File Exchange

FingerPrint Application

version 1.1.0.1 (422 KB) by Florence Kussener

Capture the Minutiae from a fingerprint

4.51351

42 Ratings

116 Downloads

Updated 01 Sep 2016

View License

Add to Watchlist

Overview Functions Examples

A fingerprint is made of a series of ridges and furrows on the surface of the finger. The uniqueness of a fingerprint can be determined by the pattern of ridges and furrows as well as the minutiae points. Minutiae points are local ridge characteristics that occur at either a ridge bifurcation or a ridge ending.

Comments and Ratings (78)

Rate this Submission 1 2 3 4 5 (Rating not required)

Comment on this submission

jiji jiji
30 Mar 2017

Thank's a lot for this code,
could you please tell me! what is the role of the two fnctions Tronsform and Trasform2 ?

lisper
3 Feb 2017

hello, Can you please send me the matching code to my mail aleli_08@hotmail.com sir i am doing my project on fingerprint and i need the code urgently please. i really need your help, thanks

hazem mefteh
24 Jan 2017

hi, Can you please send me the matching code to my mail hazem2674@hotmail.fr sir i am doing my project on fingerprint and i need the code . thanks

nabila mona
28 Nov 2016

Can you please send me the matching code to my mail id nabila.mahjabin92@gmail.com sir i am doing my project on fingerprint.i need the code for reference

Tuan Nguyen
26 Apr 2016

Hi Lamia!
Thank you so much your code!
I am doing this program, so, I hope you can share the code that can refer.
My email is: tuannv2710@gmail.com

kuki yahoda
24 Nov 2015

★☆☆☆☆
hi lamia, i hope u can share the code that can use for other image, i really need your help right now.

my email : zahrulmohamed@gmail.com

Harishchanddra
13 May 2015

Its horrible here to hear from all . FR code is almost 98% ready. Just matching is not there. All are using this ready code and again asking for minutiae matching. What lazy people those all or other way I think they don't know anything about matlab coding. Writing matching code is just the issue of calculating the difference between 2 minutiae point/ vectors and even that you can not do. Shame on you all.....

Richa
12 May 2015

Thanks Lamia for the code..

Can someone plz also share the code for matching phase... i need it badly. Please it would be great help
My email id is : richie_akka@yahoo.co.in

Richa
9 May 2015

Hi Lamia
Can u plz share the code that works on other fingerprint image/database as well. I am getting error in Z.*ROI'. Thanks a lot.
My email id is richie_akka@yahoo.co.in

Mike Reer
8 Apr 2015

★★★★★
hepl novice,please
I need to change ROI size to single vector with lenght, say 5 mm

what to change here:

```
Kopen=imclose(K,strel('square',7));

KopenClean= imfill(Kopen,'holes');
KopenClean=bwareaopen(KopenClean,5);
imshow(KopenClean)
KopenClean([1 end],:)=0;
KopenClean(:,[1 end])=0;
ROI=imerode(KopenClean,strel('disk',10));
imshow(ROI)

%%

imshow(I)
hold on
imshow(ROI)
alpha(0.5)

hold on
plot(CentroidTerm(:,1),CentroidTerm(:,2),'ro')
plot(CentroidBif(:,1),CentroidBif(:,2),'go')
hold off
```

Nurzalina Harun
3 Apr 2015

★★★★★
Thank you so much for your code.Can you please send me which paper that u used as the reference paper in developing this matching code to my mail:
nurzalina@tmsk.uitm.edu.my

ANISHA RANA
29 Mar 2015

please send the matching code also on my email id
anisharana1990@gmail.com

kayalvizhi meena
11 Feb 2015

Can you please send me the matching code to my mail id kayalvilimeena@gmail.com.sir i am doing my project on fingerprint.i need the code for reference

SuJong Kim
8 Jan 2015

★★★★★

SuJong Kim
8 Jan 2015

★★★★★
Can you please send me your code file at my email wowhul78@gmail.com

SuJong Kim
8 Jan 2015

★★★★★

vignesh
18 Dec 2014

Thank you so much for your code. can you please tell me how to remove the spurious minutiae points and fix the distance 'D' as 6 my mail id : vignesh.prem93@gmail.com

ezenwo balogu
12 Dec 2014

thanks for posting this, i really need the code and application for my project urgently.... kennethezenwo@googlemail.com

