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A Novel Approach to Detect and Rectify Distortion of Fingerprint

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ABSTRACT

Fingerprint matching is very sensitive for generating fingerprints. After that fingerprint is distorted then recognition of that fingerprint is very difficult task. Some users may purposely distort their fingerprint for hiding their identity. In this paper we propose one approach to detect and rectify distortion of fingerprints.In existing System k-nearest neighbour algorithm is used but time complexity for k-nn is much more. We propose some new algorithm k-means algorithm, Time required for k-means is less and so time complexity is less than k-nearest neighbour algorithm. Also we use contour extraction for edge detection, ORB algorithm for provide fast and robust features.

Keywords: **Fingerprint, distortion, k-means, ORB.**

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I. INTRODUCTION

The term "biometrics" refers here to automatic recognition of an individual based on behavioural and/or physiological characteristics (e.g., fingerprint, face, iris, voice, signature, etc.), which cannot be stolen, lost, or copied [3]. Biometric recognition, or simply biometrics, refers to the use of distinctive anatomical and behavioural characteristics or identifiers e.g., fingerprints, face, iris, voice, hand geometry for automatically recognizing a person. Questions such as "Is this person authorized to enter the facility?", "Is this individual entitled to access the privileged information?", and "Did this person previously apply for a passport?" are routinely asked in a variety of organizations in both public and private sectors. Developments in biometric reorganization have provided strong mechanism for an authentication. The biometric reorganization is based on face, retina, DNA, Voice, Fingerprint etc. Fingerprints is a unique identity of person.[1] Traditional credential based systems no longer suffice to verify a person's identity. Because biometric identifiers cannot be easily misplaced, forged, or shared, they are considered more reliable for person recognition than traditional token-based methods e.g., keys or ID cards or knowledge-based methods e.g., password or PIN. Biometric recognition provides better security, higher efficiency, and, in many instances, increased user convenience. It is for these reasons that biometric recognition systems are being increasingly deployed in a large number of government e.g.border crossing, national ID card, e-passports and civilian e.g., computer network logon, mobile phone, Web access, smartcard applications.

A number of biometric technologies have been developed and several of them have been successfully deployed. Among these, fingerprints, face, iris, voice, and hand geometry are the ones that are most commonly used. Each biometric trait has its strengths and weaknesses and the choice of a particular trait typically depends on the requirements of the application. Various biometric identifiers can also be compared on the following factors; universality, distinctiveness, permanence, collectability, performance, acceptability and circumvention. Because of the well-known distinctiveness and persistence properties of fingerprints as well as cost and maturity of products, fingerprints are the most widely deployed biometric characteristics. It is generally believed that the pattern on each finger is unique. One of the main difficulties in matching two fingerprint impressions of the same finger is to deal with the nonlinear distortions, which are caused by the acquisition process[2].An important issue in designing a

practical biometric system is to determine how an individual is going to be recognized. Depending on the application context, a biometric system may be called either a verification system or an identification system.

II. EXISTING SYSTEM

We see that in existing system KNN (K-Nearest Neighbour) algorithm is used. KNN algorithm uses Euclidean distance formula. By using this formula each pair of fingerprints is compared with given input fingerprint .After that it will decided the right output among many images of same finger .It creates many output of same fingerprint ,so that it fails to recognize right output fingerprint output. As many output are generated of each pair so that increases time and space complexity .

Disadvantages of exiting system:

a) Each pair of fingerprints to be compared.

b) Get many image of same finger.

c) Time complexity increases.

d) That method is very inconvenient.

e) Incorrect output is created.

f) It affects all fingerprints detection application

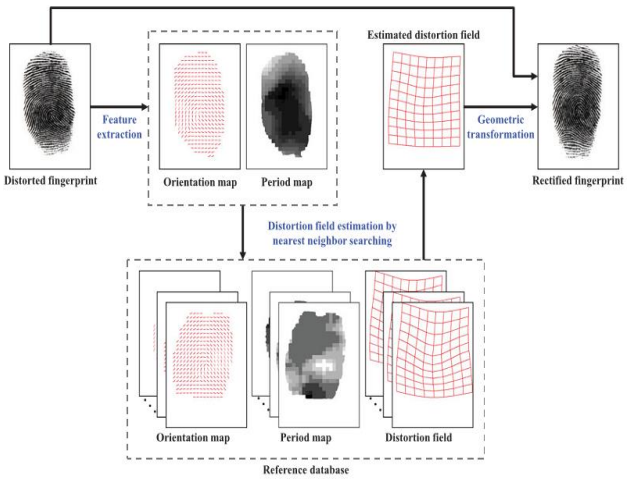

Fig. Existing system architecture

PROPOSED SYSTEM

In this paper we propose a new system to get the fingerprint from system, to recognize if that fingerprint is distorted or not. And also to rectify distortion in fingerprint. So that to give the rectified fingerprint .In proposed system we proposed a new algorithm that is K-Means clustering which gives better performance than existing that is KNN algorithm. K-Means clustering target is to divide n observations into k-cluster's in which every observation belongs to the cluster with their nearest mean. It reduces calculation time. so that time complexity as well as space complexity is minimized. Instead of creating multiple fingerprint output it gives ore correct fingerprint output than KNN algorithm.

