Biometrics

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Lecture No. # 24

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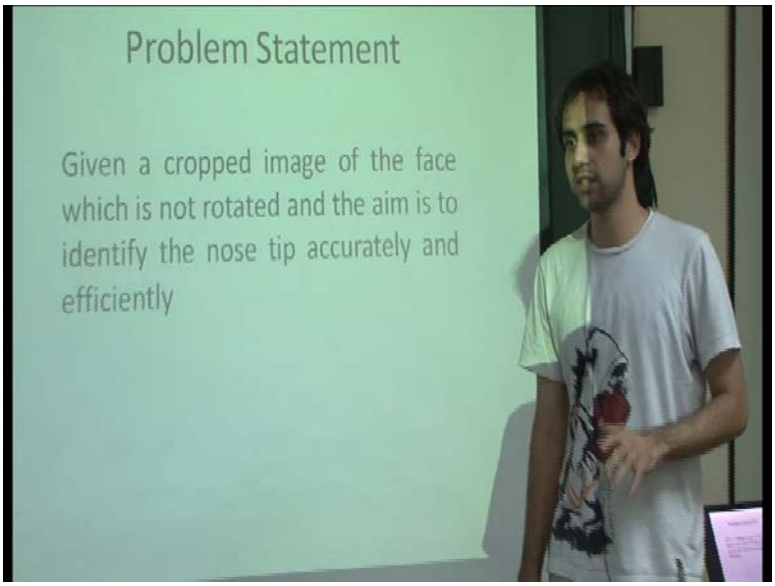

Myself lakshya khurana, my roll number is 9305 and the basic problem statement is like, I will be having a given face image of that. Which is the cropped image and I have to identify the nose tip from-from the image that this is the research paper that I am using this.

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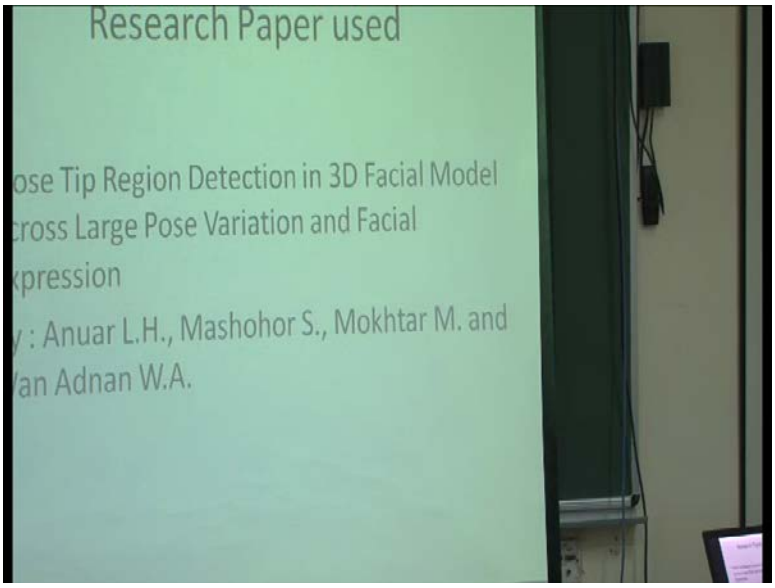

Your input is 3 d face;

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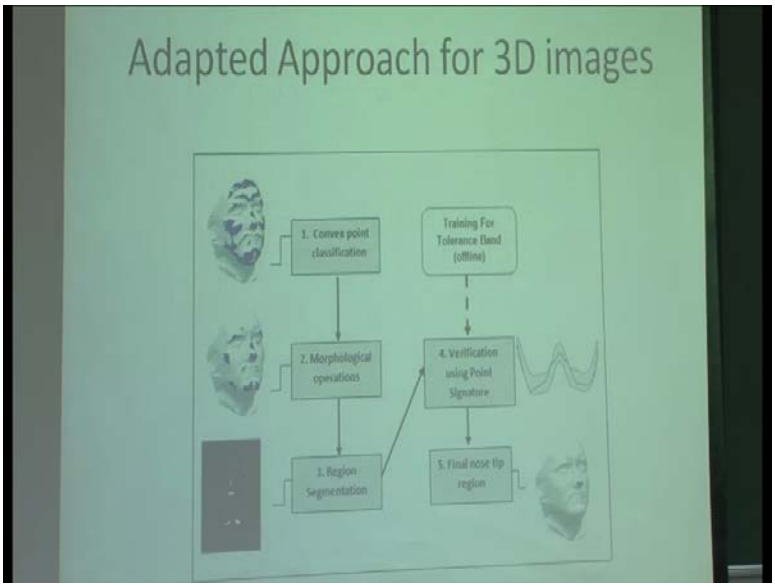

Yes I- I;

Three d face FL nose tip is very simple, if you take the z highest value of z it is a nose.

No but, there are some hair or the eye brows.

But you told that cropped image that is the thing you told, you have got a cropped image so why to keep once you are you crop the any other thing.

Yes, I initially I read about the 3 d images and I do not take any.

No 3 d images 3 d image FL, what is the challenge in that I am not getting see in the 3 d images just that z value of nose you have to know.

No sometimes the eyebrows some-some people have.

Can you show me a case here? Whose eyebrows is nose tip will be the highest peak. That means the z value will be the highest am I or not you tell 3 d image does not have much problem.

Sir, in this research paper is written on this research paper is written on the 3 d images itself it is written in nose tip.

Who has done what I do not know what? I want to tell that nose tip for 3 d image, if I have the frontal image or whatever it is if I once I rotate 3 d image FL and wherever you get the maximum z value that is your nose tip am I yes or no.

This is not I am, I am not able to find the cases when it is not true but, I do not think.

I will rotate it 3 d face, no here bring down the x axis to y axis z axis. What is the problem, because the tree d data you have all angle 3 data, you have the data.

I do not have the data now.

Who will give you the data? Are you going to create the data, because I do not have 3 d camera what I can give you? I can give you the 2 camera or more than 2, can you create the 3 d data how are you going to test your system.

If I have like for every 3 d image, I can have like 10 to twelve or may be 22 d images and I will convert to 3 d.

20 images to get a 3 d image,

Ah with different layer.

Why you need stereo effect you need at least 2 images but, more also you can but, let us assume that 2 2 or 3 scanner. You take 3 camera 4 camera, I can give you that much. I can give you 5 camera rest, I do not know but, now changing means, I can give you if you want 5 5 camera, I will give you 5 camera. .

I have read that.

You have to get the three.

I can modify this for the 2 d images for this data.

Are you going to create for 2 d?

Yes, I can modify, I have read the approach for 3 d.

2 d done come out 2 d you tell now.

I have read this approach only I have not read for any 2 d. I will modify it, I will have to modify it.

That means everything is blank and you have to justify. How you are getting the nose tip? I gave you that 1 example, if I have the 3 d images getting nose tip is not a problem, because z is maximum z value will be maximum that is the straight forward formula.

If this would have been true then like this research paper wouldn't have been published then he has done some more thing not only nose point.

He has done the nose tip detection.

Large pose variation and facial expression, so are you going to get that see the word large.

Data set.

Then remember 1 thing, why do you use any research paper. you have to write down in which comparison (( )).

So that case easily understands, FL. You can explain understand the complexity of the (( )). If you can generate the 3 d images, you have then you proceed. I can whatever support you need, we will provide but, do not ask 3 d scanner we cannot provide.

Even if say, he can create from this 5 camera if you create the 3 d model then itself there are.

Can you do it?

You have to read about it.

Can you do it forget about all these things? what he is suggesting that I am giving you the 5 cameras 3 cameras you create 3 d image.

And then use the data set on this.

Nothing,

Just on this 3 dimensional image.

Projection, FL

Yes I will do that I can do that.

You can do it.

Yes-yes and 10 ten or 18 student is there, they will be sitting. They will be sitting and I have the how many camera you need three.

I have to read like how-how.

Five camera,

Are you going to do it? Can I change it no?

Yes so what shall I write generation of 3 d images from 5 cameras.

Five 2 d images Yes,

Five 2 d [FL], if you want more thing, what we can do, we can give you 5 images, we can give them give him the 5 images and they are registered also 1 shot [FL].

So we have a person sitting in front of the camera and there are 5 cameras and in 1 shot you get 5 images of the same person.

Can you let us decide? Let him do this 1 that he has to do only that.

Whatever I mean, whatever 3 dimensional information you get.

Then what we can give, we can give you thirty degree 15 degree 0 degree minus 15 degree minus thirty degree images 2 d images can you combine them to get the 3 d image.

Also they are registered.

Registered also,

A person will be sitting and 5 images 5 cameras are placed and it is not changing so from that same view you are getting that same person and he has not moved also.

They are taken so they are registered, so it is good for you they are registered.

I will do that.

I will do that.

We are changing so you collect the data so who is next.

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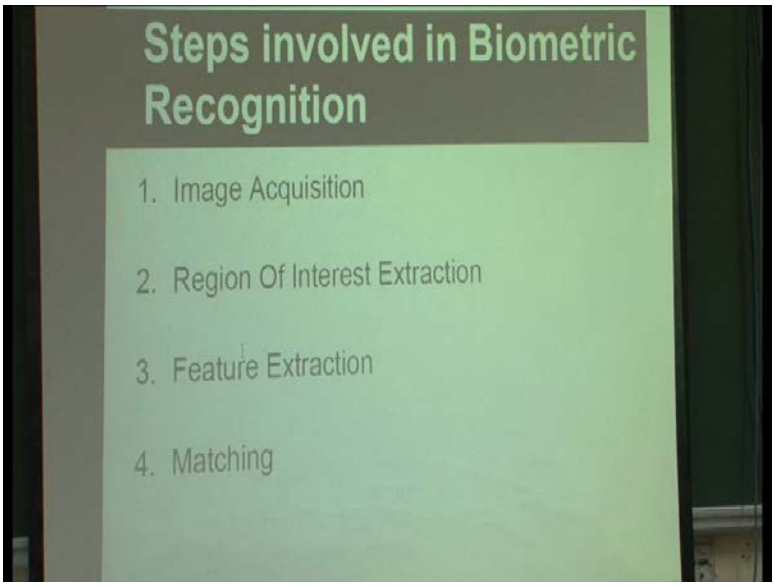

Sir; this is the research paper for phase congruency induced local features for finger-knuckle-print recognition basically. The steps are involved in any biometric recognitions are image acquisition r o i extraction feature extraction and matching and I will be doing feature extraction and matching for finger-knuckle-print recognition.

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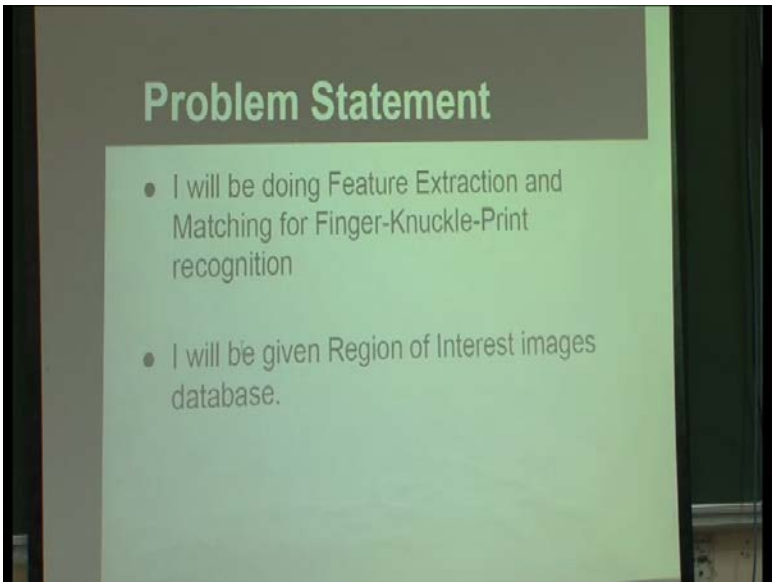

I will be given the region of interest images. I have received it, my problem statement has consists of 2 parts the first part is that I have to implement the technique.

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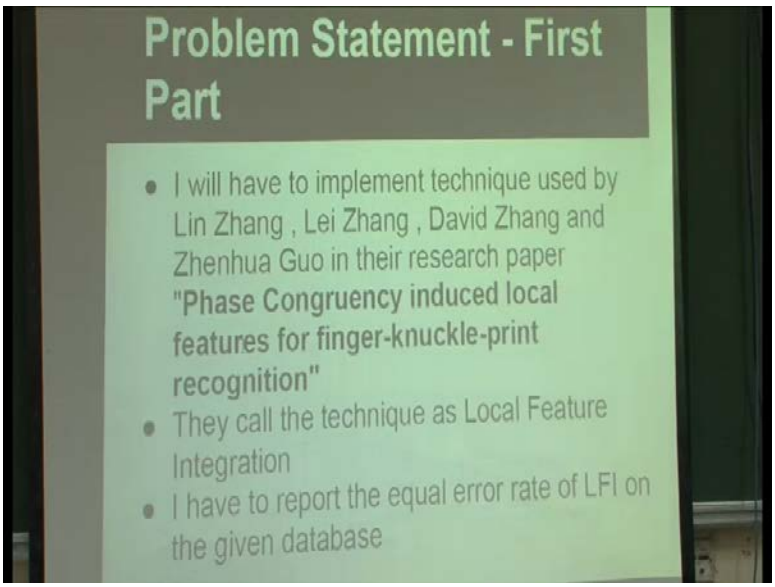

That is suggested in this paper and I have to report the equal error rate. This technique is known as local feature integration technique in this l f i scheme. They essentially extract the 3 local features out of the image and find their individual matching distance. These 3 local features are phase congruency local orientation and local phase.

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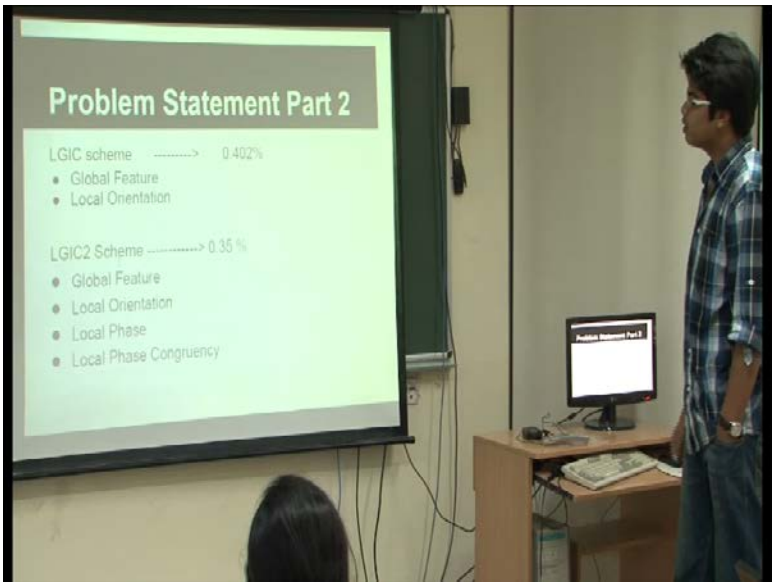

And after extracting these 3 individual matching distances they combine them together to get final matching distances. This is the e e r rate which they have given, so obviously the combined will give better results than individuals now the second problem statement.

