Identify and Rectify Algorithm for Distorted Fingerprint

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Abstract- *Fingering fingerprints is a major cause of misconduct. Even if this affects all fingerprint markers, it is harmful to negative markers such as viewer and copying. In this program, malicious users may intentionally blink their eyes to avoid identifying them. In this article, we suggest new algorithms to look up and correct the damage to the theme based on the same fingerprints. Detection of distortion, seen as a problem for classification into two classes, function vectors using registering cards of orientation and maturity Ridge, map of the fingerprints and managers are trained SVM to perform the task of this assortment. Correction of distortion (or curved equivalent of field distortion) is considered a regression problem in the input impaired fingerprint distortion and result field distortion. To solve this problem, offline steps create a database (referenced database) of multiple fingerprints and a corresponding field of distortion, then the closest endpoint on the net of the input finger is located in the reference database and the corresponding distortion field is used to change the input footprint to normal. Three successful outcomes in the wrong fingerprint database - FVC2004 DB1, Tsinghua's wrong finger database and database with SD27 NIST fingerprints.*

Keywords- Fingerprint, FVC2004 DB1, SVM, Ridges, nearest neighbor regression

I. INTRODUCTION

Although fingerprint authentication technology has evolved rapidly in the last 40 years, there are still some research issues such as lower print quality recognition. Matrix fingerprints are very sensitive to image quality, as seen in FVC2006, where the accuracy of the algorithms changes sharply across different datasets due to image quality changes. The difference between the authenticity of fingerprint, messaging and messaging is even bigger as observed in the NIST technology.

The consequences of low-quality printing depends on the type of fingerprint recognition system. A fingerprint recognition system can be classified as a positive or negative system. In a system of positive recognition such as physical access control systems, users are expected to collaborate and wish to be identified. In the case of a negative recognition system, such as identifying individuals in the watch list and looking for multiple subscriptions under different names, interested users (eg criminals) are presumably unwanted or unidentified. With poor quality recognition systems, it is likely to lead to legitimate user refusal and will lead to disruption. However, adverse health consequences for negative recognition systems are even worse when malicious users may reduce fingerprint quality to prevent fingerprinting. In fact, law enforcement officials encountered cases where criminals tried to avoid identifying the damage or changing the implants of their fingerprints.

Therefore, it is of paramount importance for fingerprint recognition systems to detect poor print quality and improve their quality so fingerprint systems are not destroyed by malicious users. Decomposition of fingerprint quality can be formulas or geometries. Image degradation can be due to non-elastic skin condition, contaminated surfaces, and complex background images (especially fingerprints are updated). Decomposition of the geometry is caused by deformity of the skin. Image degradation has been widely investigated, and some algorithms for quality assessment and resolution of algorithms have been proposed. In contrast, decomposition of the geometry due to skin disorders has not received adequate attention, though important. This is a problem the paper is trying to address. Note that in a fingerprint recognition system, its security level is lower than the weakest. So it is urgent to develop an algorithm for browse and repair (DF) to fill the socket. Echo blocking is recommended because of the flexibility of fingerprints to retrieve fingerprints based on relationships and lateral forces or torque. Skin irritation increases the degree of variation (the difference between fingerprints from the same finger) and thus leads to misinterpretation due to the limited capability of the existing fingerprints for recognizing the deformed fingerprints. In Figure 1, two left are normal fingerprints and one part is seriously damaged. According to the Veri-Finger 6.2 SDK, the game between both left is higher than the result of the two right-hand games. The big difference is that the distortion is not to overlap. Although it is possible for matching algorithms to suffer from large format corruption, it will result in more fake matching, and it will slow down the match.

This novel gives the algorithm to solve the problem of fingerprint error. For given fingerprints, distortion detection was first performed. If it is determined to be distorted, the correction is performed to change the input footprint to normal. Flexible fingerprints are similar to those with expressions that affect the accuracy of the matching of the familiar face system. Broken fingerprints on normal fingerprints are similar to the change in a person with a neutral expression that can increase face recognition.