Advantages of proposed system:

a) Gives Better performance than Existing system.

b) Faster computation.

c) Time complexity is low.

d) Feature extraction implementation is more clear .

e) Accuracy is more.

f) External classification is not needed.

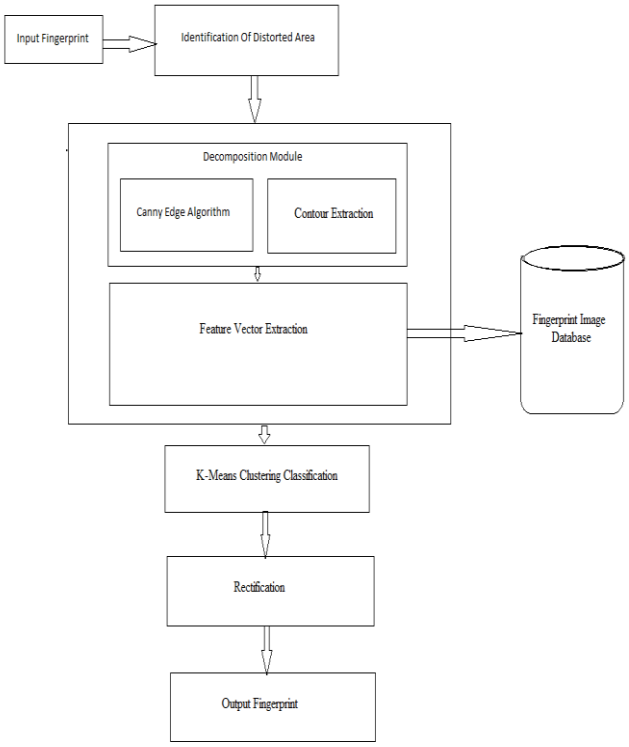

Fig.Proposed System Architecture

The techniques used to build system:

CONTOUR EXTRACTION

Contour extraction is performed using OpenCV's inbuilt edge extraction function. It uses a canny filter. It is also known as "Border following" or "boundary following."OnceYou can tweak parameters to get better edge detection.Also known as border following or boundary following **.**Contour tracing is a technique that is applied to digital images in order to extract their boundary. Once the contour of a given pattern is extracted, it is different characteristics will be examined and used asfeatures which will later on be used in pattern classification .Correct extraction of the contour will produce more accurate features which will increase the chances of correctly classifying a given pattern. the contour of a given pattern is extracted, it's different characteristics will be examined and used as features which will later on be used in pattern classification.

FEATURE VECTOR EXTRACTION

When the input data to an algorithm is too large to be processed and it is suspected to be redundant, then it can be transformed into a reduced set of features (also named a "features vector"). This process is called feature extraction .The extracted features contain the relevant information from the input data. The desired task is performed by using this reduced representation instead of the complete initial data. Feature vector extraction is defined as sin (2O) cos (2O) P] , where O denotes the orientation vector on sampling grids and P denotes the period vector on sampling grids . Feature value at sampling points outside fingerprint region is set as 0[4].

EDGE DETECTION

The Canny edge detector is an edge detection operator that uses a multi-stage algorithm to detect a wide range of edges in images. The Process of Canny edge detection algorithm can be broken down to 5 different steps:
1. Apply Gaussian filter to smooth the image in order to remove the noise.
2. Find the intensity gradients of the image.
3. Apply non-maximum suppression to get rid of spurious response to edge detection.
4. Apply double threshold to determine potential edges.
5. Track edge by hysteresis: Finalize the detection of edges by suppressing all the other edges that areweak and not connected to strong edges.

4 ORB ALGORITHEM

ORB (Oriented FAST and Rotated BRIEF) is a fast robust local feature detector its aim is to provide a fast and efficient alternative to SIFT. ORB is basically a fusion of FAST key point detector and BRIEF descriptor with many modifications to enhance the performance. It computes the intensity weighted centroid of the patch with located corner at centre. The direction of the vector from this corner point to centroid gives the orientation. To improve the rotation invariance, moments are computed with x and y which should be in a circular.

5 K-MEANS CLUSTERING

K-means clustering is a method of vector quantization, originally from signal processing. K-means clustering aims to partition *n* observations into *k* clusters in which each observation belongs to the cluster with the nearest mean.
Algorithmic steps for k-means clustering
Let X = {x1,x2,x3,……..,xn} be the set of data points and V = {v1,v2,…….,vc} be the set of centers.
1) Randomly select 'c' cluster centres.
2) Calculate the distance between each data point and cluster centers.
3) Assign the data point to the cluster centre whose distance from the cluster centre is minimum of all the cluster centres.
4) Recalculate the new cluster centre using:
Where, 'ci' represents the number of data points in ith cluster.
5) Recalculate the distance between each data point and new obtained cluster centres.
6) If no data point was reassigned then stop, otherwise repeat from step 3).
K –Means Clustering:
'||xi - vj||' is the Euclidean distance between xi and vj ,'ci' is the number of data points in ith cluster, 'c' is the number of cluster centres.

III. CONCLUSION

Developed a system to detect and rectify a distortion of fingerprint

IV. ACKNOWLEDGEMENT

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