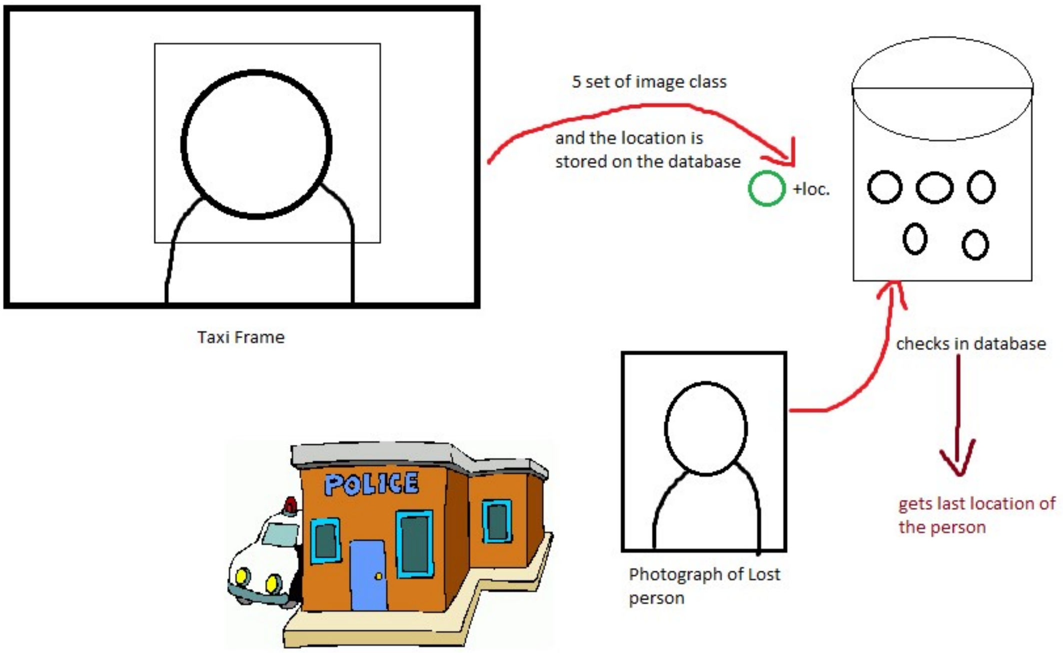
CONTENTS

Overview

In this project of implementation of Image processing on CCTV footage we are mainly focusing on the camera inside the taxies.

So, there was an initial project various features to make a car or vehicle secure like alarm system, GPS tracking etc. So, what we propose with this project is that how about govt. offers every Taxi this level of security and return put up a CCTV cam inside each taxi, for security and surveillance purposes.

So, the CCTV part of the whole project is done in this project.


Taxi Frame
5 set of image class
and the location is stored on the database
+loc.
checks in database
gets last location of the person
POLICE
Photograph of Lost person

So, consider a case that a person in sitting in that smart Taxi. The system takes 5 photos and makes a class of photographs.

Now, this person never reaches home. His Mom takes his photo to the nearest police station to make a FIR.

Now what the police officials can do is scan that photo and scan the whole database if the photo matches the police official will know all the details including the last location, No. plate of the Taxi, Taxi person name and address etc.

So, this project is divided into several parts:

-Detection of face from CCTV

-Storage of the face from CCTV on database

-Assigning the face the same class.

- Making the Police end code to recognize the face.

-Comparing both the faces.