Distortion Detection Based On Special Hardware

It's a tendency for automatic distortion during buying fingerprints, so incorrect fingerprints can be denied. Many researchers have suggested that they find irregular energy using specially designed devices. Bolle et al. To look for strength and torque that expose using force coil. They have shown that buying fingerprints has led to improvements. Fujii has proposed to find distortions by looking for the differences of films that are seamlessly connected to the sensor area. Dorai et al. Requested to detect distortion by fingerprint scanning. However, the methods described above have the following limitations:

- They require special force sensors or fingerprints that capture video.
- Cannot find the fingerprints in the existing fingerprint database; And
- No distorted fingerprints were detected before the sensor was pressed.

Distortion-Tolerant Matching

The most popular way to deal with this distortion is to make the fingerprint accuracy tolerate distortion. In other words, they deal with distortions on a case-by-case basis, me. For each fingerprint, compare. The most widely used method based on minutia fingerprints has been approved as follows three types of strategies for dealing with Distortion:

- Accepting a Global Box Hard Transformation and being used with constant tolerance or size, coordinated size to compensate for distortion;
- Exemplifying the thin spline (TPS) resize model;
- Restricting local distortions. Multiple methods for the distortion process of overlapping are also used in a matrix on the basis of the image or the matrix of the baseline. However, allowing more distorting matches inevitably leads to high rates of false games.

For example, if you increase the border area around a few vanes will be a little unrelated, the chance is paired with. Additionally, allowing more volatility in the tournament will also slow down.

Distortion Rectification Based on Finger-Specific Statistics

Learn the difference from the set Image Exercises on the same finger and changing the template with the average variation. They show that this leads to accuracy of minimum matching. However, this method has the following limitations:

- Purchase many of the images on the same finger are awkward some programs and existing fingerprints are common only one finger. And
- Though many Fingerprints are available, this is not required enough to cover various skin damage.

Distortion Rectification Based on General Statistics

Senior Manager and Bolle have developed an interesting approach Remove the distortion before that step. This method is based on the assumption that the ridge is in the fingerprints Located permanently. So they deal with distortions Make normal compact size on fingerprints fixed price. Because they did not find distortions Algorithms, they apply polarizing algorithms Of each fingerprint. Compared to other approaches that are considered high above and the Bolle method has the following advantages:

- It does Do not require special hardware.
- can solve a problem Insert fingerprints and
- Do not need a set of Image training of the same finger.

However, the density of the rug is not limited to the finger and do not fix the finger. In fact, there are many researchers reported the accuracy of matching accuracy by inclusion Information on the density of ridge in mathematical material. Simply the density of the fingerprints of all fingers will losing sensitive information in fingerprints and can improve the results of betrayal games. Besides, Validation of the voucher this method can create fingerprints with fixed carpet but odd Cards are oriented. Compare to the first challenge Restrictions are even more dangerous because it will reduce the reality Match results. These limits were not found in since the algorithm has only been tested on an existing database with six fingers and finger rotations not considered.

Our approach shares the benefits of Super Bowl and Bolle Method over other methods, meanwhile, receive a portion of its limits. Our approach is based on statistical data

studied by Google Definitely distorted fingerprints, not impractical Assumption for the uniformity of the carpet. Distorted because finger rotation can be processed by our method. In fact, the suggested method is to handle different types the change in the nature of such abuse exists Training set. In addition, extensive experiments have been carried out to validate the suggested method. Currently Work is a major update of our previous studies, which detects distortion based on a simple hand-generated feature And no removal function.

II. PROPOSED WORK

Literature research is the most important step in the program development process. Before creating this device it is necessary to determine the company's economic, time, and strengths. Once these things have been done, the next step is to define the operating system and languages that can be used to develop the device. When developers start working with devices, developers need more external help. This support is available from high-end developers from books or from the web. Before formulating this system, the above focus should be taken into consideration when designing the proposed system.

A key part of the project development sector is to fully examine all the necessary requirements for project development. For each project, literature studies are the most important areas in the program development process. Before setting up the equipment and the design involved, it is necessary to identify and investigate the timing, demand, resources, human resources, economy, and strength of the company. When these things are satisfied and fully explored, the next step is to identify the software features in the system, such as the operating system, what the project is going to be, and what are all the essential software programs to continue with the next step as developing the tools and operations involved.