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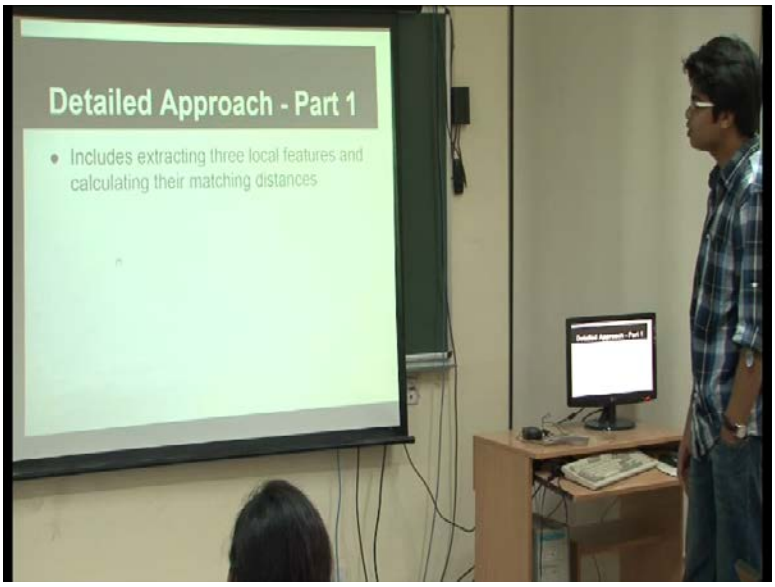

Problem part is that in there in 1 of the previous papers. They proposed a local global information combination scheme in which they combine a global feature and a local orientation feature and they received the e r rate of point 4 0 2 percent which was quite good.

So in this paper they are proposing that we can combine the 2 further local features which we calculated and integrated in the above scheme.

Noise and the paper that he is coding that is the latest.

So sir detailed approach and so first involves-involves extracting the 3 local features and calculating their matching distances second part will include extracting the global feature. Which was which is the Fourier transformation coefficient so first in first part the basic idea of face congruency is that they have used are is that the features are perceived at the points in an image where Fourier components of the image are maximally in phase.

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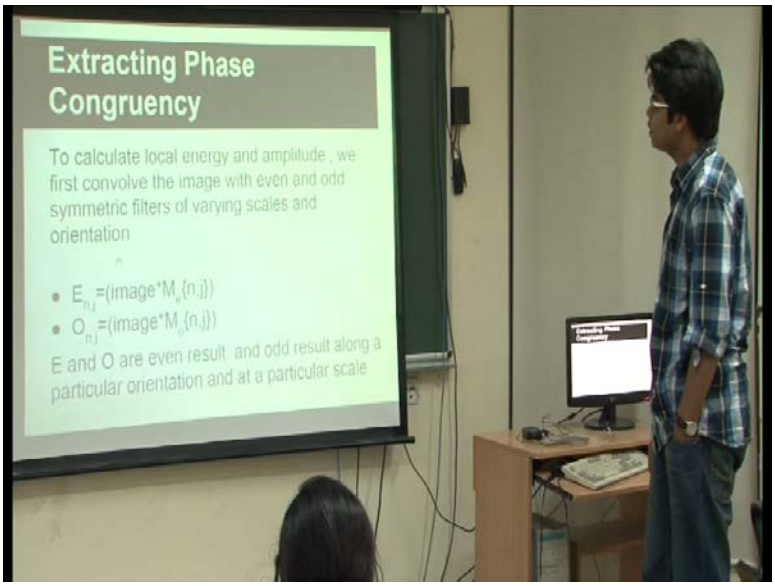

These points are said-are said to have high phase congruency to calculate the phase congruency. They have used the peter kovesi's algorithm and peter kovesi basically used this equation. This equation comes from the result that the local energy function is directly proportional to phase congruency so whenever the there will be peak in local energy.

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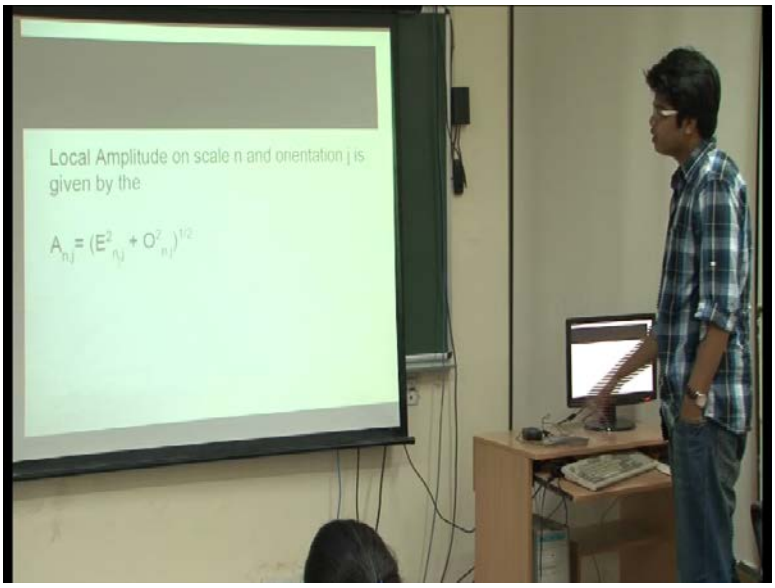

There will be a peak in phase congruency, these are the amplitude, j is the orientation and the they have used this sum of amplitudes on all scales approximately.

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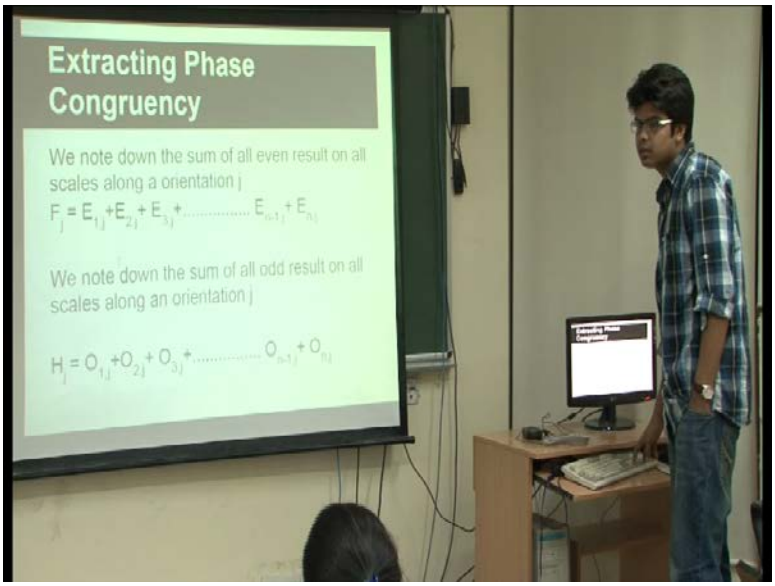

First step would be to calculate the phase congruency would be convolving the image with even and odd symmetric filters. In this case I will block filters so the result of the convolution would be e and o these are even result and odd result so to calculate phase congruency. We need a local energy and amplitudes to calculate amplitudes they have given this equation to calculate.

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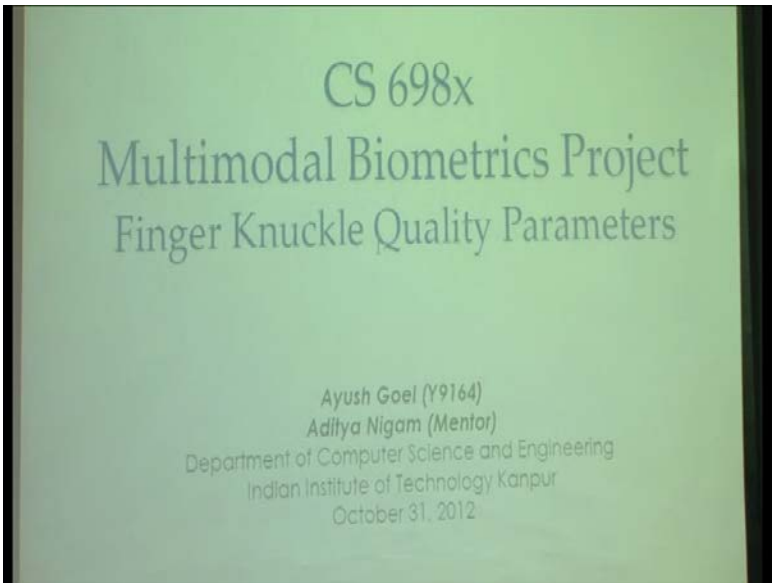

that is its very difficult if you tell all this.

Yes sir.

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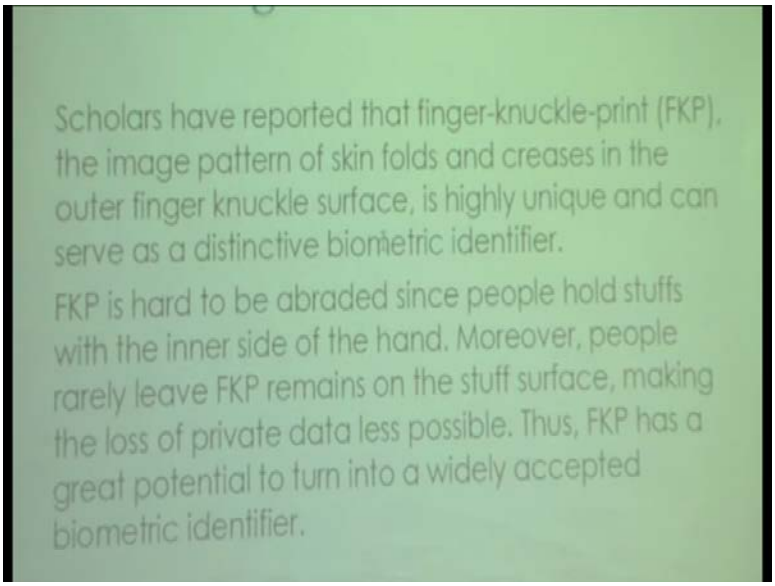

I need to know from you all this things later on but, at this moment you tell us where you are.

Sir; I have implemented all both the codes.

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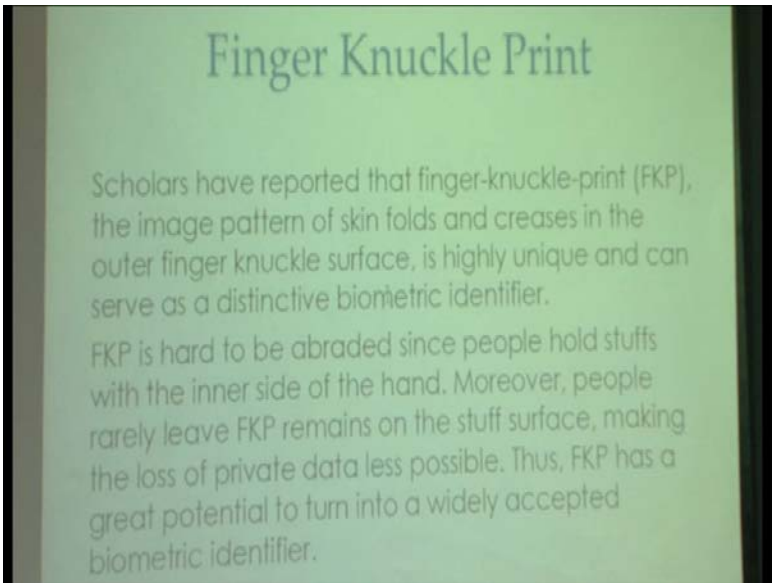

Both the codes what is that.

Sir; I have to test it i have not calculated e e r i have to calculate e e r now.

You are in the point 6 point 3 5 basically different fuses.

It will take.

Different thing and then you will be it should be less than 1, I think so.

Point 3 5 is the expected.

That is another thing that they have coded so whatever he has coded, it will be giving something like 0 point 3 5 but, you but, I know that so.

That is the thing you have written code whether code is correct or not.

For testing, I will tell you have got the data.

Yes sir.

So, that also the script to generate the result, I have uploaded on the web page data paper project on the webpage. You can download from there and you can and you can read and then you will be knowing that how you can use that and I will tell you that how you can .

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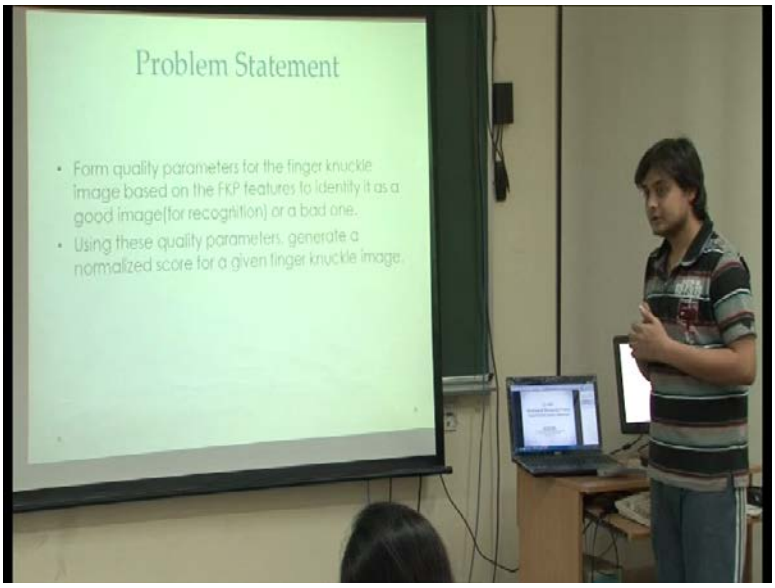

And my multimodal biometrics project finger knuckle quality parameters actually. I have not given my first presentation. So I would like to start from the start first was finger-knuckle-print finger quality parameters to generate a score from the quality parameter.