Ramy Ahmed
11 Oct 2014

★★★★★
Thank you very much for your code
please send me the matching code in order to dealing with my data bank of fingerprint images, Also the code to handle with other types of images bmp,jpg,tiff,png,and any others.
I am also need that code to finish my researches about Fingerprints Recognitions
and verifications, I am doing my master in that field, I will be appreciated if you help me to find it if you please find it, also If its possible to have a contact with you to discuss that field and the problems which we met and how to overcome it.
Thanks very much.
Eng. Ramy Ahmed email: ramyahmed21@gmail.com

Hadeer
2 Oct 2014

★★★★★
can you please provide me matching code at hadeer.mourad@gmail.com

Sumeet
2 Sep 2014

★★★★★
Thanks a lot .Your coding is great.
can you please provide me matching code and
Can you please tell me which papers you have reffered to code this program at my mail id 3sumeet@gmail.com

Joan
14 Aug 2014

★★★★★
Could you help me with my fingerprint projects? I am required to map to a X-Y coordinates, marking especially the deltas.

hira m
14 Aug 2014

how to remove false minutiae points, plz m stucked for so long at this step
my email adressis:fypgroup68@gmail.com

hira m
14 Aug 2014

how to remove false minutiae points, plz m stucked for so long at this step
my email adressis:fypgroup68@gmail.com

zahra

21 Jul 2014

Hello
could you kindly please send me the matching code to my email if you have it,thanks
My email:za_boroomand@yahoo.com

andy
27 Apr 2014

hello bro, help me please, im on my final project deadline T_T send me the code how to match, please...
andyparker.metaaal92@gmail.com

pravin ingle
23 Apr 2014

★★★★★

pravin ingle
21 Apr 2014

when I run the program, following error occurred. can anybody help me to understand the problem here?

??? Error using ==> sub2ind at 56
Out of range subscript.

Error in ==> fingerprint_pravin at 105
indTerm=sub2ind([m,n],CentroidTerm(:,1),CentroidTerm(:,2));

Vinay
20 Apr 2014

Hello, I need Identify at least 7 minutiae that are consistent across the 4 samples from the same finger. Need to circle each in red on one fingerprint image and provide the (x,y) coordinates, angle and type of each, in a manner consistent with the ISO/IEC 19794-2 standard.

Can anyone help me with the code for above task..

Seyyed Hamid
13 Apr 2014

In regarding to correct format for feature matrix in finger print recognition, I have a question.

I have 9 finger prints(for 3 persons) which I want to train my network, and I have 3 fingerprints for testing(each person one).

After preprocessing and post processing, I could successfully reach to 2 feature of each finger print which are:
Termination=[X Y angel]
Biorefication=[X1 Y1 Angel1 Angel2 Angel3]
both of the matices for each finger print have different row size.

As I told you I have 9 input, in another words, I have 9 inputs which either of them has 2 matrix which I explained above.

Now , I have no idea how I should put these feature in correct format to feed it into neural network?

I am very thankful in advance for your help.
Regards,
hamid

Rupjyoti Kalita
13 Apr 2014

★★★★★

amrutha
11 Apr 2014

plz send me the code to jayamrutha@gmail.com

silamparasu
28 Feb 2014

★★★★★
please send me the code to silamparasu.s@gmail.com

Nguyen Khuong
17 Feb 2014

★★★★★
Can you please send me your code file at my email bobiasg@gmail.com

Lamia
11 Feb 2014

★★★★★
hi, i changed the program so that it works with other images (it was many modifications and adaptation to do) if anyone wants the code let me a mail at lamia.gaoua@gmail.com and i will send u the code ;) Bon courage à tous!

Soorej
10 Feb 2014

My email
ks.soorej88@gmail.com

Soorej
10 Feb 2014

Thanks for this code. But how to use it for other images. It is not working with other images.

Lamia
5 Feb 2014

★★★★★
hi everyone! to avoid the problem of "ZTerm=Z.*ROI';" I resized the image like the original image (200,200), you will have just the problem of orientation at the end...

Lamia
5 Feb 2014

★★★★★
hi, thank's for this code, but please tell me how to do if we have other images, it works only with yours, how to do to evoid erros like this: Subscripted assignment dimension mismatch.