Look for fingerprints from an image - X. Si, J. Feng and J. Zhou - 2012

The friction of friction on the skin is a challenge in fingerprint monitoring. Because the existing fingerprinting system cannot match the badly damaged fingerprints, criminals can distort fingerprints to avoid identifying. Technology Detecting existing distortion requires specialized hardware or fingerprints that restrict their use of real-world applications. In this article, we investigated fingerprint distortions and developed algorithms to detect fingerprints of images that were captured by traditional techniques for recognizing fingerprints. This sensor is based on analysis of duration and orientation info. The result of the promise is obtained in a soft fingerprint public fingerprint database.

Manual for fingerprint recognition - Maltoni, D., Maio, D., Jain, A., Prabhakar, S. - 2009

With its clarity and consistency in the past, fingerprints continue to be a feature of anatomy that is widely used in a system that identifies humans automatically. This highly improved second edition provides comprehensive coverage of the latest achievements and fingerprint recognition practices. The reader will seek a comprehensive and comprehensive coverage of key concepts, themes and key systems and security issues related to the fingerprint marking system. With the same first-generation success formula, this unique reference only includes the latest technology for tracking and covering the fingerprints of sensor technology, performance ratings, international standards, and security of the system.

Use fingerprint quality to improve Visitor Identification in the United States and Immigration Status Indicators - L. M. Wein and M. Baveja - 2015

Motivated by the difficulty of biometric system to compare the fingerprints of poor image quality, we have prepared and handled the creation theory of the problem of identifying the two terms are: to apply for a visa to the United States to be checked against the list of visa holders to detect fraud and visa to enter the United States to be monitored Check the list of criminals and suspected terrorists. For the three types of decision-making biometrics, in which the US government chose the parameter value of the best strategy, to increase the probability of the finding, provided that the limitations of the time visitors processed biomass secondary process, then the bombers select the image quality to minimize the probability of the discovery. At the current level of staff, our sampling inspections portal predicts that one strategy depends on quality, with two fingers determining the probability of detection of 0.733 to 0.526 in comparison to the quality strategy, regardless of the two fingers currently in operation at the US border. Increasing the inspection staff provides a slight increase in the probability of these two strategic findings. Using more than two fingers to match poor image quality visitors, allow discovery for 0949 at the current level of staff, but may require significant changes in the current biomass program in the United States. The visa number is about 11-22% lower than the entrance for the three strategies, but the same quality conclusions.

Fingerprint changes: Analysis and discovery - S. Yoon, J. Feng and A. K. Jain - 2012

The presence of an automatic fingerprint identification system (AFIS) vulnerability in law enforcement and border controls strengthens the need to ensure that the system is not compromised. While discovering a number of issues related to the safety of the fingerprints, including the use of fake fingerprints to hide identity, the problem with fingerprints or outbreaks has received little attention. The dimmed fingerprints refer to this change intentionally in the pattern of the fingerprints of an individual whose identity is unknown. Many cases of fingerprints were reported in the media. The program to evaluate image quality of the fingerprint (e.g., NFIQ) cannot be changed. The fingerprints are completely image-quality, since the change cannot change dramatically.

The main contributions of this paper are:

- A compilation of case studies of events is established that a person has changed in order to avoid their fingerprints AFIS,
- Examine the effects of climatic fingerprints on the accuracy of fingerprint Matrix
- In three major categories and a proposal for the possible countermeasures,
- The development of techniques for Fingerprint detection change based on the analysis of the field and distribute the minutes to automatically estimate and
- Evaluation and suggested tools and algorithms NFIQ in a large database of fingerprints evolve executive agency. Experimental results demonstrate the possibility of proposed approaches to detecting this change, fingerprints and stress needs to address further the problem.

Image quality of fingerprints - E. Tabaci, S. Wilson and S. Watson - 2014

The internal biosynthetic features of the biosynthesis can be used to determine its own suitability for the extraction of the biometric system or to evaluate its compliance with pre-established standards. The biometric signal quality is the numerical value (or vector) that measures the existing attribute. Quality Score is a demonstration of the quantity of electronic device samples or forecasts in a comparative environment. This means the image quality, fingertip estimates should match the false and false games observed compliance with the rule of non-model.

