**SECURE BIOMETRIC AUTHENTICATION SYSTEM FOR EMERGENCY**

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**ABSTRACT**

**Fingerprint recognition is one of the most important biometric technologies based on fingerprint distinctiveness, persistence and ease of acquisition. In fingerprint recognition process, the important step which effects on system accuracy is matching between template and query fingerprint. These matching algorithms may be classified into three types: minutiae-based approach, correlation-based approach and feature-based approach.Biometric data mining (BDM) is the application of knowledge discovery techniques to biometric information with the purpose to identify underlying patterns. This tracking system is mainly used to find a human anywhere.  Missing human, thief and dead people details and those who met with an accident. Here we have applied data analysis algorithm to analyse the data from the database. A created mobile application to track the database and to get the details about the people using secure authentication with the help of thumb scan. Once we trace the details then it is possible to find a nearest  Police Station , nearest Blood Bank , Ambulance service  using area mining . Then it tracks and forwards the information immediately.  Location tracker is very useful to help the remedies of the particular situation.**

**General Terms**

**Biometric pattern recognition, Image processing, Location Tracking.**

1. **INTRODUCTION**

This tracking system is mainly used to find a human anywhere. Missing human, thief and dead people details and those who met with an accident. Here we have applied data analysis algorithm to analyse the data from the database. A created mobile application to track the database and to get the details about the people using secure authentication with the help of thumb scan.  Once we trace the details then it is possible to find a nearest PoliceStation, nearest Blood Bank, Ambulance service using area mining.

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ICE Unlock Fingerprint Scanner, Diamond Fortress Technologies, Inc. takes an average of six times to get a match. Also the app shuts down quite regularly.

A new app for Android smartphones turns the lock screen into a finger scanner; a feature incorporated by updated mobile phones. This Android App will be applicable in all android mobiles. In this proposed system we use combination of these footprint,fingerprint,palm recognitionand, facerecognition techniques.



Fingerprint Database

Matching

Extract Features

Find Ridges

PreProcess/Convert Images

AuthendicatedFingerprint

The matching Algorithm is classified into three types they are

1.minutiae-based model

2.correlation-based model

3.feature-based model.

From the analysed part these algorithms are not highly score.So,it’s need to design a finite fingerprint model in order to improve the matching score.In this paper,we propose a finite fingerprint model to synthesize fingerprint for all fingerprint templates which is stored in database for while matching.

Location Tracking:

Present Technological advances in wireless location tracking is unprecedented opportunities for monitoring everyone movements. Technology support Location –Based Services to find current location of the person .

Location-Based Services(LBS) is classified into three types they are

1.Position Awareness-This refers to a device which monitors the individual’s position such as in-four wheeler navigation ,but the only use such information internally.

2.Sporadic Queries-applied to services in which individual initiates the transfer position information to outside provider.

3.Location Tracking-services can receive the frequent updates about individual’s position.

visitedSensitiveArea = false

For each location update {

If the new location belongs to a new zone{

If not visitedSensitiveArea {

Disclose path

}

Delete path

visitedSensitiveArea = false

Disclose the new zone

}

Add current location to path

If current location inside sensitive area {

visitedSensitiveArea = true

}

}

The *k*-area algorithm. This algorithm suppresses locationupdates in a region around the entered sensitive area, so that thearea remains indistinguishable from at least *k*–1 other sensitiveareas. It assumes a partition of the map wherein each partitioncontains at least *k* sensitive areas.

Granted Location

Updates

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Privacy Manager

Location sensititvites

path sensitivity analysis

Data users(service provider)

Notification manager

privacy policies

policy matching

privacy

checker

location updates

datasubjects

**2.Finite Fingerprint Model**

2.1 Fingerprint Features

When a fingerprint is pressed against a smooth surface a fingertip epidermis is produced.The most evident structural characteristic of a fingerprint is its pattern of interleaved ridges and valleys.Ridges and Valleys run parallel but they can suddenly terminate sometimes.



Valleys

Ridges

The minutia, which is created when ridges and valleys bifurcate or terminate, is important feature for matching algorithms.

  

(a) A termination minutia (b) bifurcation minutia (c) termination(white) and bifurcation (gray) minutiae in a sample fingerprint

The fingerprint pattern contains one or more regionswhere the ridge lines create special shapes. These regionsmay be classified into three classes: loop, delta, and whorl.Many fingerprint matching algorithms pre-alignfingerprint images based on a landmark or a center pointwhich is called the core



2.2Finite Fingeprint Model

we propose a model to create a new fingerprint image, which contains ridge line and minutia of the original ones. The model includes the following steps:

1. Pre-processing fingerprint image: for each image, we recognize fingerprint area, thinned ridge lines and extract minutiae.

2. Finding and adjusting parameter sets: at first, choose a fingerprint which has largest fingerprint area as mean image. Then, we use Genetic Algorithms in to find the transformation between mean image and others.

3.Synthesizing fingerprint: with the transformations inprevious step, we re-calculate parameters’ value to get exact value for parameters, add supplement ridge lines and minutiae to mean fingerprint.

4. Post-processing: this step will help removing the noise of step 3.



Find and Adjust Parameter sets

Pre-Processing

Synthesize fingerprint



Post-Processing

**Pre Processing fingerprint:**

for input image, we find fingerprint area and thin ridge line whose width is 1 pixel. P is a point on processed

fingerprint image and pixel(P) is value of pixel at P:

Pixel(P) = 1 if P belong to ridge

Pixel(P) = 0 if P belong to valley.