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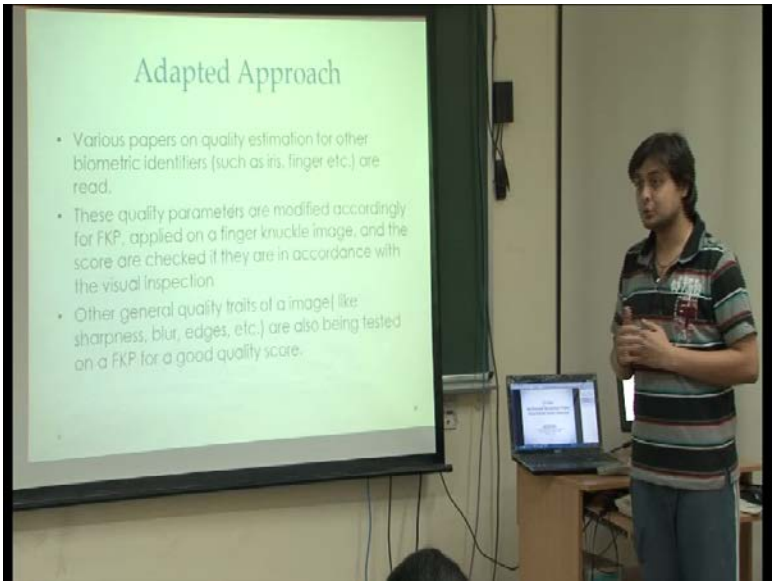

It should be consistent with the visual and these are some basic parameters and then using those quality parameters and to generate a normalize score which can be used for finger-knuckle recognition and my of that.

As the finger system is a new system, so there is not much research in the field. So, I have like, I have studied various other biometric identifiers like iris and finger and then their parameters i-i am trying to manipulate them and then and then applying them to.

So you are considering the 4 parameter 4 parameter,

No no those 4 were the basic parameters.

Four basic parameters and.

Other

You would be defining.

I would be defining, So till now I have implemented these edges detected canny algorithm and what these images, these mean values I got FL these are different r o I section of the images and that

Mean value of what.

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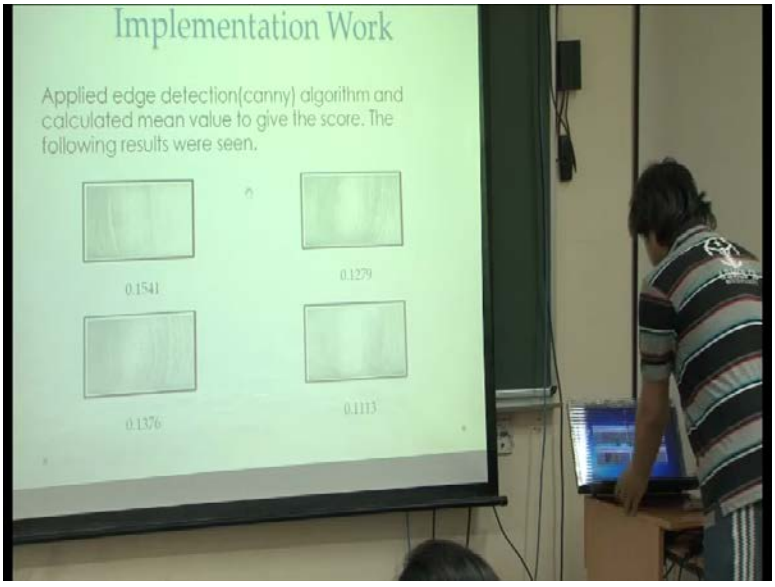

Mean value of the pixels the whole pixel gave me these images.

Mean value is point 1 5 one.

And these images I get from that

Canny.

So,

After that

The point and the I can manipulate the value to get higher for this white portin the 1 one grade will be given so the mean will be.

So these values are what 0 and one.

Yes,

Zero or.

Zero and one,

Zero and one,

So this number is lying between 0 and 1.

Yes,

How many ones divided by total number,

Total number of pixels they have.

So that value is 200 and five.

200 and 5 for this these images,

So what need to be what-what is the use of this?

This value can [FL] the more the number of edges [FL], the these edges the more number of edges it would be more, it would be possible to use for recognition.

This time you are saying that if you are having good edges.

Good edges.

And good amount of.

Good amount of edges.

Number good amount or number of edges,

Good number of edges.

Then the then the discriminative hence the quality is better than, So as you are suggesting that point 1 5 it is having prominent edges then point 1 one it is not having that prominent edges that is why they are.

Here there is a latest spectral reflection due to which the there is a less amount of edges and [FL], I can use other to improve these detection and as I told that there specular reflection is also coming. That means, so I tried the specular reflection on this-this image is having the large area of specular reflection-reflection. So, it is giving a very low score.

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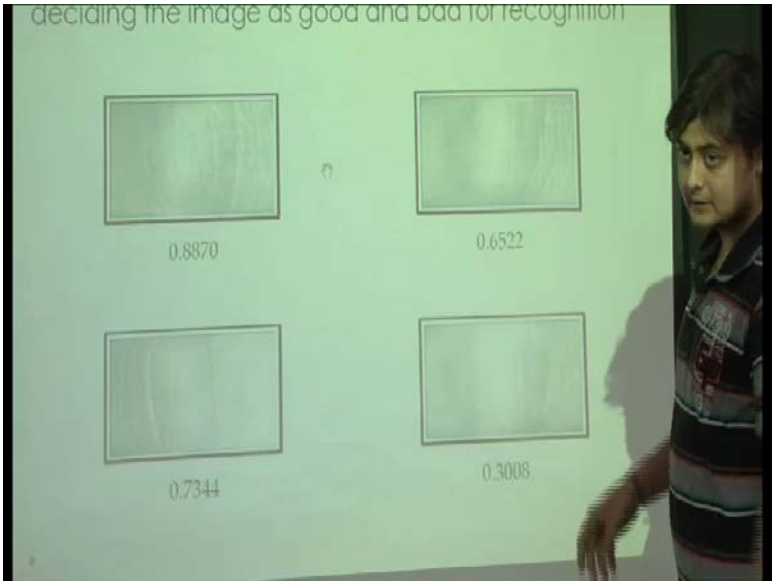

Here there is very less amount only little here, so it is giving a high score. So, this and the previous the previous both are the image are in the same sequence. So, we can see that both are consistent. So, we can use both together use a normalize score giving weight age more weight age to the edge part to get.

One other I apply the focus when I applied that I did not get good results but,

On focus is meaning you applied the main on edges that someone has suggested.

That is what I thought applied on a some little part.

The focus is.

The focus also was like it gave me the good number of edges. The more the edges the focus value would be more.

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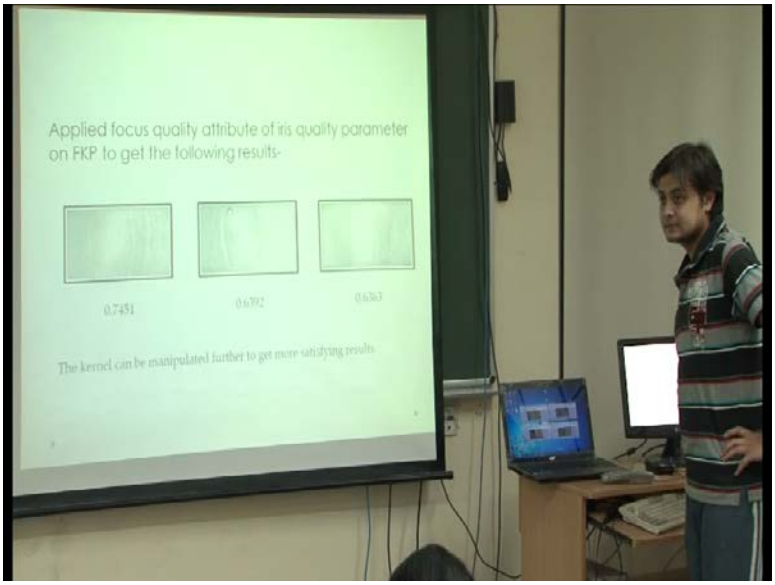

But, why not why not,

I am searching more.

Entropy is 1 thing.

I am searching for.

Energy of that, if you if you try to find out the energy of the edge basically.

Entropy and 1 more 1 more point Richard told me, I was on it but, I have not done like joint between the edges they are more edges they like minutiae point so.

Number of bifurcation,

So number of minutiae point so those can be also detected and.

Don’t go for the termination points because since you are abruptly taking the images only bifurcation trifurcation those type of thing.

But the images not [FL] i did not understand the abruptly.

Use the image beside there is bifurcation,

Yes.

Are there crossing is there.

Yes sir

Those type of point,

Do not take the end point end point these images are cropped.

That is that.

Or what you can do is for the end point you leave the within-within a particular interface within the.

Take a cross section,

Ten pixels up and down left and you leave that and.

And these are the ratings also I have done and read about the polu, database and the paper work from lin zhang who first started this finger-knuckle quality estimation and other paper provided by.

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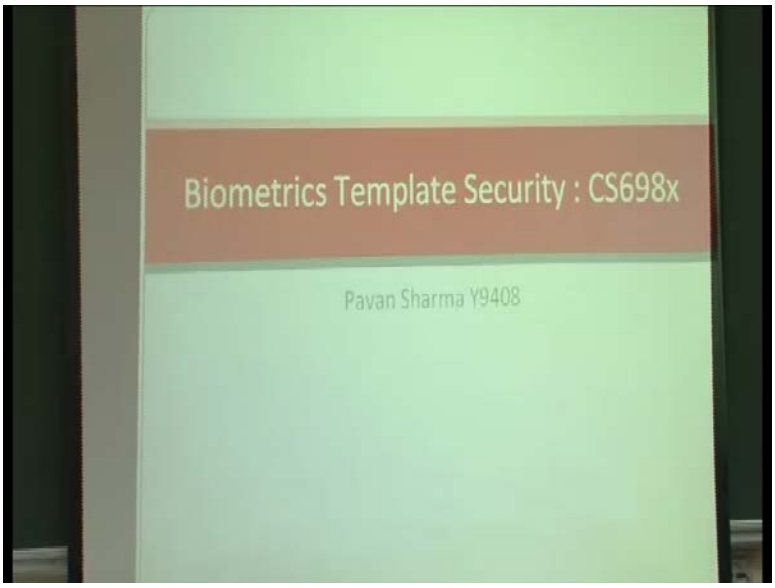

I am doing projects on the biometrics template security. I the basically biometric template and feature extractor working area.

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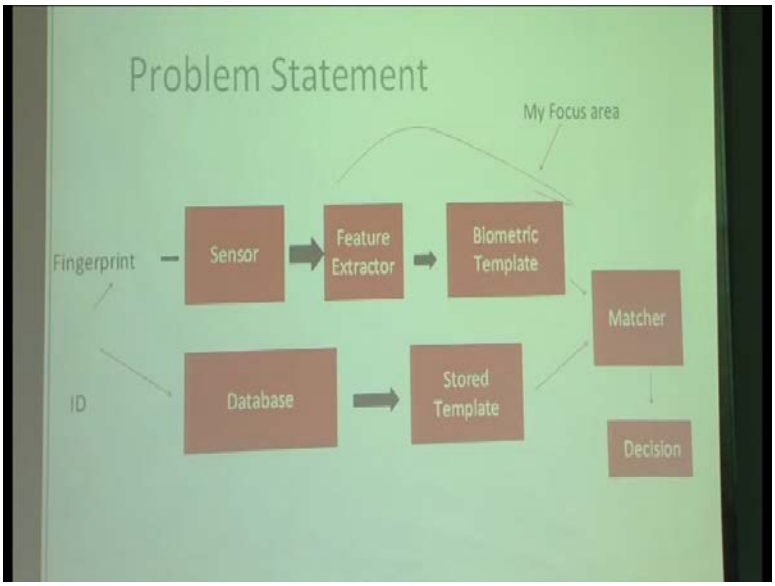

What is that?

Basically a biometric section biometrics template and feature extractor I am working on this.

For template security,

What is the input what is the input.

Input will be finger prints.

Finger prints and after that.

Sensor then r o I,

R o i also you will be using.

No-no, Iam doing just on this feature;

On this on this which this feature extraction you will be doing.

Yes sir; modification.

You will be doing the feature extractor from the finger prints and then you will be creating the template feature.

So i am using biohash.

What is biohash.

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Sir, it is a method basically by using hashing basically convert the normal template the normal feature template and by.

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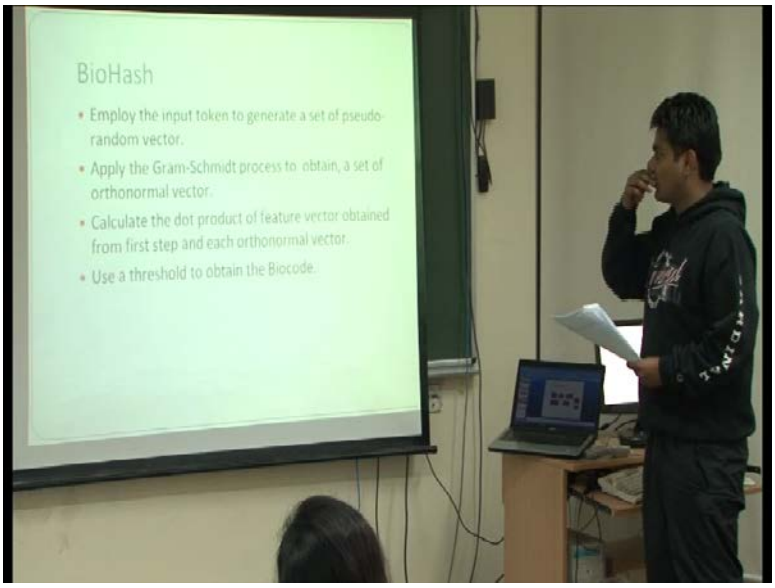

Tool system,

Name is bio hash.

Basically in that I will take a random vector and-and by using the gram Schmidt process change it to Ortho normal vector and then I will take the third product with that. Current feature template then I will store it in.

I am not getting.

Basically I will use this random vector initially and I will by using gram Schmidt process.

What is gram Schmidt,

To change any vector into Ortho normal orthogonal vectors then by then I will multiply the template by which I will take from the.

Template is what.

Feature element.

What is that?

I am explaining.

We'll be some template this is also vector or matrices.

Ah it is a vector.

It is a vector.

Also that your.

Ah yes.

If you multiply these 2 what you will get.

Instead of Ortho normal vector,

It will be a vector.

Yes and then by using the threshold I will get.

You will get what you will be getting.

Zero one.

Is a vector

No; I will -I will store it in a end.

It is a protected template and which cannot be used while to construct the original biometrics image this is a kind of calculate.

No-no but, once you know the similar product what will be the output what will be number am I.

Yes;

The concept here is the token the vendor can be changed in case that anybody knows that his biometrics template has been compromised see inner product of or not inner product of the random number.