Error in fingerprint (line 201)
    OrientationTerm(ind,1)=Table(i,j);

thank's very much, please send me your answer at tbagrees@hotmail.fr

kasi meena
22 Jan 2014

★★★★★
Can you please send me your code file at my email kasimeena45@gmail.com

Omid

2 Dec 2013

★★★★★

Usman Qadir
6 Nov 2013

Can you kindly send me your code file at my email usmanqadir91@gmail.com

Turcanu
25 Oct 2013

Hello Mr. Florence ,

You did a great job! Could you please send me the code for fingerprint matching?
e-mail: andreea.lturcanu@yahoo.com

Mohamed Deyaa
18 Jul 2013

★★★★★

Please send this code to my mail "mdeyaa@gmail.com"

supratim
23 Apr 2013

★★★★★

The code is running only on the image you used in your code. But for other images it is showing the errors like
??? Error using ==> sub2ind at 58
Out of range subscript.

Error in ==> fingerprint at 157
indTerm=sub2ind([m,n],CentroidTerm(:,1),CentroidTerm(:,2));

please help me about this...

annu
21 Jan 2013

The code is running only on the image you used in ur code . For other images it is showing the error in finding ROI code.
??? Error using ==> times
Matrix dimensions must agree.

Error in ==> fingerprint at 165
ZTerm=Z.*ROI';
What to do to remove this???????

r89hooda
9 Jan 2013

★★★☆☆

sir please send me code for fingerprint alignment.
email_id: r89hooda@gmail.com

VIJETH KUMAR
4 Jan 2013

★★★★★

hi
I am doing my final year engineering and I have a problem regarding my project fingerprint image processing. plz send me the code to read the pixel values of a gray scale image in binary format. plz send the code to this email id : vjth.shetty@gmail.com
thank you

Anne GRACE
29 Dec 2012

★★★★★

Hi Florence,

Thanks for sharing this code.

Even i m getting the same error as mentioned by a person previously.

ZTerm=Z.*ROI';

If I changed the last line to ZTerm=Z.*ROI; then it works by the ZTerm becomes zero matrix. It makes the program failure.

kindly help me on this .. it would be a great help.

Thanks
Anne

Kushagra Mittal
19 Aug 2012

★★★★★

First of all, Thank You very much for the code. The code is perfect, except that a minor customization is needed for my project. I need a code which puts the given fingerprint in one of the five pre-defined categories: whorl, right, loop, left loop, arch and tented arch, based on their ridge patterns. Please send it. Thank You.

shahosj
13 Jul 2012

Thanks for the code, however i have a question how to insert code so it can detect fingerprint system automatically? Im using a built in fingersweep by acer aspire 4389. Any help i will appreciate the most.

Smit Bhagat
11 Oct 2011

★★★★★

Hi, I am a final year Engg student. This code has really helped me in coding for my project i.e. Fingerprint Recgnization. I acknowledge Florence Kussener. Thank you for your help.

Abdul Aziz
9 Aug 2011

★★★☆☆

Amos Lim
30 Jun 2011

heys everyone, i am conducting a project to make an optical mouse into a Fingerprint Scanner Optical Mouse. So, is this code viable for optical mouse itself to scan fingerprint?

i am just doing a basic project, need to get the optical mouse able to scan and capture the fingerprints.

mohen

★★★★★

12 Jun 2011

thankyou

amir hazifuddin
18 Apr 2010

★★★★★

hamza
24 Jun 2009

thanks for the code it was useful to me

kalpana saini
25 Mar 2009

sir,
i getting error in this program in Suppress extrema minutiae . using sub2ind i m getting error,index out of range. please give me solution as early as possible.

madhu j
15 Feb 2009

hi,
i am doing my final year project in fingerprint verification. i 've performed binarization and thinning. but thinning is taking more time.. so plz send me the code for thinning to my mail id. my mail id is shayam.jayaraman@gmail.com. also during the minutiae extraction lots of spurious minutiaes r detected. so plz help me to remove this also.. please help me... i am having marks for my project.. thanks in advance.. plzzzzzzzzz....

2000forever dagdeviren
30 Jan 2009

★★★★★

i need cmac(cerebellar model arithmetic computer) matlab code for fingerprint classification.can anyone help me?

vijay kumar
4 Jan 2009

★★★★★

Please add minutia matching code,
please I need code source for minutia matching
transform hough is eficase code
send the minutia match algorithm determines whether the two minutia sets are from the same finger or not. two steps: 1. Alignment stage 2. Match stage

Adil
25 Nov 2008

★★★★★

Great application.

cons: it resizes your images to a predetermined size in the GUI (looses aspect ratio).