III. SYSTEM ARCHITECTURE DESIGN

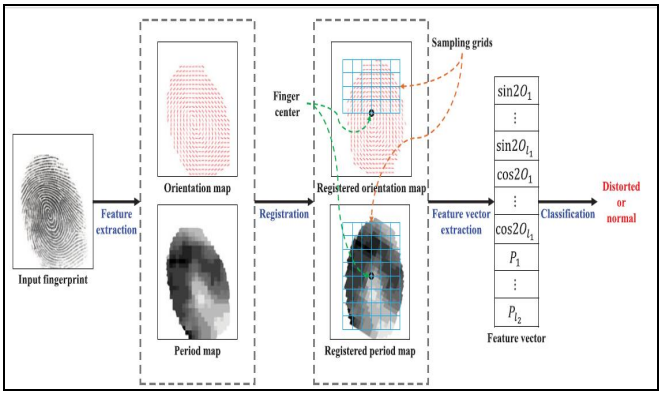

Figure 1. System Architecture Design

The most popular way to handle distortion is to make the fingerprint matcher tolerant to distortion. In other words, they deal with distortion on a case by case basis, i.e., for every pair of fingerprints to be compared. For the most widely used minutiae-based fingerprint matching method, the following three types of strategies have been adopted to handle distortion:

- assume a global rigid transformation and use a tolerant box of fixed size or adaptive size to compensate for distortion;
- Explicitly model the spatial transformation by thin plate spline (TPS) model;
- Enforce constraint on distortion locally.

Various methods for handling distortion during matching have also been used in image-based matcher or skeleton-based matcher. However, allowing larger distortion in matching will inevitably result in higher false match rate.

For example, if we increased the bounding zone around a minutia, many non-mated minutiae will have a chance to get paired. In addition, allowing larger distortion in matching will also slow down the matching speed.

Flow Diagram

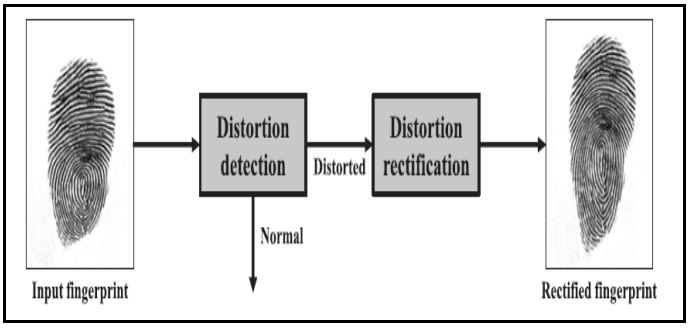

Figure 2. Flow Diagram

Fingerprint Distortion Detection

Finding a fingerprint distinction can be considered two factor ,The problem of division. We used a registered nest The map of the direction and map of the vector period of the function,Which is classified by SVM classifier

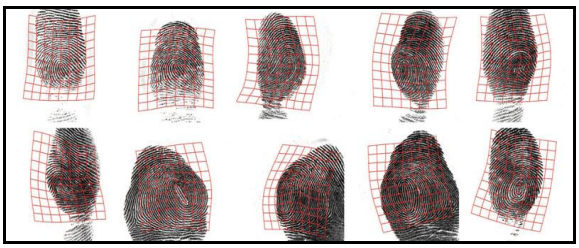

Figure 3. Fingerprint with orientation map

Flow Chart Of Implementation

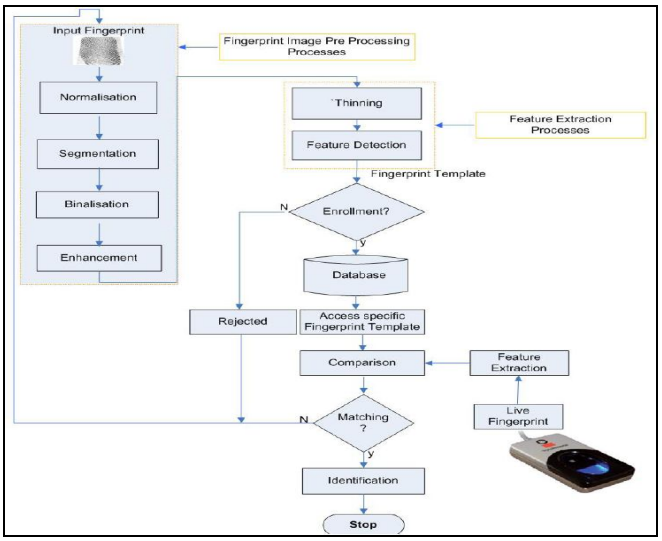

Figure 4.