Yes.

Meets the template it will give you what is number.

Yes.

Am I then what is this box he has drawn?

This,

Above,

These are the basically i mean from this template no-sorry.

No-no.

What is no-no, it is the image you are showing this is an image and this is another image this is a noise image you are doing.

And.

Actually sir biometrics ultimately means adding some kind of noise at some.

But, noise is a vector but, this representation is not is defending you like anything.

Why till then you were sick actually.

No sir.

Actually i was trying to.

Why.

I was not sure.

Not sure what type of.

Not sure what type of problem you will be solving.

Yes actually i was working on palm-palm system so according to this from the threshold.

Speak and you will be getting some numbers after that number that would be hash it is an integer number which one.

Which one,

This it is an integer number or.

It is just a basically a template of 1 and 0 binary number.

So it is what integer or.

It is an array or.

Array of what,

This filter (( )),

Binary,

Binary,

[FL].

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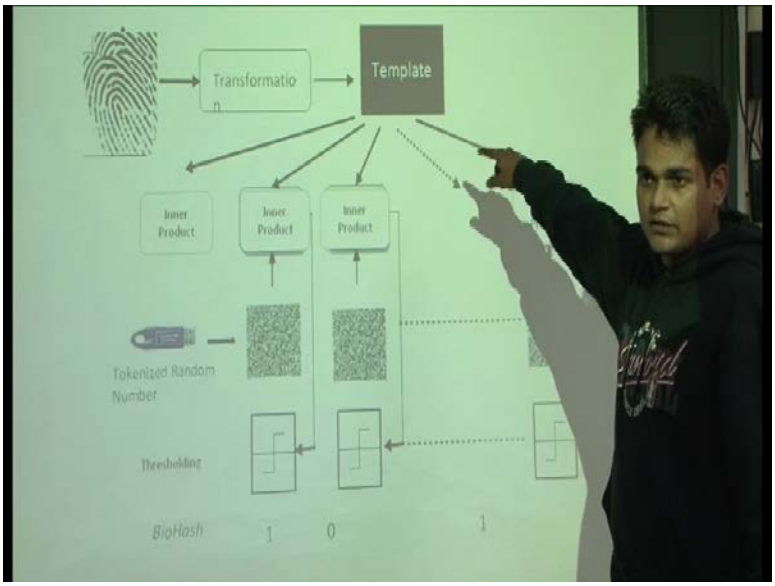

Yes,so this is for the basically template one.

[FL].

And now I will use in the feature extract.

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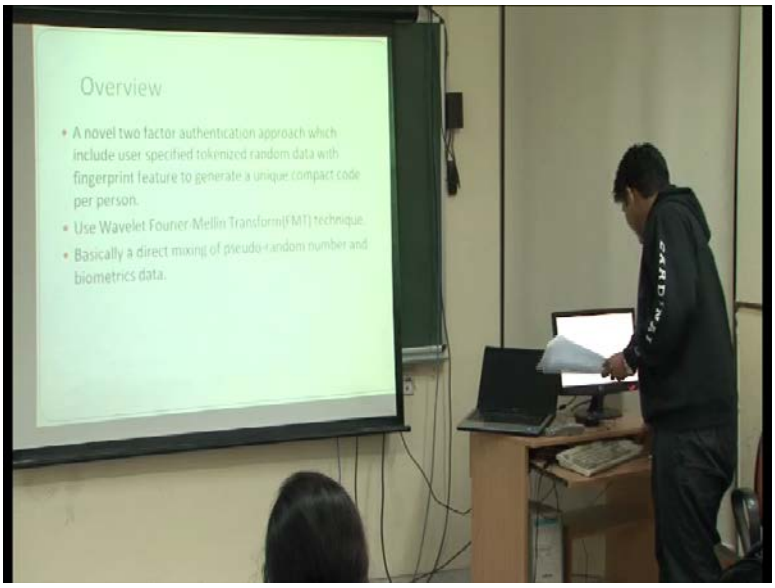

[FL].

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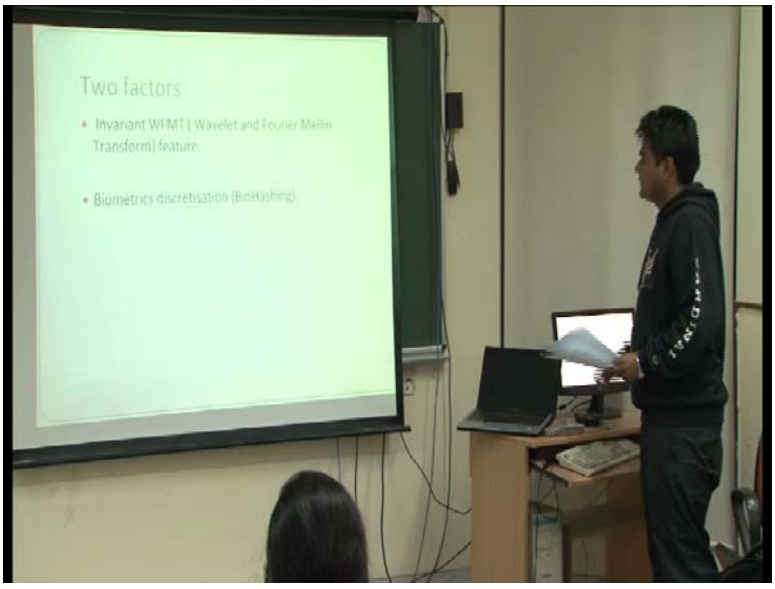

And I used Fourier mellin transform.

For what,

For feature extraction.

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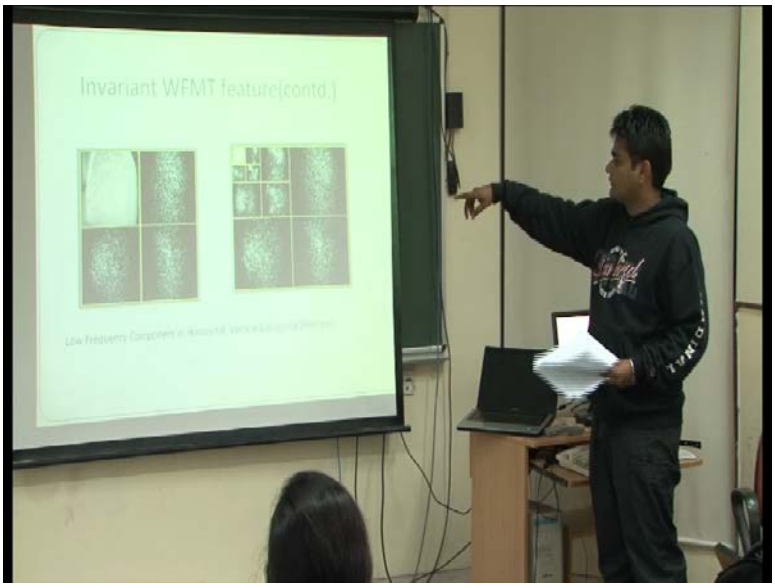

Basically this initially, the basically the frequencies variation in the frequencies and-and that is the basically the approximation image so after few levels 2 levels this is the example and.

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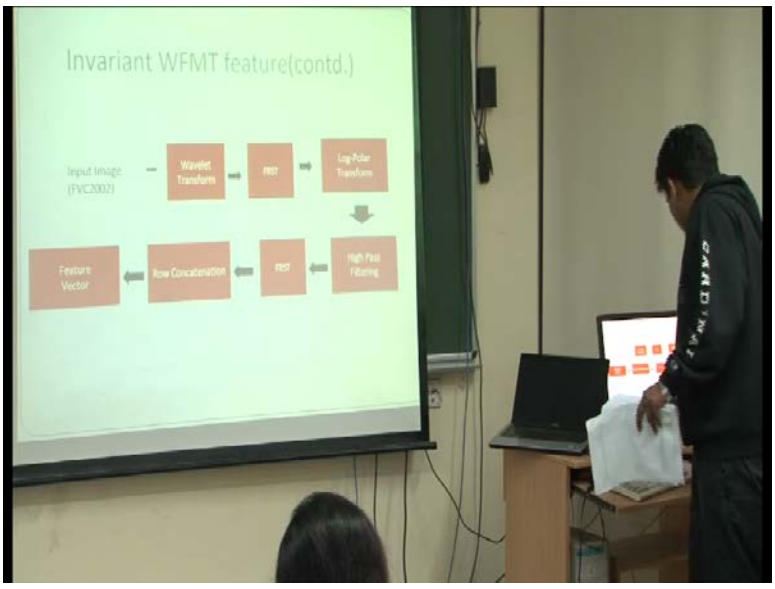

You have reduced the size.

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Yes.

Then you have got a 0 1 metrics 0 1 vector.

Yes.

Some of them will be positive some of them will be negative.

Actually I will get the 0 in the process.

[FL].

Then I will then I will forward it to the means.

To the inner product,

Yes but, after that you get some number vector after that what that will be your template.

Yes template.

That will be secured template 0 1 0 1 like that and so then very good concept of there is no concept of minutiae point.

No.

Yes this process is better than minutiae point.

1 9 7 9 4 you have to use minutiae point anyway let us see.

So this one,

I understand that you will be taking the 3 components and then you will be making. So that is why from there you will be taking 1 unknown number and instead of doing the unknown number you could have taken some other some other biometrics also.

Yes.

Why not iris or some other data,

Iris or then yes this can be used on face iris.

These 2 so in that case I can have 1 feature which is the fusion of iris and can you finish it by next week I do not know.

By,

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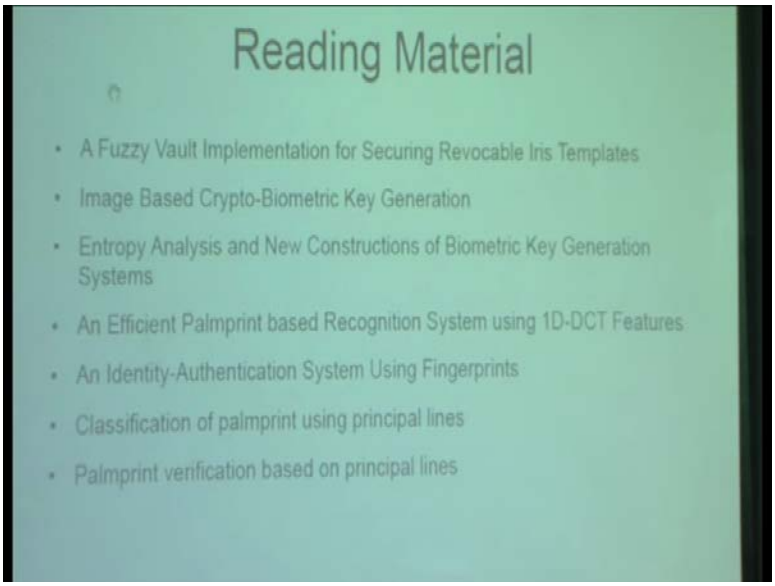

To generate a biometric key and define a function for the biometric key so for this I have read the following papers on basically on palm print verification principle line extraction and generating the key .

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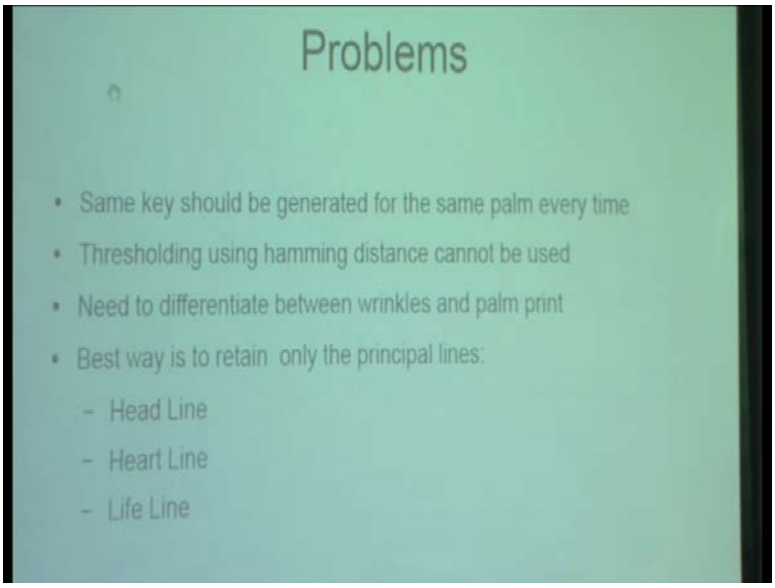

So the mean problem 1 of the papers is a palm print verification system from 1 d d c t feature that is of mister badrinath who has worked here.

The mean problem with using that approach is that we need to have certain set of features which are generated each time we get the palm print so we cannot use hamming distance as such to for a particular threshold we need to extract some prominent feature which are generated every time so for that we have decided to use the principle lines the headline the heart line and the life line to basically consider as the feature vector.

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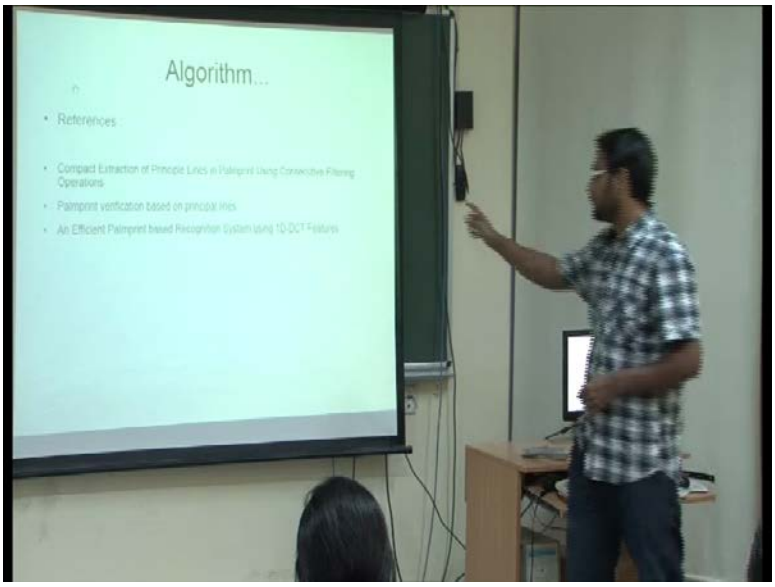

In order to extract the principle lines we i am using the implementation of the first and the third paper in the third paper i am using the enhance ah enhancement code of that enhancement part to enhance the image and in the first i am using the consecutive filtering operations to get the result.