No comments on code and bad documentations.

I did not know how to use the validation application

Saravanan
24 Nov 2008

In the fingerprint demo program, I am getting the following error.

??? Error using ==> times
Matrix dimensions must agree.

Error in ==> fpdemo at 89
ZTerm=Z.*ROI';

If I changed the last line to ZTerm=Z.*ROI; then it works by the ZTerm becomes zero matrix. It makes the program failure.

Please help me.

Saravanan
21 Nov 2008

Hi Florence,
I downloaded this application and first two modules Binarize, and Thinning working fine with the given images Empreinte.bmp and Image.bmp with this application. But raised following errors in the third module Find Minutia

Could you help me please. trysaran@yahoo.com

```
>> fingerprintgui
Warning: Function call fingerprintgui invokes inexact match C:\cs\florence\fingerprint\FingerPrintGUI.m.

??? There is no 'Colormap' property in the 'uipanel' class.

Error in ==> imshow at 115
    set(figHandle, 'Colormap', map);

Error in ==> FingerPrintGUI>FindMinutia_Callback at 289
imshow(255*I)

Error in ==> gui_mainfcn at 75
        feval(varargin{:});

Error in ==> FingerPrintGUI at 42
    gui_mainfcn(gui_State, varargin{:});

??? Error while evaluating uicontrol Callback.
```

ahmad a
21 Oct 2008

hi, thanks for the code, could you please tell me which other fingerprint images (or database) that i can use with this code, or it only works for this image. because whenever i change the image it doesnot work
thanks

Faiyaz Zagral
22 Jul 2008

★★★★★

Its is really excellent for the begineers.

Chulesgom Kanthong
6 Jul 2008
★★★★☆
thanks

houssam hassan
21 Apr 2008
PLz can you help me in how to find point core in fingerprint image .....
SO plz if you know send me at my adress email
than's

Abid Anjum
12 Apr 2008
★★★★☆

E Yu
16 Mar 2008
★★★★☆
The following change is needed -
figHandle = ancestor(axHandle, 'figure');

% get(axHandle, 'Parent');

E Yu
16 Mar 2008
★★★★☆

Vijay Bidla
5 Mar 2008
Sir please add on ALignment and Matching codes in this

benmouna brahim
1 Mar 2008
please I need code source for minutia matching
transform hough is eficase code

Manju g
29 Feb 2008
★★★☆☆
Hello,

Please add minutia matching code.

Leena Patil
19 Feb 2008
★★★★★
Hello Florence ,

Code is working excellent,please add minutia matching algorithm,so it is more useful.

John D
4 Jan 2008
★★☆☆☆
Code is not working on gray scale images and also it is not working on different size of images(eg. 256*256).

Avinash Pokhriyal
14 Nov 2007
★★★★☆
no explanation file. No image enhancement techniques applied, otherwise it would have been excellent.

hitesh shah
13 Nov 2007
★★★★☆
it need to include Enhancement algorithm to handle poor quality images.

Updates

1 Sep 2016	1.1.0.1	Updated license
3 Mar 2016	1.1	...

Requires

Image Processing Toolbox

MATLAB Release

MATLAB 7.5 (R2007b)

Tags Add Tags

fingerprint minuti... image analysis

Cancel

FingerPrint/

- DistEuclidian(dataset1,dataset2)
- FingerPrintGUI(varargin)
- lissage(x)
- minutie(x)
- saveMinutia(name,MinutiaFin,Minu...
- ValidationGUI(varargin)

```
function D=DistEuclidian(dataset1,dataset



h = waitbar(0,'Distance Computation');
switch nargin
    case 1
        [m1,n1]=size(dataset1);
        m2=m1;
        D=zeros(m1,m2);
```

FingerPrint/html/

- FingerPrint Demo

FingerPrint Demo

If manual comparison by a fingerprint expert is always done to say if two fingerprint images are coming from the same finger in critical cases, automated methods are widely used now.

