system with importing packages such as cv2, sys, numpy, enhance, skimage, global to process the image further.
2) *Step 2:* System read the name of input images and lists all the files in database.
3) *Step 3:* System read input image is as Grayscale image. Under the descriptor algorithm it calculates, "Contrast Limits Adaptive Histogram Equalization" of the input thumb image.
4) *Step 4:* System enhances the image, and then computes ridge segments as well as ridge orientation. System finds overall frequency of ridge segments and orientation.
5) *Step 5:* It converts image type into uint and normalized the image between 0 and 1 values. By applying thinning it reduced each connected component in a binary image to single pixel wide skeleton
6) *Step 6:* System calculates Harris corners, key points and distance by using descriptor algorithm.
7) *Step 7:* System set match flag to false. It applies descriptor algorithm to all the images in database as a same. It read file in database one by one.
8) *Step 8:* It gets descriptors of files.
9) *Step 9:* It uses a brute force match on input image and database image and calculate the distance.
10) *Step 10:* In system if distance is less than 33 i.e. threshold value then the finger print found it's matched, if distance is greater than the threshold value the figure print not matched with database. System will stop.

### C. *Software Used*

1) *Python3:* It supports functional and structured programming methods as well as OOP. It can be used for building large applications. It can be used for interactive games application. It's a high level language. It has various web scrapping applications. Its data science, and data visualization is major advantage. It is used in testing and working programs.
2) *OpenCV Library:* Read and write images. Capture and save videos. Process images (filter, transform). Perform feature detection. It is used to detect the fingerprints, images, sample examples from various databases. Analyze the video, i.e., estimate the motion in it, subtract the background, and track objects in it.

## III. RESULT

### A. *Database Creation*

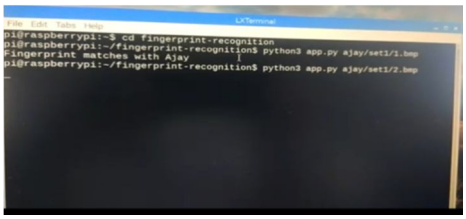
Figure no 3 Database

1) *Example 1:* Fingerprint is matched from database.

In this work, the fingerprint in the original state is compared with database created. It is possible to see that the scanned image is successfully identified by the system.

(a)

©IJRASET: All Rights are Reserved



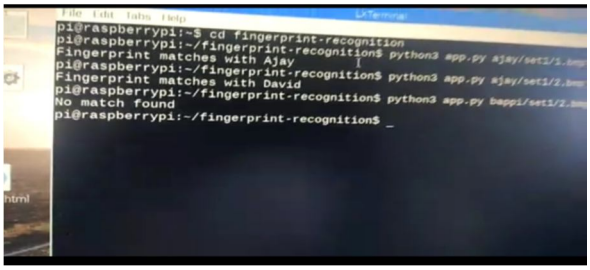

(b)

Figure 4 (a) Input image (b)output

*2) Example 2:* Fingerprint is not matched from database.

In this example a dummy fingerprint is taken. This print is then checked with the images available. So, accordingly the result we want to see is not available. The output we get is the image is not matched.

(a)




(b)