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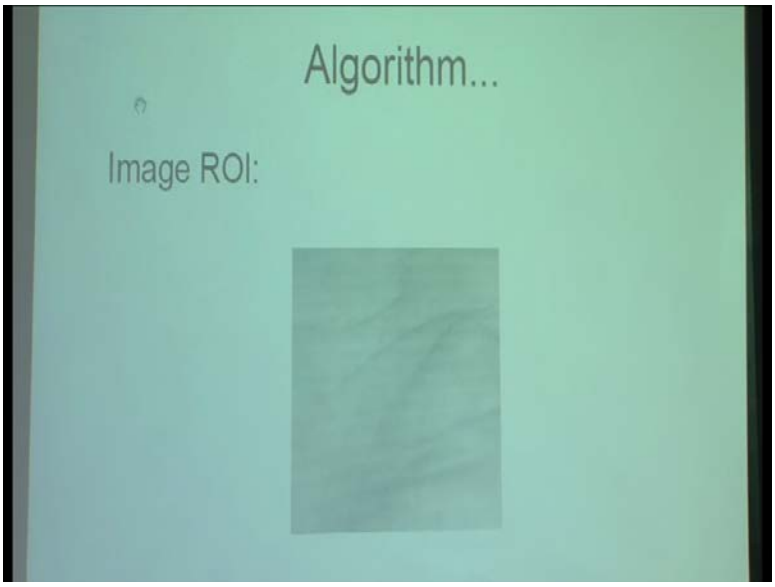

So this is the r o i of the image that is provided to me from that the enhanced image looks something like that there is some problem with the blocks that i need to still create from that from the enhanced image smoothing filter is applied to the image.

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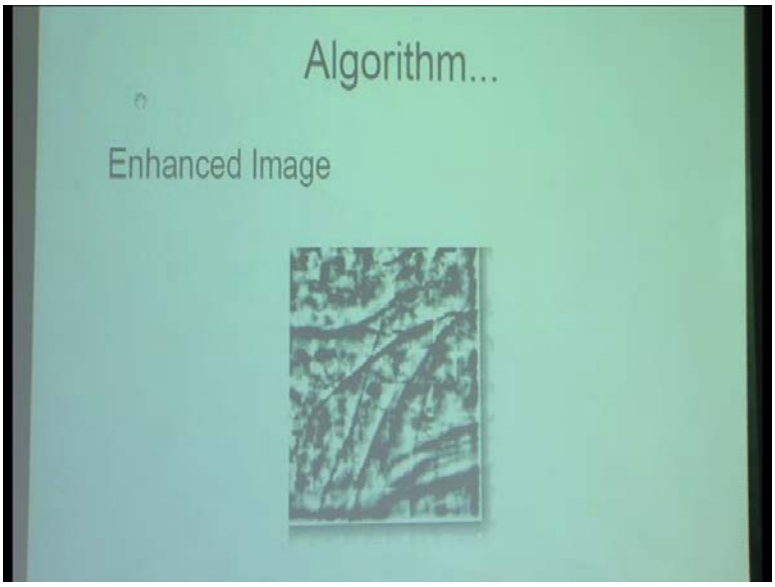

And to basically remove the noise then i-i have applied sobel filter to get the edges and get the mean lines from the sobel filters now there can be cases in which there are lines there is principle line Yes so but, but they are little bit separated so.

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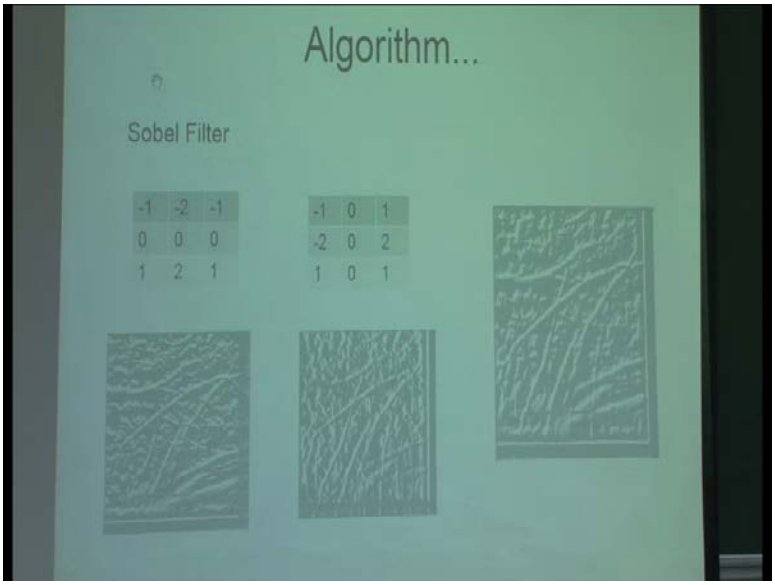

Featured line,

Yes,

So you want to connect them,

Yes,

So, that for that I have used closing and further smoothening to get the image and.

But why do you leave that.

Let us say, there is a principle line of this kind so this is the palm and principle. Line is such that there is just a very little gap between the principle lines. It is not exactly touching but, by filling it.

One 1 or 2 pixels,

Yes, so kind of.

To connect,

Yes, so for that I have used the still s t r l disc object. So to fill that so from that this image is generated now, we basically merge the gradient image that was obtained from the sobel filter and this-this image the smooth the closed image to get this particular image. Now in this particular image that, this clear separation between background and the object so that will help in binarization of the image. Now the from that we use the automatic threshold to get the binarization of the image and each of from this we get the connected components of the image from the connected component. We find all the connected-connected such connected components and apply a threshold. Now the threshold is dependent on the biggest- biggest connected component the threshold is.

Basically on length,

Yes not exactly on the number of points,

That in the length of the dimensional,

May be the width also as in instead of the principle line, There are wrinkles or some other lines which are very thin but, may be long. So, we need to consider the total number of points instead of that. Total number of points total number of point which we will take into account the thickness as well as the length.

Length will be a good idea,

But there could be like there are lines as in which go from.

Lines there are you check lines.

There are lines which are very long but.

So, the number of pixels i have considered and.

Here you want to know the density of the.

Yes sir yes sir,

If density is high then we can

Yes sir,

Am I,

Yes sir, so in this is at lower threshold, this line this line this actually a wrinkle that we are getting as the principle line but, at higher threshold we are not getting this line so the results.

I have what you want to tell.

Yes, so the threshold is on the basis of like.

There is wide range you got.

Yes, so in the biggest connected component so I find the largest.

What is biggest component?

The connected component in which there is the maximum number of points.

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So using that the threshold is divided decided so the result that I got was in this image. I got the 3 principle lines, this is the enhanced image and this is the result this is from the k c r database 1 of the images from the k c r database.

You have coded up to this

Yes sir,

You mean these are,

These are mine image.

It is having a piece of connected component having some highest number of textures and after that your, this is the threshold then you are not checking this wrinkles.

Yes,

But instead you are getting

Actually,

Because I feel that that small line,

Even this line should not have been there.

Exactly,

So this is the problem with the enhancement. There the enhancement makes the image dark as in the next image also. You can see due to the enhancement here the more number of pixels are black. So as a result of that we are getting some pixels here. So I need to improve upon this to basically improve on this. So, this is 1 of the image from the poleu database here these lines are very thick so this is the much more.

How many how many lines you have on your,

So,

More lines,

Kind of we should ideally get.

Four lines,

Four lines,

Previous-previous slide go back, go back see here also. You have the fourth line that you people said so it becomes connected fourth line is where.

This one,

Because, you have no line sitting here that is why could have been joined as a result you have been.

So understood,

Yes sir.

So some something in to work out,

This as the paper said this algorithm is not that accurate but, it is very fast so we are trying to also other.

What is this?

First you then you go for that.

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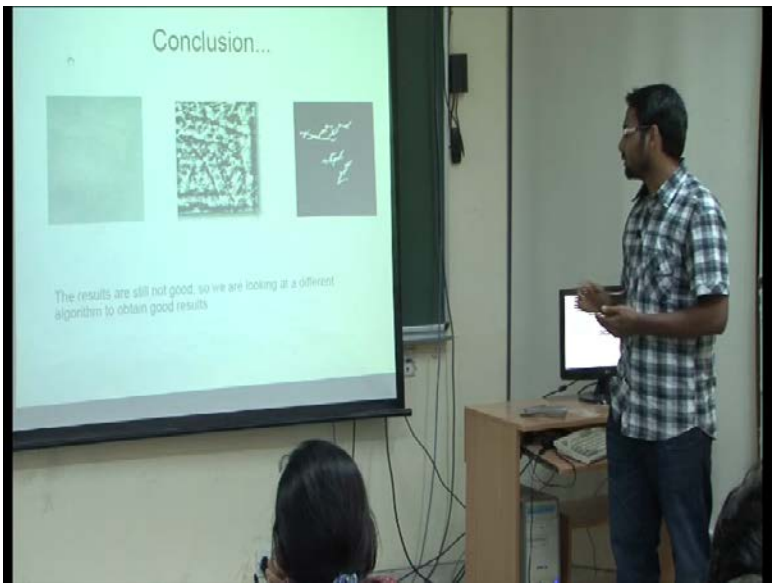

So, like there are some results in which the results are very bad. So, in this case for example, using this algorithms, so we are looking at other paper using 1 of the paper uses red 1 filter modified finite red 1 filter transformation to get the this principle lines and so I am trying to basically. I am reading that and trying to implement that also.

What is that what you are doing you are trying to find out the principle line and then.

And then from the principle lines, because the principle lines are prominent feature, they will be generated each time. So, when we generate the key from the principle lines, that in the key we consider all the points. So, if in the key there are too many points, which do not which are not, which does not appear the next time then for if a person gives a palm print. He would not be able to again generate the same key the next time if there are too many such points.

It means that the lines that you are getting it are due to suppose, you assume that every time you will be getting usually getting those lines.

Yes I should be getting palm.

Yes sir,

If it is not then whole system gets down.

Yes, kind of so,

So this enhancement physical enhancement behavioral, Enhancement is you know a bit different. It will change the image if you see that.

Yes sir;

Here you will be getting, because you introduce a several are there in the image this enhancement. So, next time when you are getting the same image you may not be getting that same artifact change enhancement used and if you use you will see several features which are here but, actually are not in the image they have introduced that as you have saying what you have seen may be in the next image. You may not be it is because of the light-light area or some image or something like that. So if you want that level of accuracy because after all these are the points which you will be using to create the key or whatever.

Yes sir,

And if it is changed,

Then the whole thing will be you know that accuracy is important in your data otherwise.

So even in the enhanced image we need to extract the principle lines very accurately.

But I think it is,

And.

because in our case we, what if you are recognizing the thing then we say that it is not a exact but, in for your case it is not like this.

But here are words you have to so that and as you were saying this that produces the same kind of thing that you are doing this kind of system this is only the initial that we are doing initial state that we are doing.

What do you expect what do you expect?

Yes I expect that,

Over this figure after getting this principle line.

So first what is that we have to expect,

Expect the principle line then,

So first you got it what he is telling he wants to beat the of this so that he can get let him do that the feature expecting up to this let him do and then you think after this so you will just expect the 4 principle lines correctly.

Sir;

You know you have to tell us why it is correctly what you have to justify. How much it is the accuracy of eighty percent correct say as I showed have shown.

Yes sir.

That this line you just how why we use that,

Yes sir.

Because there is a high quality because light is,

Threshold whatever threshold you are using the bottom of that side cannot be used here.

Understood,

Yes sir;

As a second thing that once you got these lines, how will you show in your presentation you show on that image you superimpose this thing?

See that, it is red color or some different color you superimpose and show that here it is matching; here it is not matching why it is matching why it is not matching.

You have to just superimpose on it.

Yes sir.

So you but, this 1 you have to see what it cannot be a fixed threshold.

Yes sir.

Clear.

Yes sir

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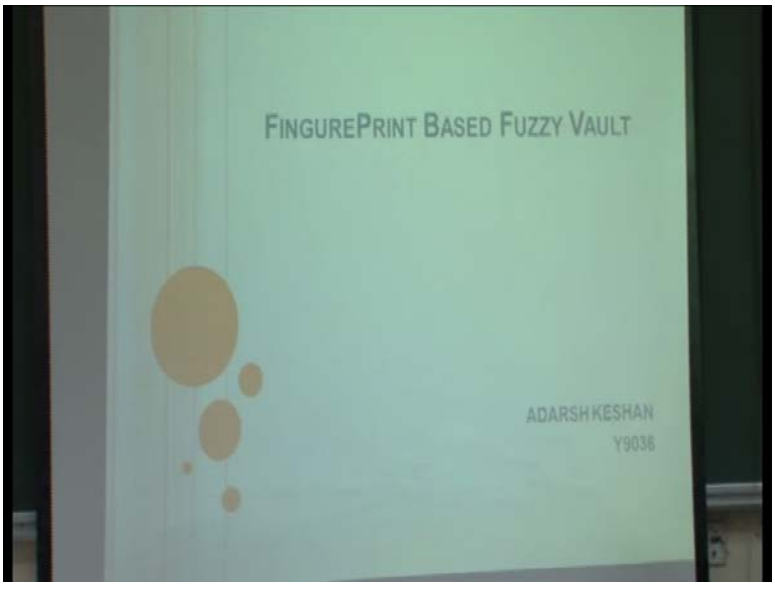

Good evening everyone, My name is adarsh keshan. I am working-working on fingerprint based fuzzy vault system my problem stated is something like this. There is a paper that came out recently in 2009 that claims a very high accuracy rate of about 98 percent.

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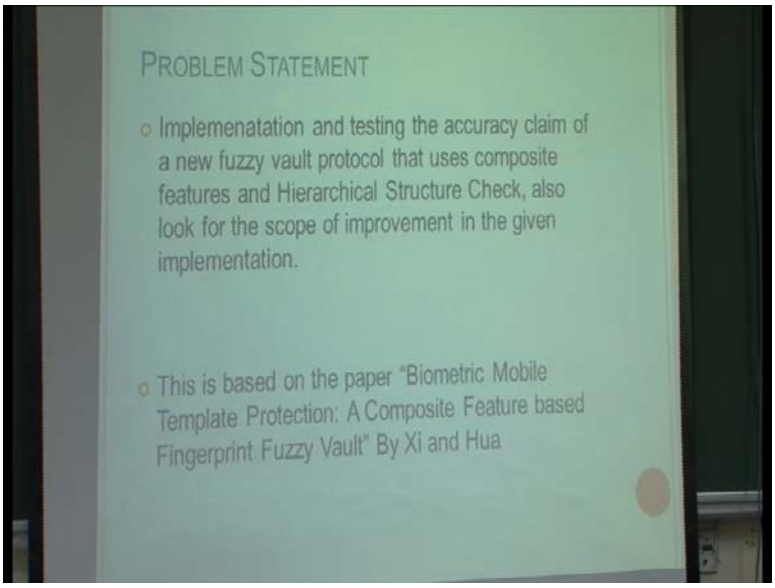

What it does it uses a composite feature miniature mapping and uses a hierarchical structure check to do matching and what I am suppose to but, I am thinking of doing is like do a implementation of this paper and checking-checking. It is a accuracy claim also, I am will be looking on the scopes of improvement in this paper.