Among all the biometric techniques, fingerprint-based identification is the oldest method which has been successfully used in numerous applications. Everyone is known to have unique, immutable fingerprints. A fingerprint is made of a series of ridges and furrows on the surface of the finger. The uniqueness of a fingerprint can be determined by the pattern of ridges and furrows as well as the minutiae points. Minutiae points are local ridge characteristics that occur at either a ridge bifurcation or a ridge ending.

Contents

Florence Kussener, The MathWorks Application Engineer August 2007

```
clear all,close all,clc
```

Load image

The general shape of the fingerprint is generally used to pre-process the images, and reduce the search in large databases. This uses the general directions of the lines of the fingerprint, and the presence of the core and the delta. Several categories have been defined in the Henry system: whorl, right loop, left loop, arch, and tented arch.

Most algorithms are using minutiae, the specific points like ridges ending, bifurcation... Only the position and direction of these features are stored in the signature for further comparison.

```
I=imread('Empreinte.bmp');
imshow(I)
set(gcf,'position',[1 1 600 600]);
```

Enhancement

A critical step in automatic fingerprint matching is to automatically and reliably extract minutiae from the input fingerprint images. However, the performance of a minutiae extraction algorithm relies heavily on the quality of the input fingerprint images. In order to ensure that the performance of an automatic fingerprint identification/verification system would be robust with respect to the quality of the fingerprint images, it xould be essential to incorporate a fingerprint enhancement algorithm in the minutiae extraction module.

In our case, the quality of the image is really good, and we wwon't need to enhance our image.

Binarize

We binarize the image. After the operation, ridges in the fingerprint are highlighted with black color while furrow are white.

```
J=I(:,:,1)>160;
imshow(J)
set(gcf,'position',[1 1 600 600]);
```

Thining

Ridge thining is to eliminate the redundant pixels of ridges till the ridges are just one pixel wide.

```
K=bwmorph(~J,'thin','inf');
imshow(~K)
set(gcf,'position',[1 1 600 600]);
```

Minutiae

We filter the thinned ridge map by the filter "minutie". "minutie" compute the number of one-value of each 3x3 window: * if the central is 1 and has only 1 one-value neighbor, then the central pixel is a termination. * if the central is 1 and has 3 one-value neighbor, then the central pixel is a bifurcation. * if the central is 1 and has 2 one-value neighbor, then the central pixel is a usual pixel.

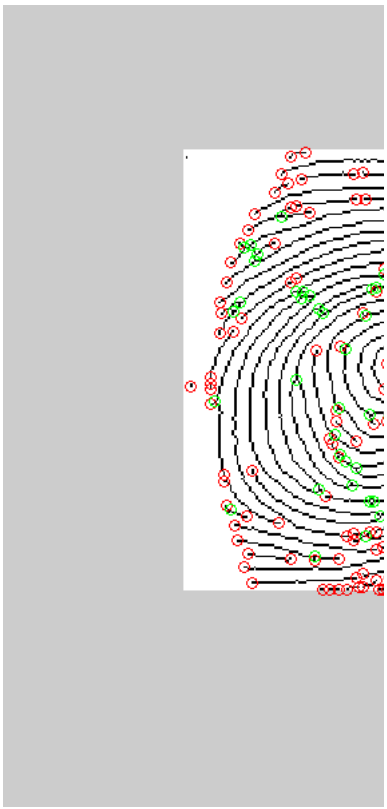
```
fun=@minutie;
L = nlfilter(K,[3 3],fun);
```

Termination

```
LTerm=(L==1);
imshow(LTerm)
LTermLab=bwlabel(LTerm);
propTerm=regionprops(LTermLab,'Centroid
CentroidTerm=round(cat(1,propTerm(:).Ce
imshow(~K)
set(gcf,'position',[1 1 600 600]);
hold on
plot(CentroidTerm(:,1),CentroidTerm(:,2
```

Bifurcation

```
LBif=(L==3);
LBifLab=bwlabel(LBif);
propBif=regionprops(LBifLab,'Centroid',
CentroidBif=round(cat(1,propBif(:).Centr
plot(CentroidBif(:,1),CentroidBif(:,2),
```



Remarks

We have a lot of spurious minutae. We are going to process them. process 1: if the distance between a termination and a biffurcation is smaller than D, we remove this minutiae process 2: if the distance between two biffurcations is smaller than D, we remove this minutia process 3: if the distance between two terminations is smaller than D, we remove this minutia

```
D=6;
```