From the above flowchart 3.4 shows that there is we have to be used that of the distorted fingerprint daabase such as FVC 2004DB1,ND7 wrong fingerprints database where we have to compare the fingerprint template with query fingerprint where it will have to check that the enrollment of the suspect or candidate fillup that the proper data in the form and register there detail with fingerprint at the same time after enrollment we preporcess that of the fingerprint by the using minuiae extraction perform binalisation , segmentation, normalization , and enhancement perform and then form fingerprint template when we check that with query fingerprint it check the necessary parameter of the fingerprint image simply by the comparing ridges,horizontal or vertical orientation map of fingerprint also checks that the nearest point on skin to determine that the whether it is matches or not if it not matches then just message box pop up and shows fingerprint not registerd and if it found match between query and tmplate fingerprint shows that the minute requred during matching also it shows that the registered user detail .

IV. SYSTEM ANALYSIS

Existing System

Echo blocking is recommended because of the flexibility of fingerprints to retrieve fingerprints based on relationships and lateral forces or torque. Skin irritation increases the degree of variation (the difference between fingerprints from the same finger) and thus leads to misinterpretation due to the limited capability of the existing fingerprints for recognizing the deformed fingerprints. In Figure 1, two left are normal fingerprints and one part is seriously damaged. According to Veri-Finger 6.2 SDK, the game between two left players is higher than the game between two players. The big difference is that the distortion is not to overlap. Although it is possible for matching algorithms to suffer from large format corruption, it will result in more fake matching, and it will slow down the match.

Proposed System

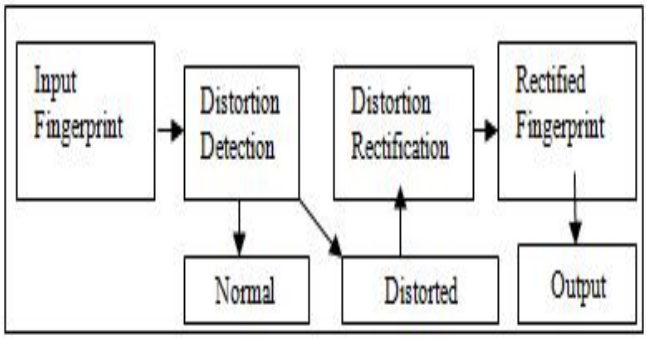

Figure 5. The framework of Identify and rectify of distorted Fingerprint

In this system, detection is seen as a problem for classification into two classes, function vectors using Registered Card Calculations and Ridge Matches, and SVM Authorized Officers are trained to perform the task of this assignee. Correction of distortion (or curved equivalent of field distortion) is considered a regression problem in the input impaired fingerprint distortion and result field distortion. To solve this problem, the offline stage creates a database of fingerprints, multiple references, and corresponding fields of distortion, which is then the nearest neighbor's ringing ring field is in the Fingerprint Database, References, and the corresponding Distort field is used to retrieve the fingerprints. The main features of the proposed system are that it does not require the change of existing fingerprint sensors and fingerprint recognition procedures. Such assets are essential

for an easy integration of existing fingerprint recognition systems. The requested system is evaluated in three FVC2004 DB1 databases, which are strongly affected, with distortion, Tsinghua, curved fingerprint and wrong video fingerprint, NIST SD27 hidden fingerprints. Experimental results show that the proposed algorithm can actually improve the accuracy of this distorted fingerprint match.

V. RESULT ANALYSIS

The detailed understanding about the evaluated performance of the proposed Identification and Rectification Algorithm for Distorted Fingerprints. Therefore this chapter includes the different performance parameters and description on which basis we compare base and proposed model.