Each minutia contains x- and y- co-ordinates,which is termination and the angle between the tangent to the ridge line at the minutia position and the horizontal axis.The processed fingerprint called Flist.



(a)Fingerprint image in Database (b)Fingerprint image after pre-processing step

Find and adjust parameter set:

depends on the result of Pre-Processing step,we are using Genetic Algorithm proposed by Tan and Bhanu to find the transformation between a fingerprint which has the largest fingerprint area as mean fingerprint(meanF)and others in Flist.and we recalculate the exact valueof parameters.

Step1:

Finding the parameter set:

From the proposed transformation of Tan and Bhanu

==s.R.+T

Here s is a Scale Factor

R=

ө:angle of Rotation between two fingerprints

T=[] is vector of translation.



(a)Fingerprint template (b)meanF and the transformation

F(s,ө,)

The above set contain several parameters.each parameter has a form of <s,ө,>. to build a parameter set ,we perform:

INPUT:fingerprint template FList.

OUTPUT:Parameter set ParamList

1.meanF=fingerprint which has the largest fingerprint area

2.removemeanF from Flist

3.For each *f*Data in FList:

(a)Param=Find the transformation between meanF and *f*Fata

(b)addParam to paramList

after first step we recalculate exact value of the parameter

Step2:re-Calculate exact value of parameter

INPUT:FLIst,ParamList

OUTPUT:ParamList with real value of parameters

For each *f*Data in FList:

1.Find 2 minutiae A, B in *fData*and 2 minutiae C, D in*meanF*in which A is corresponding to C and B is

corresponding D .

2. Calculate the real value for parameters:

a. s = sign(old value of s)[( distance between C

and D) /( distance between A and B)]

b. ө = sign(old value of ө)[the angle between*AB*and *CD*]

c. tx = sign(old value of tx) |(xA-xC )**|**

d. ty = sign(old value of ty) |(yA-yC)|

*3.* Update new value for corresponding parameter of

*f*Data

Synthesize Fingerprint

afterrecalculating,new value of parameter set is used to add ridgeslines and minutiae from the original fingerprint,whichmeanF does not have meanF.

Synthesize Fingerprint contain three steps:

(1) Add ridges from the original fingerprint to *meanF*

(2) Join supplement andoriginal ridge lines

(3) Add minutiae from originalfingerprint to *meanF*

*Add ridge lines to meanF:* with each fingerprint in *FList*,we use correspondentparameter in *ParamList*to transform each pixels to *meanF’s*space and put the pixelwhich doesn’t have corresponding point in *meanF.And*Finally, fill marked pixels to *meanF*

**Input**: FList, ParamList

**Output**: new meanF

For each FList*k*in FList

1. Using parameter k in ParamListto transform all pixelof FList*k*to meanFspace and save to *PixelList*

2. For each pixel H in *PixelList*If meanFdoesn’t have pixel H’ which d(H,H’) <r and pixel(H’) =1 then put H to *tempPixelList*

3. For each pixel H in *tempPixelList*Set Pixel(H)meanF = 1



meanF before and after synthesize

*Join supplement and original ridge lines:* in previous step we get a new meanFas above picture*.* However, theridges were broken because algorithm in *Add ridges to*meanFstep does not affect on the point which is the endof ridge line.



Some ridges were brtoken after syntheisixe

To solve this problem, we perform:

**Input**: FList, ParamList, meanF

**Output**: new meanF

*1.* For each *f*Datain FList

1.1. For each pixel K in meanF

If K is the terminated point (pixel(K) =1) andexist K’ in *fData*(pixel(K’) =1) whichcorrespondent to K then:

- Find all pixels N (pixel(N)=1) connectedto pixel K’

- Transform these pixels to meanF’s space

- Put them to *linkedPixelList*

1.2. Fill all pixels in *linkedPixelList*to meanF

To perform Find all pixels N connected to pixel K’task,use below algorithm:

**Input**: FList, ParamList, meanF, K’

**Output**: all pixels connected to pixels K’

1. Get all pixels, which is 8-neighbour of K’ and pixelsvalue is 1, save to connectedList

2. For each pixel M in connectedList

a. Set markedPixel= K’

b. Set startPixel = M

c. Repeat follow tasks:

1.Get pixel L, which is 8-neighbour of M,pixel(M) =1 and M is different tomarkedPixel, save to connectedList

2.markedPixel = M

3.startPixel = L

Until (can’t find L or exist L’ in meanFcorresponding to L)



meanF after ridges connection step

Post-Processing:

the step Synthesizing Fingerprint creates a fingerprint the contains all the fingerprint template features.However,Some Original fingerprint of minutiae is not correct on meanF.For example, M is termination minutiaon fingerprint template but in meanF, it is not correctbecause of ridge line connection. In this step, we re-checkall meanF’s minutiae and remove wrong minutiae.

**Input**: meanF

**Output**: meanFwith minutiaeListwhich is removed

wrong minutiae.

1. For each minutiae M in minutiaeListof meanF

*1.1*If type of M is termination minutia and pixel(M)= 1 and M is termination point then M is marked

1.2If type of M is bifurcation minutia and pixel(M) =1 and M is not termination point then M ismarked

2. Remove all un-marked minutiae from minutiaeList

**3.EXPERIMENT RESULT:**