Process 1

```
Distance=DistEuclidian(CentroidBif,Centr
SpuriousMinutae=Distance<D;
[i,j]=find(SpuriousMinutae);
CentroidBif(i,:)=[];
CentroidTerm(j,:)=[];
```

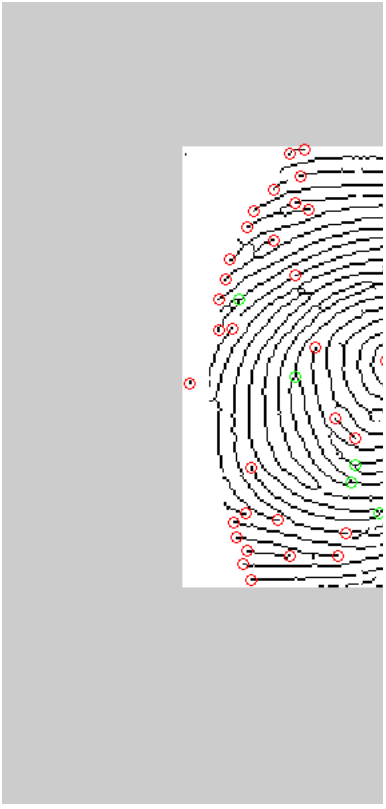
Process 2

```
Distance=DistEuclidian(CentroidBif);
SpuriousMinutae=Distance<D;
[i,j]=find(SpuriousMinutae);
CentroidBif(i,:)=[];
```

Process 3

```
Distance=DistEuclidian(CentroidTerm);
SpuriousMinutae=Distance<D;
[i,j]=find(SpuriousMinutae);
CentroidTerm(i,:)=[];
```

```
hold off
imshow(~K)
hold on
plot(CentroidTerm(:,1),CentroidTerm(:,2
plot(CentroidBif(:,1),CentroidBif(:,2),
hold off
```

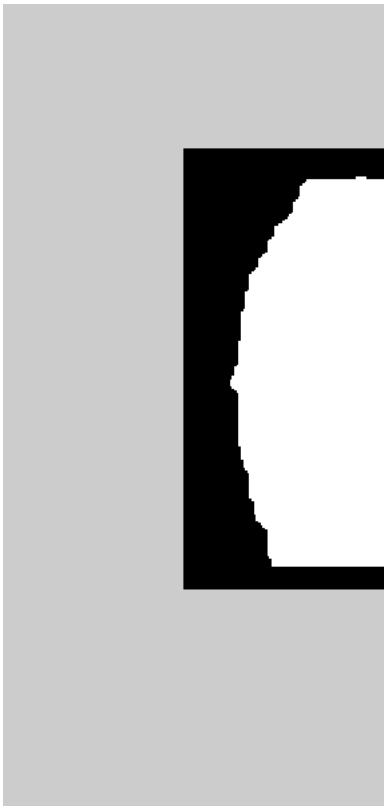


ROI

We have to determine a ROI. For that, we consider the binary image, and we aply an closing on this image and an erosion. With the GUI, I allow the use of ROI tools of MATLAB, to define manually the ROI.

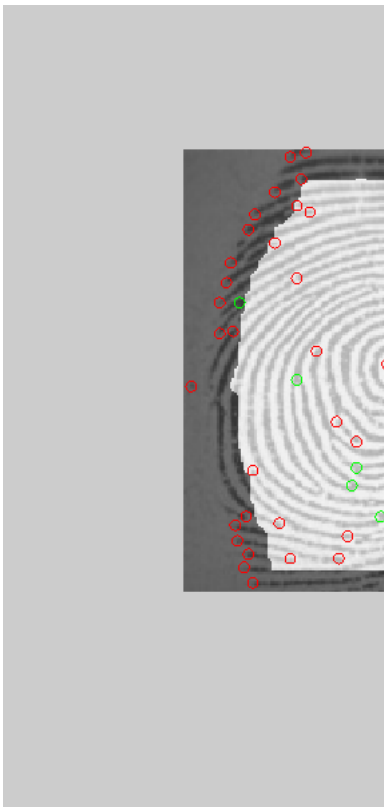
```
Kopen=imclose(K,strel('square',7));
```

```
KopenClean= imfill(Kopen,'holes');
KopenClean=bwareaopen(KopenClean,5);
imshow(KopenClean)
KopenClean([1 end],:)=0;
KopenClean(:,[1 end])=0;
ROI=imerode(KopenClean,strel('disk',10))
imshow(ROI)
```



```
imshow(I)
hold on
imshow(ROI)
alpha(0.5)

hold on
plot(CentroidTerm(:,1),CentroidTerm(:,2
plot(CentroidBif(:,1),CentroidBif(:,2),
hold off
```