Accuracy Rate on Using Various Database

Table 1. Database Description & Purpose

DATABASE	DESCRIPTION	PURPOSE
FVC2002 DB1_A	100 normal fingerprints	reference fingerprints
FVC2004 DB1	880 fingerprints	algorithm evaluation
FVC2006 DB2_A 1	680 fingerprints scaled to 500 ppi	algorithm evaluation
Tsinghua DF 320	Tsinghua DF 320	training and algorithm evaluation
NIST SD27	258 pairs of latent & rolled fingerprints	algorithm evaluation

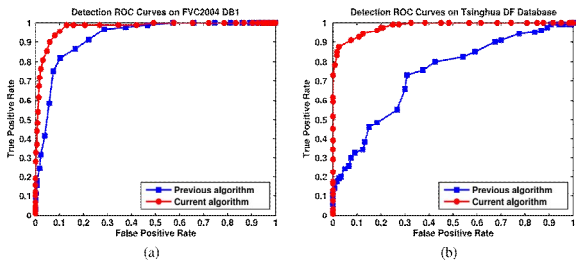

Figure 6. Graph - Accuracy Rate &ROC curve of detection and rectification algorithm of previous and current algorithm.

The above graph (a) & (b) shows that of the false positive rate vs. true positive rate of the two different old databases FVC2004 & Tsinghua DF database also its shows the ROC curve of the two previous and current algorithm.

In this there are the above comparison table shows that of the different database version with their different description and the purposes there are three version shows for that of the FVC DB i.e. FVC2002 DB1, FVC 2004, FVC2006 DB1A, and NIST SD 14, NIST SD27.Hence here there are the current algorithms the distortion detected and rectified more accurately than the previous one.

Error Rate in Detection and Rectification

Detection error

Table 2. Error Rate of Detection

	Slight distortion	Low quality	Small area	Non-frontal pose
FVC 2004 DB1	9/89	26/791	16/791	6/791
Tsinghua DF	7/120	5/120	0/120	8/120

Rectification error

Table 3. Rectification Error

	False positive	Low quality	Small area	Non-frontal pose
Distorted subset of FVC 2004 DB1	0 / 8 9	7/89	5/89	0 / 8
Tsinghua DF	10/120	4/120	0/120	5/12

Distorted fingerprints are viewed as positive samples and normal fingerprints as negative samples. If a distorted fingerprint is classified as a positive sample, a true positive occurs. If a normal fingerprint is classified as a positive sample, a false positive occurs. By changing the decision threshold, we can obtain the receiver operating characteristic (ROC) curve shows the ROC curves of the proposed algorithm and our previous algorithm on FVC2004 DB1 and the test set of Tsinghua DF database. The test set of Tsinghua DF database contains 120 pairs of distorted and normal fingerprints. FVC2004 DB1 contains Distorted fingerprints are viewed as positive samples and normal fingerprints as negative samples. If a distorted fingerprint is classified as a positive sample, a true positive occurs. If a normal fingerprint is classified as a positive sample, a false positive occurs. By changing the decision threshold, we can obtain the receiver operating characteristic (ROC) curve. Fig. 10 shows the ROC curves of the proposed algorithm and our previous algorithm on FVC2004 DB1 and the test set of Tsinghua DF database. The test set of Tsinghua DF database contains 120 pairs of distorted and normal fingerprints. FVC2004 DB1 contains such an example is shown in Fig Applying rectification to normal fingerprints may reduce matching scores. We have

examined all detection errors on FVC 2004 DB1 and Tsinghua DF database and have categorized the reasons into four types. The results are shown in Table 2. Note that this classification is not exclusive and one example might be attributed to multiple reasons.