Figure 5 (a) Input image (b) output

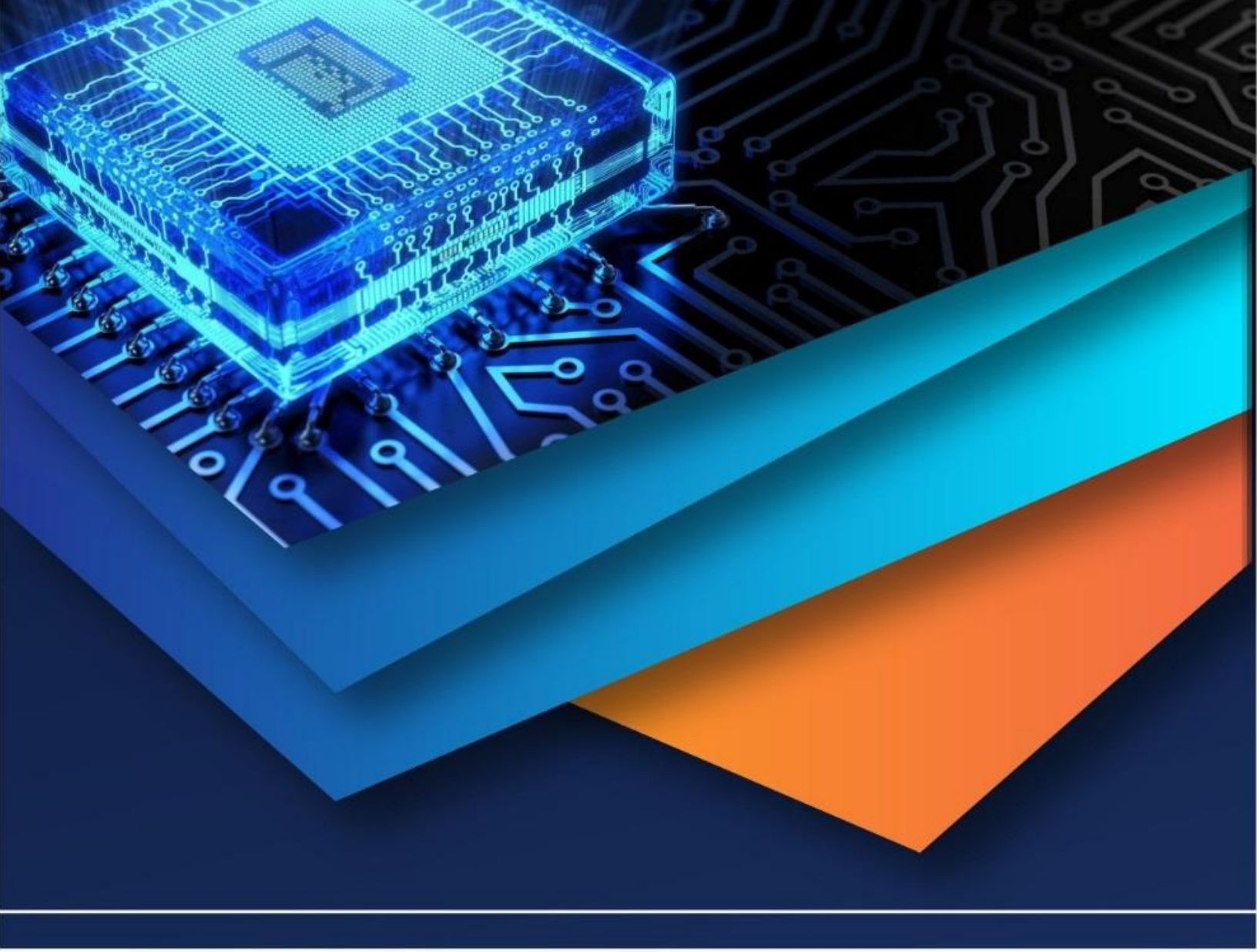
## IV.CONCLUSION

To improve the performance of the extraction and matching algorithms, and fingerprint analysis, an efficient algorithm has been proposed. Reduce the human effort during extraction of image from hardware copies. The performance of our system is based on Contrast Limits Adaptive Histogram Equalization of the input image. Various operations are done on the image. Operations performed such as filtering, geometric operations, feature detection, corner-points to get the clearer image. The proposed algorithm will remove a limitation in orientation process; the quality of the image is disturbed as the ridges after processing are not as smooth as the original. This requires further enhancement. In this project, we have done database creation and classification of people based on their crime. The computation time, accuracy is also considered. Research is in action to reduce the time used and its impact on accuracy.

## REFERENCES

[1] “Fingerprint Recognition and Matching using MATLAB” , by Aliyu Tukur, Department of Electrical Engineering, Hassan Usman Katsina Polytechnic, Katsina-Nigeria.
[2] “An efficient Algorithm for fingerprint pre-processing and feature extraction”, Nanasivam*, S. Muttan Centre for Medical Electronics, CEG Campus, Anna University Chennai, Chennai-600041, India
[3] “Survey on multimodal Biometric son human identification using real time filtering algorithm”, Anouska Master of Engineering, Department of Computer Science and Engineering,
[4] ”Fingerprint Recognition under Missing Image Pixels Scenario”, Dejan Brajovic, Kristina Tomovic, Jovan Radonjic Faculty of Electricity University of Montenegro.
[5] ” Research on a New Mathematic Description for Fingerprint Identification”, Zhao Ma, Shanyu Tang*, Liping Zhang, Linchen Yu, Sifa Zhan School of Computer Science, China.
[6] ” Fingerprint Orientation Field Enhancement”, Lukasz Wieclaw University of Silesia, Institute of Computer Science, 41-200 Sosnowiec, Bedziska.
[7] Fingerprint Orientation Refinement through Iterative Smoothing”, Perugia Makoni, Riccardo Piergallini and Filippo Santarelli Department of Mathematics, University of Camerino, Camerino, Italy.

©IJRASET: All Rights are Reserved



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)