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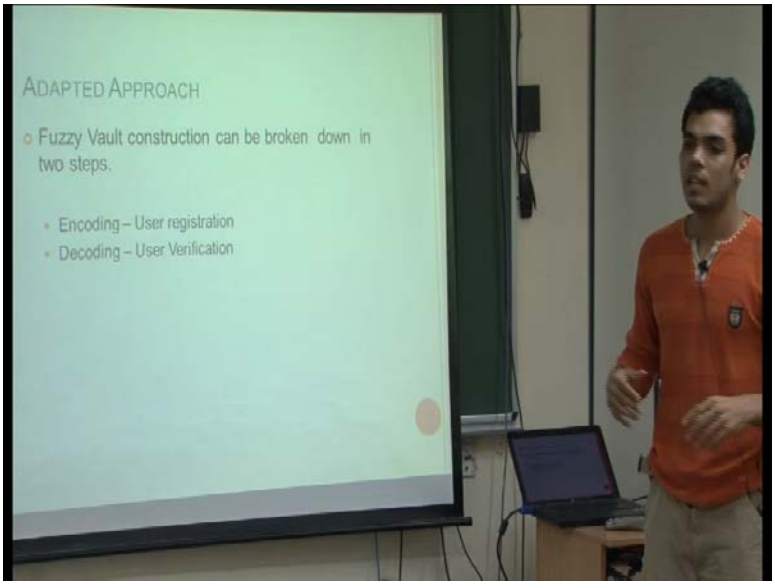

Basically if we talk about fuzzy vault, it can be just broken out broken down into 2 steps. First step is encoding and then is decoding encoding comprising of based on genuine

user and decoding phase is simply when an user comes give its identity and the secret gets revealed.

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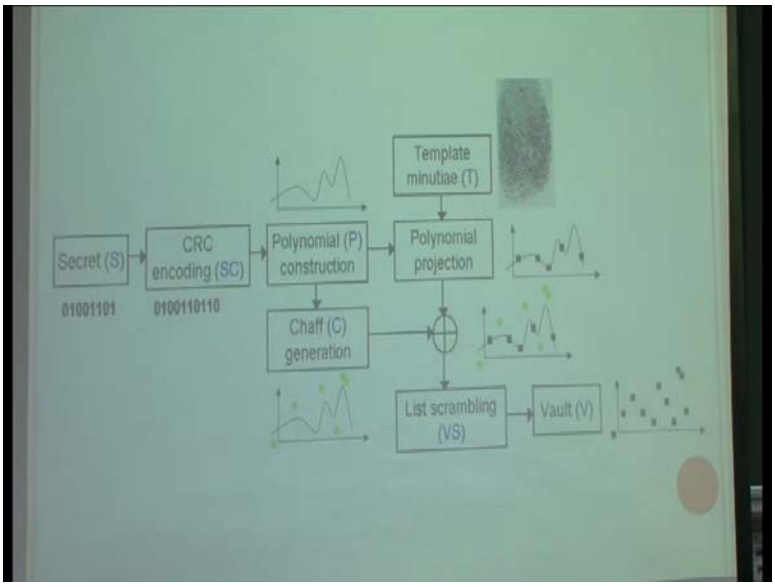

So what happens in a simple encoding phase is that we have a secret key that we have to protect, so what we do we take a secret key s. We add some error correction beats to the code to and then from this error correction code composite key b generate a polynomial and to this polynomial we use the template given finger print template using this-this miniature point of the finger print. We use a hash function to get a single point and this fit back this point into the polynomial to get the value of that polynomial on that particular x value.

So, these are the genuine points in the system to these genuine points. We add some shef points, shef points are like the fake points in the system. These are these offset points that make the system secure so and then we take union of all the points and then scramble these points and then make our vault.

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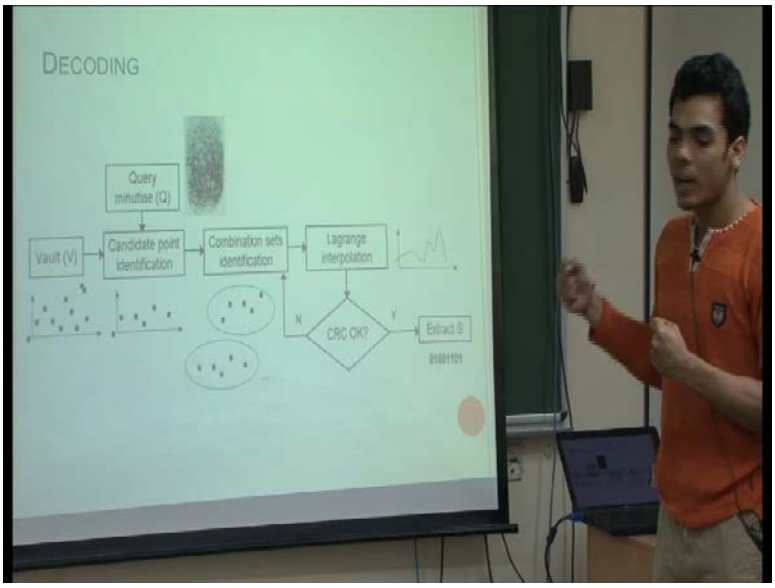

In the decoding phase what we have is a set of points in the vault that includes both the genuine and fake points and there is a query that arrive these candidates. These-these candidate points try to identify the genuine points in the set since. They are fake points they are fake points, we have introduced in the system the query has to identify certain number of genuine points to reconstruct the polynomial since-since if we have initially made an n degree polynomial. We can remake n plus 1 and for a 1 values of a polynomial, we can re guess the polynomial we can after guessing the polynomial, we can check it is a check if it is or wrong using the c r c code that we have appendant after that.

The problem with all these initial implementation of fuzzy vault was that it uses a pre-aligned fingerprint pre aligned fingerprint impression that uses simple miniature in coding with x with simple x y and then value the simple these pre-alignment and image registration is a non trivial issue and also the storing the alignment information in terms of x y theta is inherently- inherently insecure-insecure.

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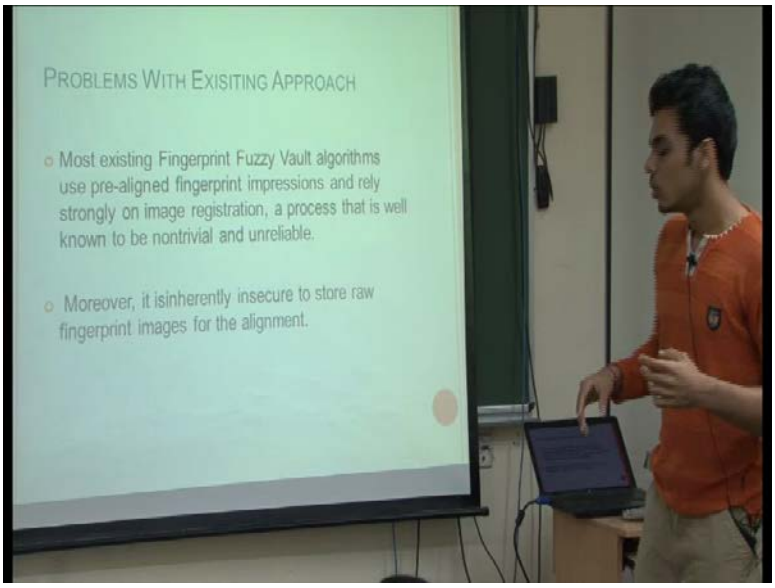

So, what the paper is suggested is to store this miniature information in a composite form. So, for example, this is a miniature m point m i and m j, what we do is the length between these 2 vectors. The angle between these-these miniature and the these angle between the line connecting the origin and the second minima and the initial midpoint .

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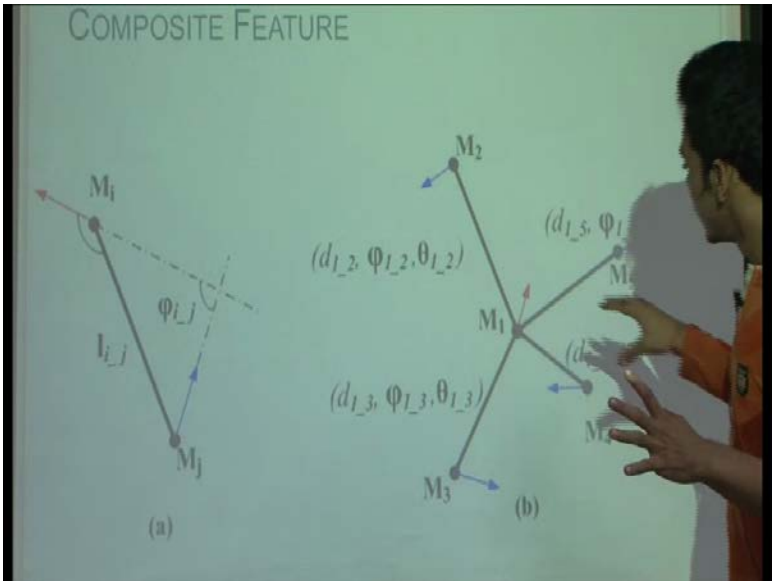

So, what we actually store is a composite vector. These are central miniature point and there are some central several miniature point that are in the neighbor. So, if we have a if we have a or graph of miniature points, what we do we take a central miniature point and

just consider the neighboring elements of this miniature to make composite feature vector at this point.

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We have x y theta values for each of the miniature, so what we can do is we have a x y by x 1 and y 2 and theta 2 value of all this thing so we can easily find the distance.

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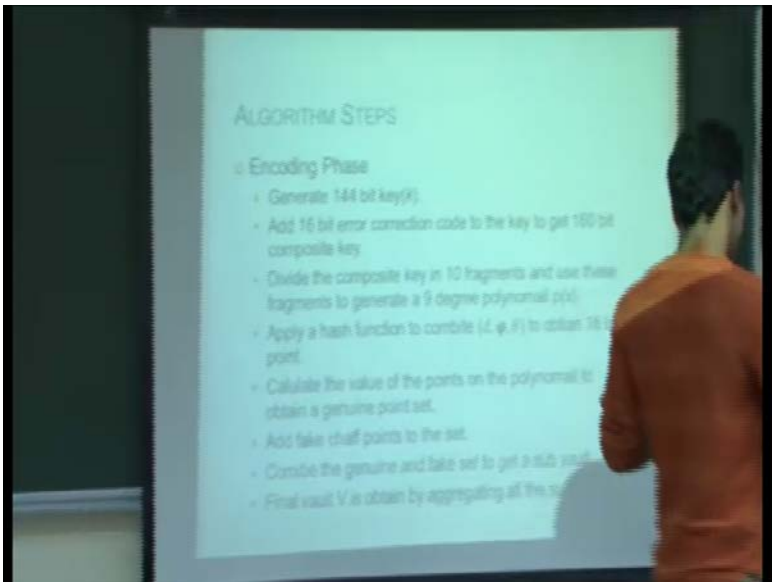

We may make the feature vector for all the for all the miniatures in the system.

No we take for every miniature we do this.

For every miniature I-I make the composite feature vector.

N c two,

Yes, n c 2 this is the encoding phase the new algorithm that uses. What it does, we have a initial key of 144 bites and then it includes a 16 bit error correction code and then that results into 16 61 60 bit of a key then we make divide it into 10 segments and construct a 9 degree polynomial of out of it and then we have a initial components. Initial we have the initial when we resister a user we take out thirty 8 top thirty 8 free composite vectors out of it we feed this composite vectors into-into the hash function and then via the polynomial and then we introduce-introduce the shef points we composite make the composite.

Go back go back,

It would better if I explain with a image, so if we have the initial registration image we obtain several of these points so if.

To distance,

No there if there are hands miniatures there would be n such points.

No-no,

No vector, what was that the vector that we are making that would be n vectors only.

N minus one,

Just make take a concrete example for example, this is a b c.

For example e so each 1 would have a vector for example, if this is we had to only considering then elements of this.

How-how-how are you getting these points.

We will take a threshold value of the number of neighbors we have to consider.

This is the registration I will go it to the next phase.

So registration whatever miniature points you got,

Circle,

Circle,

So we will get a 5 of these points.

Five of

Five of these,

Five of this type of circle,

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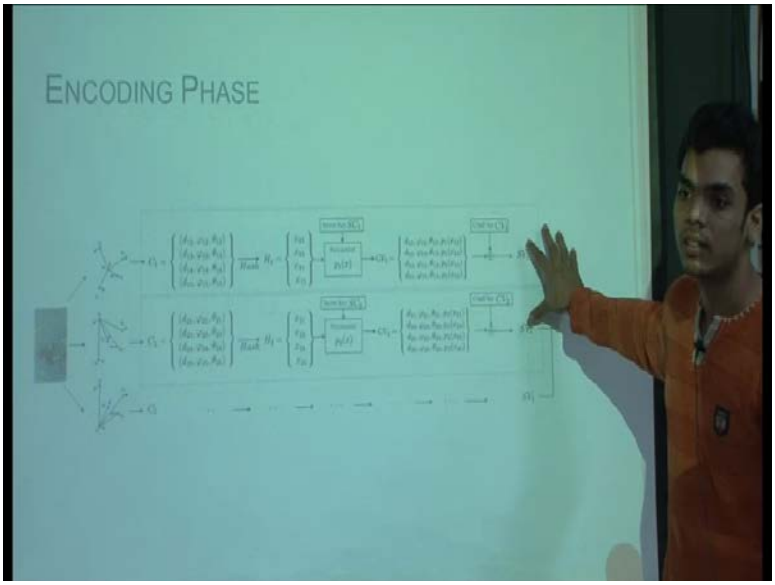

These type of circle, so each-each of these circle will have this this type of vector that would that will represent an edge. That will be distance and the angle and the relative angle between them using the each of these pair triplet would be set through a hash function and then via polynomial to generate that, then generate a point and then we will add the shef point to create a sub vault. Since we have 5 of these sub vaults we will take a union of this sub vault to finally, get back to the decoding phase.

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There is another interesting idea that was proposed in this paper for example, this is a template image and this is a test image in most of the cases. What happens is that there is a overlapping region between these 2 are very limited. So what it tries to do is take the test image segment it to various sections like at the top left and then fed a then use only a 1 section of this image as a query and if any of these section matches then it says the user passes.