Graph :-Shows that the ROC curve of three fingerprints matching experiment on each of the four databases FVC2004 DB1 ,Distorted subset of the FVC2004DB1,Tsinghua DF & FVC2006 DB2_A

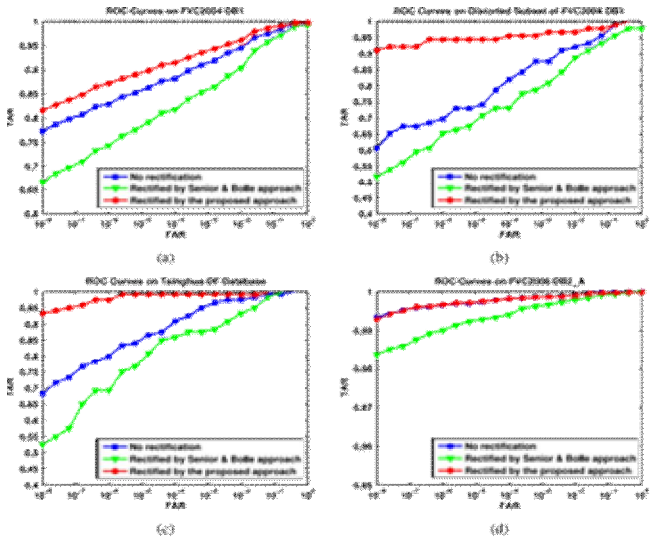

Figure 7.

three fingerprint matching experiments on each of the following four databases: (a) FVC2004 DB1, (b) distorted subset of Fig 14:-The ROC curves of three fingerprint matching experiments on each of the following four databases: (a) FVC2004 DB1, (b) distorted subset of FVC2004 DB1, (c) Tsinghua DF database, and (d) FVC2006 DB2_A. The input images to Verifier in three matching experiments are original fingerprints, fingerprints rectified by Senior and Bolle approach [28], and fingerprints rectified by the proposed approach, respectively

Speed of Distortion Detection and Rectification Algorithm

Table 4. Time consumption & speed of detection &rectification fingerprints

Algorithm	FVC2004 DB1		Tsinghua DF		NIST SD27	
	Time(sec)	Percentage	Time(Sec)	Percentage	Time(sec)	Percentage
Detection with center point	1 . 2	89.43%	1 . 4	96.25%	-	-
Detection without center point	15.3	10.57%	16.8	3.75%	-	-
Rectification with center point	63.9	86.07%	64.6	97.62%	65.3	75.97%
Rectification without center point	67.1	13.93%	66.3	2.38%	67.3	24.03%

Above table shows that the speed of the detection and rectification of fingerprints in the algorithms. in this table shows that of the detection of the fingerprints as well as rectification of fingerprints speed indirectly the time for to process the detection and rectification of it in terms of all the three databases that used in the project such as the FVC2004 DB1,Tsinghunia DF ,NIST SD27,14.to find that the speed time is main parameter for the estimation of speed so we then evaluated in the second and the percentage is calculated with respect to the time to calculate that the speed we have to first calculate that the center point of the any fingerprint then we identify that the speed of detection and rectification.

VI. CONCLUSION

The fake rate of matching fingerprints is extremely high in case of damage to fingerprints. This creates a security hole in the automatic fingerprint recognition system that can be used by criminals and terrorists. For this reason, it is essential to create an algorithm for detecting and processing fingerprint errors to fill the slot. This article describes new algorithms, distortions for fingerprint detection and processing. For the detection of registry flaw distortion and fingerprint tricks as vector entries are used, and SVM classmates are trained to classify fingerprints as "destructive" or "normal". Correlation (or curvature of the field) is used the nearest regression method the neighbor to predict the distortion of the input impedance of the fingerprint field, and then the contrast of the field distortion is used to change the wrong fingerprints normally. The experimental results of FVC2004 DB1, the Tsinghua DF database and the NIST SD27 database indicate that the proposed algorithm may increase the degree of corrupt fingerprint recognition. The main determinant of current methods is efficiency. Both the detection and correction of step steps can be greatly accelerated if proper and accurate fingerprints can be made. Another obstacle is that the current method does not support fingerprints. It's hard to concentrate a lot of printed fingerprints with sorts of distortions and, at the same time, to get specific areas of distortion to learn a sample of statistical distortion. Our ongoing work is to address these limitations.

VII. FUTURE WORK

The key aim of the work is to design and implement an identification and rectification of distorted fingerprint is

accomplished successfully .in near future the following extensions are considered for the work.

1. Implementation of the project with by using the mobile fingerprint scanner also by using mobile phone sensor to improve the accuracy.
2. Also to integrate that code with UIDAI Database.
3. And for in future to develop the mechanism to access that user feedback or review of user.

VIII. ACKNOWLEDGMENT

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