Suppress extrema minutiae

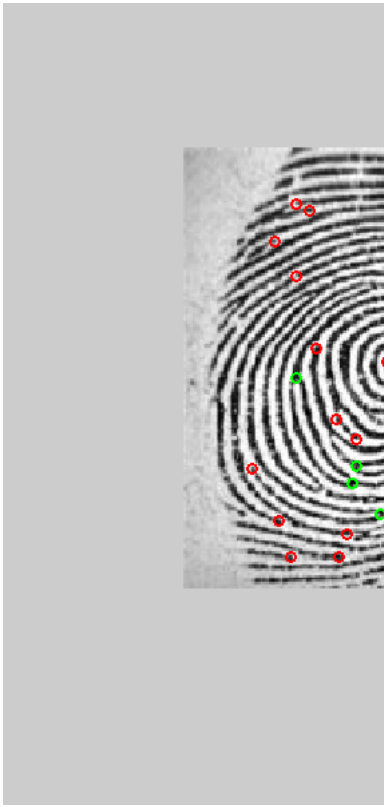
Once we defined the ROI, we can suppress minutiae external to this ROI.

```
[m,n]=size(I(:,:,1));
indTerm=sub2ind([m,n],CentroidTerm(:,1)
Z=zeros(m,n);
Z(indTerm)=1;
ZTerm=Z.*ROI';
[CentroidTermX,CentroidTermY]=find(ZTer

indBif=sub2ind([m,n],CentroidBif(:,1),C
Z=zeros(m,n);
Z(indBif)=1;
ZBif=Z.*ROI';
[CentroidBifX,CentroidBifY]=find(ZBif);



imshow(I)
hold on
plot(CentroidTermX,CentroidTermY,'ro','
plot(CentroidBifX,CentroidBifY,'go','li
```



Orientation

Once we determined the differents minutiae, we have to find the orientation of each one

```
Table=[3*pi/4 2*pi/3 pi/2 pi/3 pi/4
       5*pi/6 0 0 0 pi/6
       pi 0 0 0 0
      -5*pi/6 0 0 0 -pi/6
      -3*pi/4 -2*pi/3 -pi/2 -pi/3 -pi/4
```

Termination Orientation

We have to find the orientation of the termination. For finding that, we analyze the position of the pixel on the boundary of a 5 x 5 bounding box of the termination. We compare this position to the Table variable. The Table variable gives the angle in radian.

```
for ind=1:length(CentroidTermX)
    Klocal=K(CentroidTermY(ind)-2:Centr
    Klocal(2:end-1,2:end-1)=0;
    [i,j]=find(Klocal);
    OrientationTerm(ind,1)=Table(i,j);
end
dxTerm=sin(OrientationTerm)*5;
dyTerm=cos(OrientationTerm)*5;
figure
imshow(K)
set(gcf,'position',[1 1 600 600]);
```

```
hold on
plot(CentroidTermX,CentroidTermY,'ro','
plot([CentroidTermX CentroidTermX+dyTer
    [CentroidTermY CentroidTermY-dxTerm
```

Bifurcation Orientation

For each bifurcation, we have three lines
process than in termination case three ti

```
for ind=1:length(CentroidBifX)
    Klocal=K(CentroidBifY(ind)-2:Centro
    Klocal(2:end-1,2:end-1)=0;
    [i,j]=find(Klocal);
    if length(i)~=3
        CentroidBifY(ind)=NaN;
        CentroidBifX(ind)=NaN;
        OrientationBif(ind)=NaN;
    else
        for k=1:3
            OrientationBif(ind,k)=Table
            dxBif(ind,k)=sin(Orientatio
            dyBif(ind,k)=cos(Orientatio

        end
    end
end

plot(CentroidBifX,CentroidBifY,'go','li
OrientationLinesX=[CentroidBifX Centroi
OrientationLinesY=[CentroidBifY Centroi
plot(OrientationLinesX,OrientationLines'
```