So, in the decoding phase what we do is a we take a local set local set of a image then we obtain the composite vector of that image then use of hierarchical structure check. Let me explain this what for an example, this is the template this is the template this is the test for this is the template-template vector that we have stored and this is the reference vector that we reference vector that we get. So, what we do is we try to match-match the number point match-match these corresponding edges of this.

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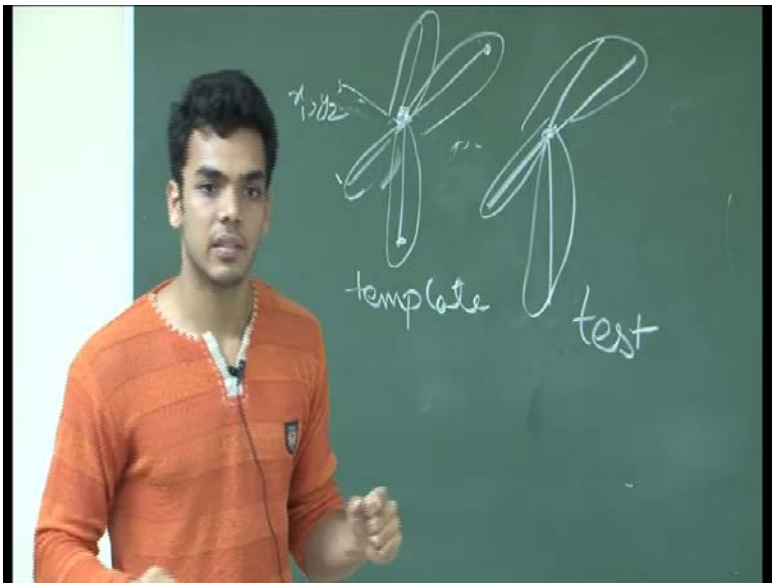

If we give the threshold for each of the 3 triplets that what will be the threshold for individual and then we try to match it in this case. If we get a match of 4 edges then we go into next step. That is a, we mark it as conditionally mapped and then we try to match the neighbors of it for example, (( )) we will consider this neighbor and consider feature vector for this vector and repeat this step. If they are threshold defined at each of the step and if it satisfy all the step then we will obtain that key for that particular value and if we can get like 11 of more than 10 key then we can reconstruct the initial polynomial and then verify the characters of the polynomial using the c r c k.

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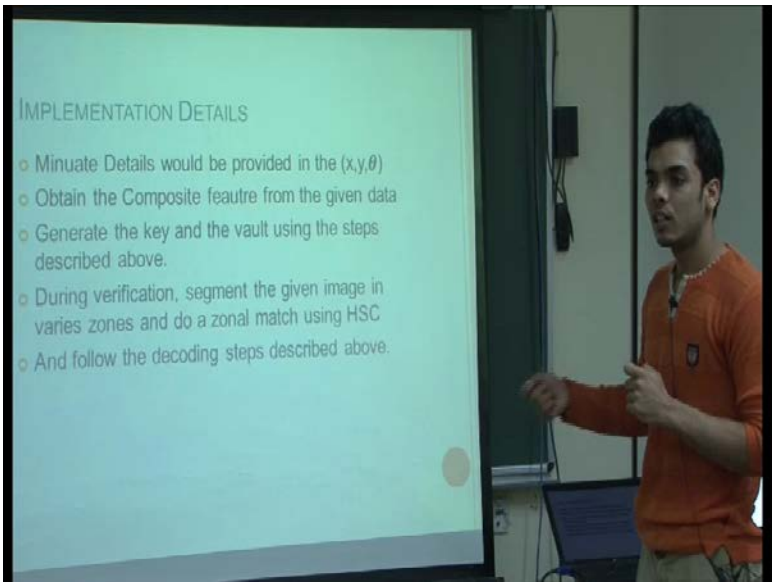

So, what have in, I am thinking of doing is like take the miniature point x y x y theta value and just get the composite vector out of it and then using this. We will, I will generate a random key and then and store and then store it in a vault and then try to feed it with a false user and try to say the security of the system. These are some of the literature I am trying to speak over this that I am, I have coded most of the encoding part of it and just the testing part of the encoding is left.

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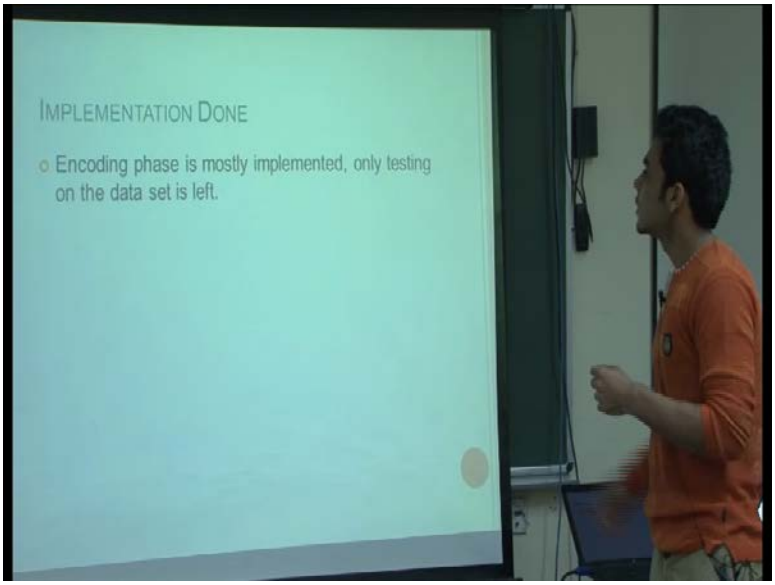

What about decoding,

It is left, I will come.

The encoding I have done the encoding part, sir we are just we are still searching for the dataset that the paper is using.

Sir the 1 of the main I want to verify the results of this.

My paper was a same as Adarsh's 1 the difference now.

Same as Adarsh one,

Adarsh the previous,

Adarsh,

Yes,

So Adarsh missed some of the points I would like to further enhance,

The basic idea from starting some,

So,

So, tell the encoding phase it same, so in the encoding phase the algorithm is actually hierarchical structure hierarchical structure algorithm. So, hierarchical structure algorithm the advantage is that as Adarsh told that for any points so d is the distance and d there are there are features d theta and phi so how do we there is a threshold. So, there is a threshold between what is-what is the maximum variation it. It can take so the hierarchy terms come in first we check for this and then we check for its neighbors.

So, this is where the hierarchy terms come in so if say 10 points passed further first feature, so if I do this. So, this is till say 10 these are 10 points, so say a threshold is like say it like eighty percent. So, if a eighty percent of them of them are made then it is.

Eighty percent of the

So like, so we there is a threshold of delta d delta theta and delta 5. So, when we compare 2 1 d something else so when we compare both-both these miniature points. So, if eight- 8 points are matched then we see. It is done so then we go further then we match further neighbors. All these are the neighbors actually, these are the neighbors of these point so then we do further neighbors and when we do other neighbors again some will match and some would not.

So we will subtract that then and sigma-sigma is equal to q by k where q is q is the number of matched neighbors and k is total number of neighbors so this is so sigma certain greater than certain threshold we declare it.

So, this was the encoding phase so next step on what we differ is mine would be to make it non invertible. So I am still looking on to this part, I am not implemented anything it after-after encoding phase.

But this is the remember see we were started with the idea that with.

Yes sir,

So until and unless you get the non invertible component,

Yes we have a.

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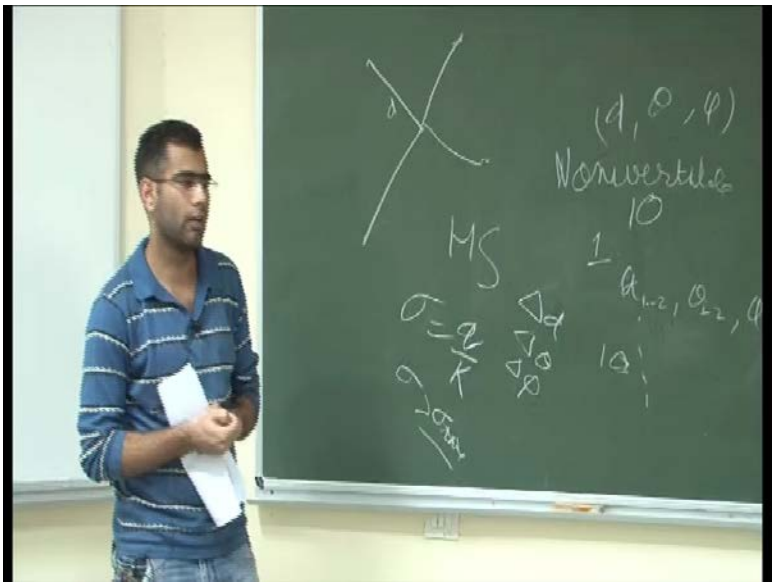

Yes, we have to think on the matching algorithm.

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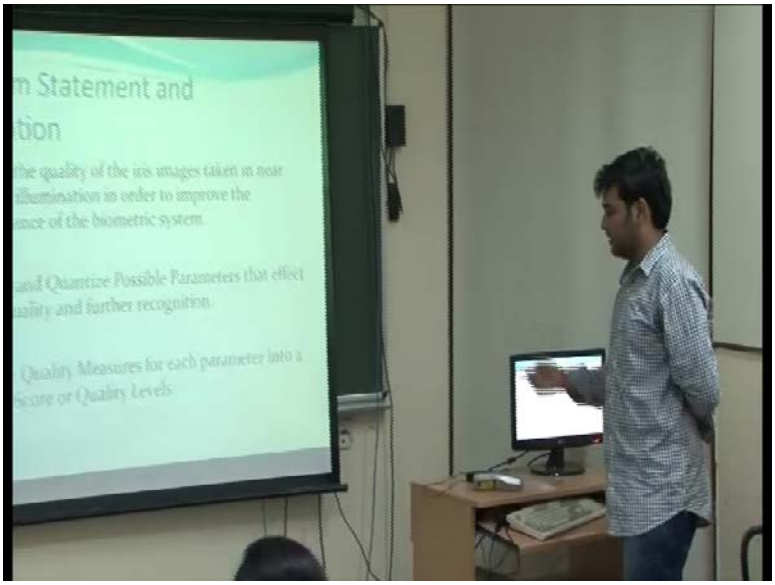

As in quite important for a multimodal biometric system, because since it is most biometric credits, we might have to give some weights to each of biometric system. Each biometric trait in order to, how is this is important, how is that is important for that the quality is actually very essential.

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I would be identifying some parameters and quantizing them that effects the image quality and further recognition and finally, I would be using quality measures for each parameter into a quality score or quality levels.

So, the process is basically as you take them encoded image. The iristic condition and then and then major the important parts of my project would be finding-finding quality measures and then I would choose a quality is a source of each quality measure to give a single quality.

Your input is the iris normalized,

Your work is iris quality.

Sir actually what happened is when you segment a iris made for example, we are using accuracy of fifty percent as in now in.

So your quality is here or there.

Sir basically the iris is not correctly segmented then the normalized width could not be correct and hence some-some but, it is not the important thing.

Where-where are you going to use your method of quality measures.

Sir after,

So input is normalized one

Yes sir.

Yes sir.

So why you are thinking about those, I will give you the normalized image. You take this normalized input take this. You have to give me the and you justify why is-is, that is that thing I need, we need I do not need to see your code iris normalization those thingIi do not need they are fairly standard .

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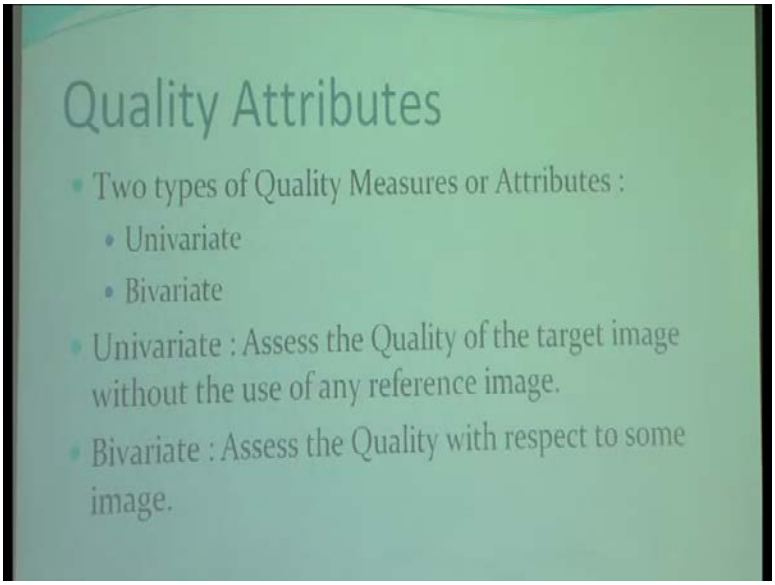

Sir, the quality attributes are actually of 2 types univariate and bivariate mostly. The most of researches that has been done in this field are considered are considering univariate these measures. Basically the univariate-univariate measures assess the quality of the target image without any use of the any reference image whereas, bivariate would refer to some image and derived from that. So, the attribute that I am proposing are for univariate focus motion blur dilartion occulusion illumination specular reflection and

off-angle is like human error that has been i. There are 3 three new bivariate measures that I am proposing correlation luminance and contrast.

Bivarient with respect with respect to the good quality images,

The thing is sir in bivariate i will consider come idealized idealized,

[FL] 1 very good measure you take and.

Yes sir,

Are you going to consider that 1 only?

I take-take a implemented, so that results can be a and off angle is something that has got.

The basic,

That is but, if you attain more in this,

Yes sir yes sir,

Yes sir.

Or he has done it.

I feel that both should do because,

But what is the credit I will give to one.

But whoever is getting the better words.

Whatever it is, I give the credit on 1 person but, I want to see this entire thing.

Then this is off angle basically images as in the photo of the when the image of the iris is captured a person might not be using straight into the dull light. So, basically what happens is there are some reflection on the iris which reduces the quality of iris quality of the iris in normalized image and this can be measured mainly 2 methods.

One is, we did not take the pupil and then draw a boundary box around it and measure the major axis and minor axis. I take the ratio of this b by this actually correspond to a

degree of formatting and the second approach that I interested is interested. It is a little bit different and little bit logical as in if you see the specula reflection on the pupil. This is the concept that I will be as in, if I do not look towards the camera if somewhere else these-these-these reflections are bound to come on the irises so my measure would be I hope that re setter distance between the centre of the pupil to that to this point to the specula reflection and this can be normalized by having by dividing the radius of the pupil with the distance from the centre of the pupil to this specula reflection.

That, this person is looking to the camera then basically, it is that specula reflection which is telling where it is where he is looking.

Yes sir and moreover sir, in the first case there is also 1 problem we assuming that the pupil and the iris are perfectly circular-circular which is not true actually. It-It might be elliptical in some places and when it is off-angle it is already in place so I am reconsider that it is a.

If i remember,

Yes sir,

He is assuming that image.

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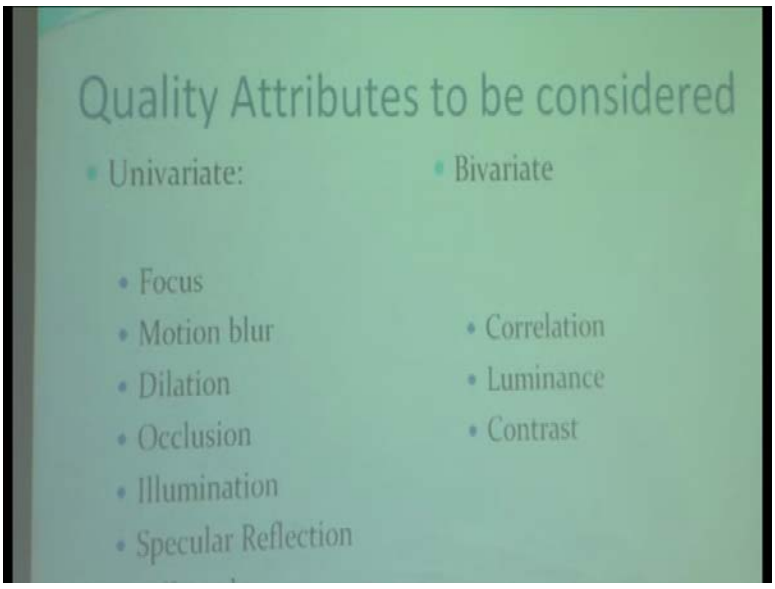

No sir, 1 case is on-angles and the other case is off-angle. If I view a circle sideways, it would have near to that, so if lets have it on a 2 dimensional and when I measure that and when I measure it measure its major axis and minor axis that will give me the degree of and so in this basic approach I assume that originally it is a circle in on-angle which is not true.

So this-this might be give you some good results which, I would like to check but, theoretically it has some problem. So I would be first of all in my first question first would be this 1 see many a times we have illusions in the iris images. There we do not have, we do not get the upper part of the iris. So can we have the top corner which lies around here as it? We have a top corner free of our so we take this part and what we do ,we can mould this image, because 6 cross 6 and I would take the values of this and take that mean of the pixels and this would be my focus feature and there is another approach to this was in a paper. What he did, was he took 2 patches on the iris and then what he what he did was he had 2 thresholds a lower threshold and a higher threshold based on which he whosoever pixels were in actually in between those thresholds were called correct and the others-others were defective. So, the patch which had less number of defected-defected-defected pixels those taken and it was 5 cross 5 square root value and then the mean value this would be the focus this is expected to be below.

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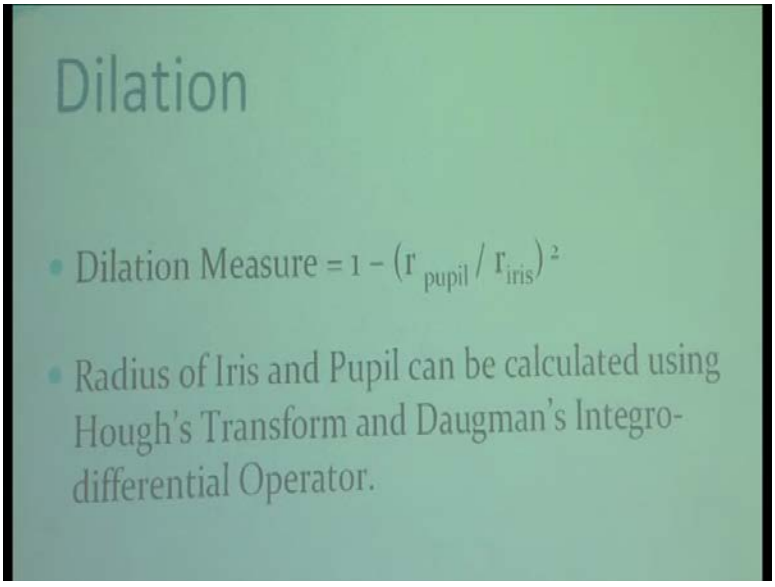

Now I come to dilation-dilation is basically that.

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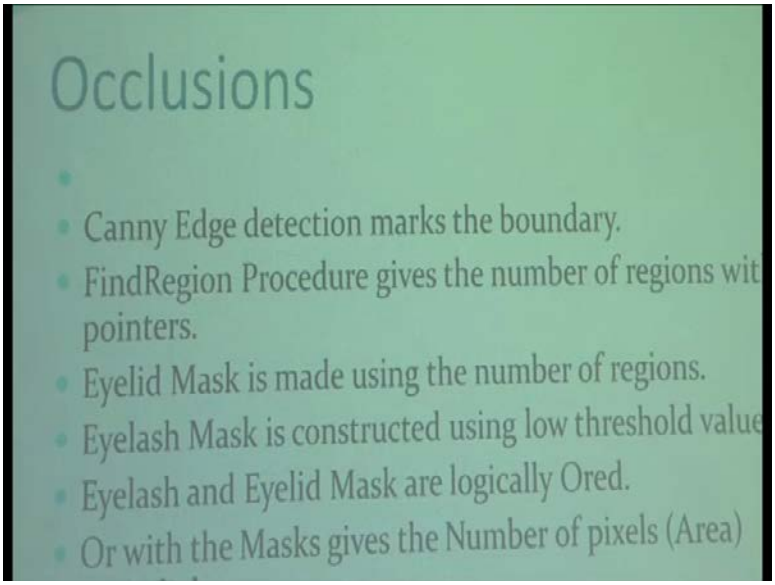

Previous 1 he said if we use only on the passage then it will work out for dilation think it is exactly the same.

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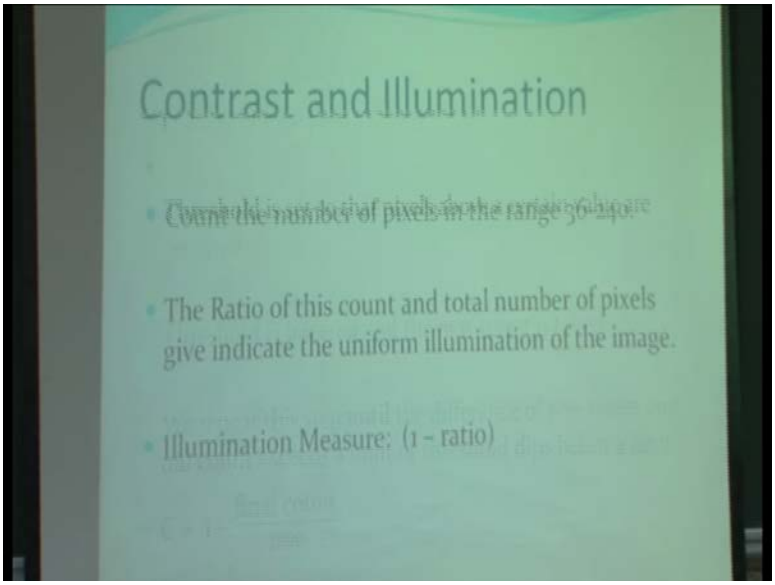

Dilation,

Yes sir.

Sir the occlusions metals,

Ok sir, Yes and the contrasting this is also.

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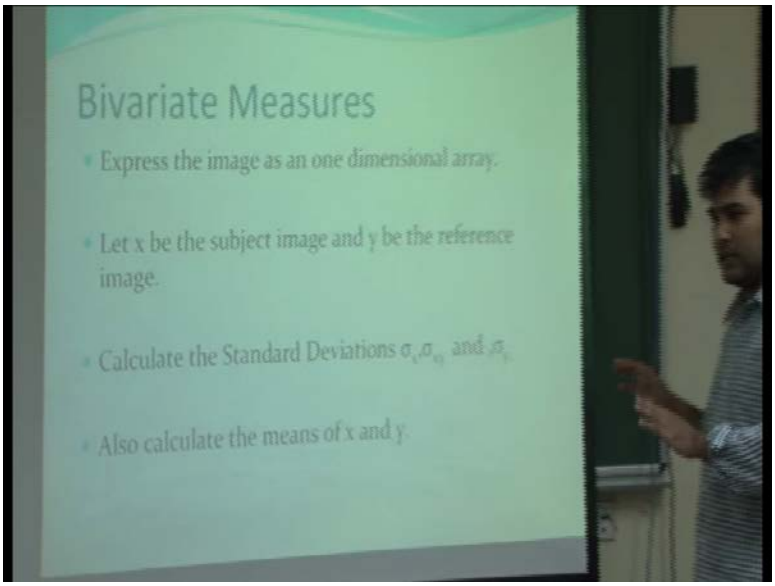

Yes sir, yes sir-sir what I have done is I have a basically 2 images and the explanation from where I got the idea actually. The idea was if I have an image and let us say radius distortant or somewhere in somewhere then how do I consider so there comes in so what I do is, I calculate the standard deviation and the means of each and every image and tell using these measures.

How can you get the coefficients correct,

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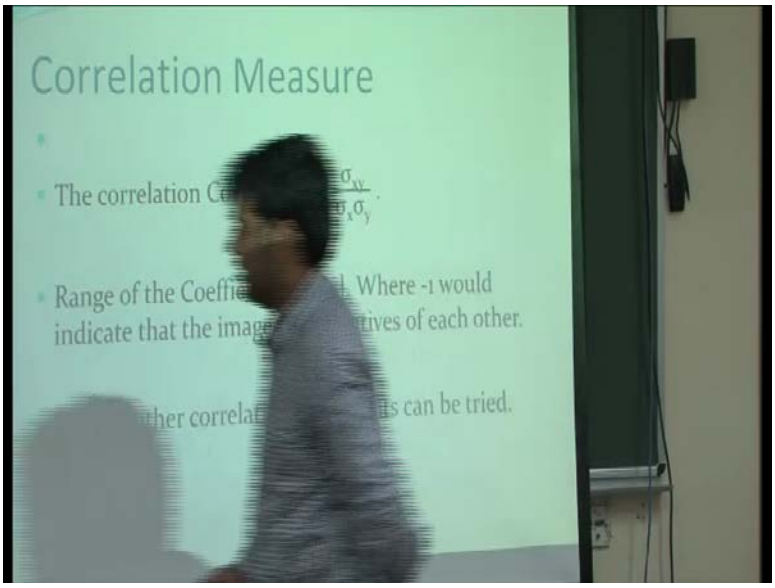

As in sir,

Except y the 2 image,

Yes sir,

Now 1 image like another 1 is shifted,

I am assuming that the dimension of both that.

Yes sir

But, next why image is shifted,

I get it yes sir,

Because you will be taking this whole thing small thing,

Yes sir.

Because of some reason it is shifted.

Yes sir.

Correlation would not work.

You shift your pattern suppose this is the image and you wanted to find out correlation between this.

That I put sir, I would first of all this is the first correlation then I would other correlation actually the correlation this correlation it takes care of the linear relationship as in there might be distortions let say the figure is on the correlation coefficients.

Second point,

They do not know these people they do not know what is correlation coefficients yes or no.

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This would be the luminous measure basically this-this is of that this is the x m, this is that y m so basically as the average actually represent the intensity of the image. So, luminous checks and first of all sir, I believe that you using some idea as in I am not having I am not matching the exact image to the exact image I am not considering.

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Correlation-correlation coefficients,

What I am doing is, I am having let us say a 1000 or 100 whatever ideal images 1000 ideal images for every for every image.

For every image,

Yes sir.

Yes sir.

Now it is a non ideal 1 or you have some then I have the second image which is a which is, because of some reason is shifted.

Yes sir.

Now correlations should not be there correlation.

1 image might be like in the centre as in the code would come like this.

Somewhere this and other would might be.

Other could might be this but, what I was repeating is a, if this image is ideal as in it is.

If this is ideal then my database would have an image similar to this.

See the above 1 is the ideal image.

Yes sir.

The bottom 1 is also ideal image.

Yes sir,

So it would not it would not be correlated so it would not be good

That is not the thing by shift operations I can go back to this.

Sir what I am doing is q m 1 q m 2 i i.

Yes sir, I-I find the coordination of all the images, so it if that images close to good or then I would certainly up 1 of these thous1000 nd images i am decent enough correlation in your these images that is the basic idea and then i would be operating these I can give them weights and I can simply give the maximum that can be.

Average-average,

Something like you can do, because you have good sample images so the good quality image should be matching with-with the pair good-good value with all of them.

See the rotation may be there I have to tell you.

You take a block and find out the block from block here and there and there then you resist the first and then you obtain the coordinate you have to find the quality to make and obtain the coordinate something otherwise if you cannot find the coordination will be there.

You can burn out the similar area.

Then you get the coordination parameter you can this is important parameter.

What I would explore various methods for quality score fusion and I think that is not correct here. That would be this I would include more parameters like entropy spatial resolution which I could not which, I could not find so, I could not include this now.

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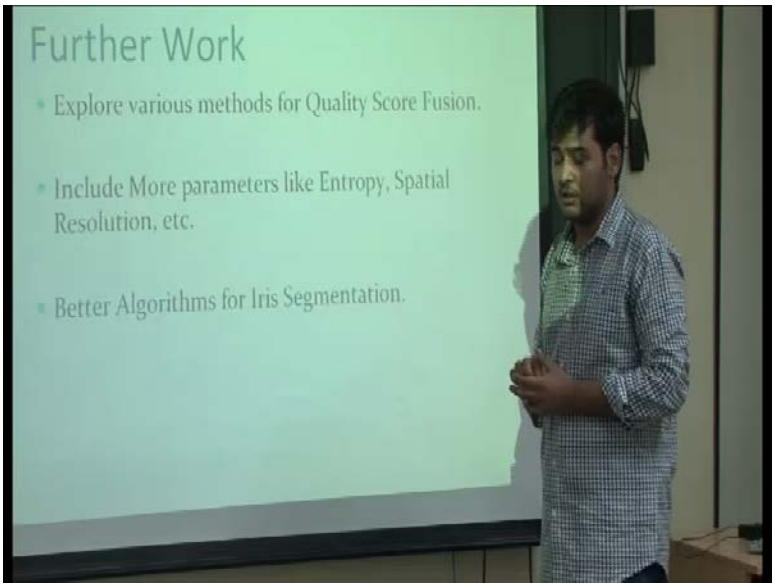

Gives what gives what,

Sir the idea of,

Basically the-the very idea that i got from some,

How many of them are adding the good work good.