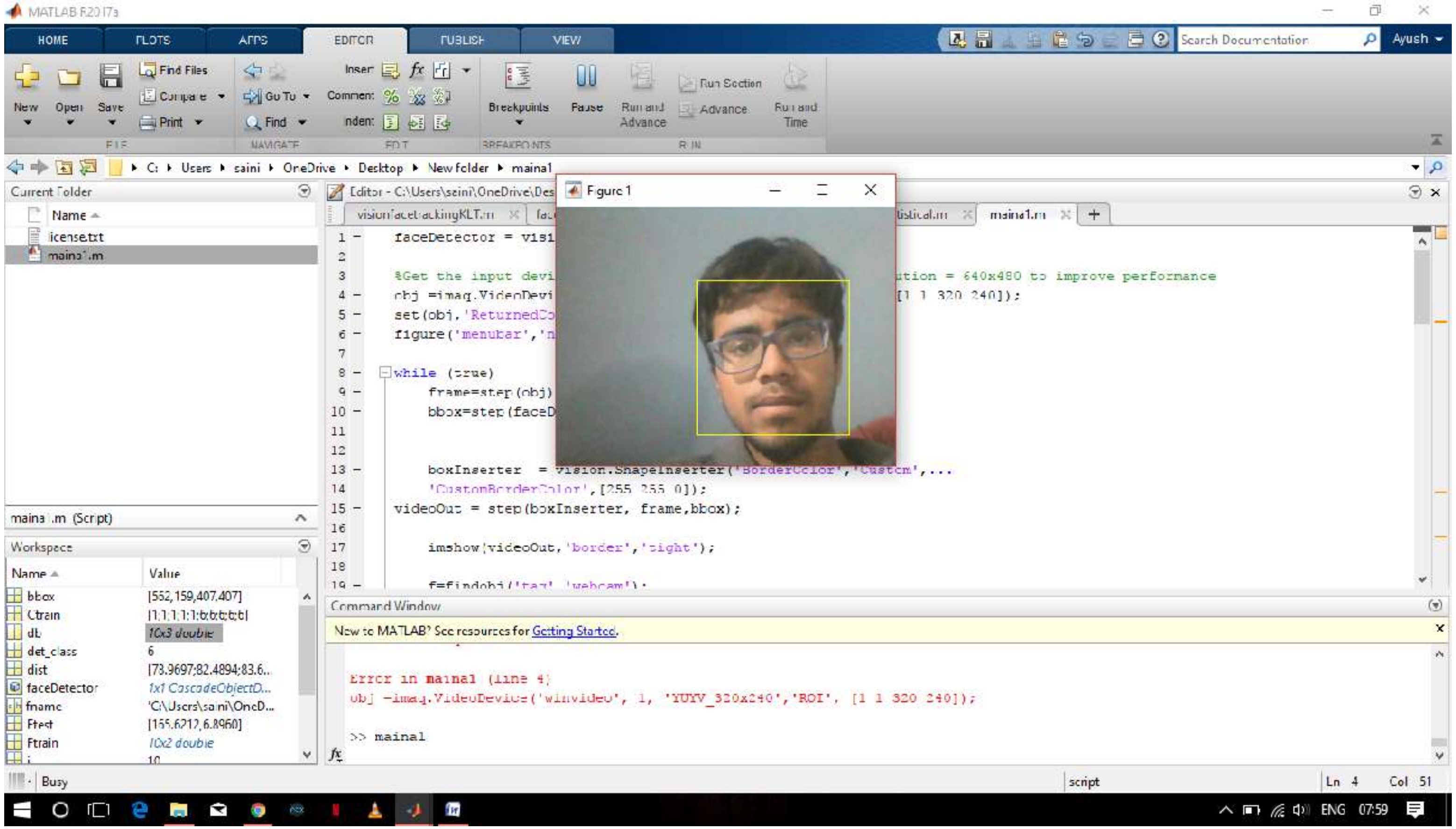
-Displaying the class of the image.

Code for face detection

```
faceDetector = vision.CascadeObjectDetector();

%Get the input device using image acquisition toolbox,resolution = 640x480 to
improve performance
obj =imaq.VideoDevice('winvideo', 1, 'YUYV_320x240','ROI', [1 1 320 240]);
set(obj,'ReturnedColorSpace', 'rgb');
figure('menubar','none','tag','webcam');

while (true)
    frame=step(obj);
    bbox=step(faceDetector,frame);


    boxInserter  = vision.ShapeInserter('BorderColor','Custom',...
    'CustomBorderColor',[255 255 0]);
videoOut = step(boxInserter, frame,bbox);

    imshow(videoOut,'border','tight');

    f=findobj('tag','webcam');

    if (isempty(f));
        [hueChannel,~,~] = rgb2hsv(frame);

% Display the Hue Channel data and draw the bounding box around the face.
figure, imshow(hueChannel), title('Hue channel data');


rectangle('Position',bbox,'EdgeColor','r','LineWidth',1)
hold off
noseDetector = vision.CascadeObjectDetector('Nose');
faceImage    = imcrop(frame,bbox);
imshow(faceImage)
noseBBox     = step(noseDetector,faceImage);

noseBBox(1:1) = noseBBox(1:1) + bbox(1:1);
videoInfo    = info(obj);
ROI=get(obj,'ROI');
VideoSize = [ROI(3) ROI(4)];

videoPlayer  = vision.VideoPlayer('Position',[300 300 VideoSize+30]);
tracker = vision.HistogramBasedTracker;
initializeObject(tracker, hueChannel, bbox);

while (1)



% Extract the next video frame
    frame = step(obj);
% RGB -> HSV
```

```
    [hueChannel,~,~] = rgb2hsv(frame);

    % Track using the Hue channel data
    bbox = step(tracker, hueChannel);

    % Insert a bounding box around the object being tracked
    videoOut = step(boxInserter, frame, bbox);

    %Insert text coordinates

    % Display the annotated video frame using the video player object
    step(videoPlayer, videoOut);
    pause (.2)
end

% Release resources
release(obj);
release(videoPlayer);

        close(gcf)




        break
    end
    pause(0.05)
end
release(obj)
```

Output:



```
faceDetector = visi

%Get the input devi                          ution = 640x480 to improve performance
obj =imaq.VideoDevi                          [1 1 320 240]);
set(obj,'ReturnedCo
figure('menubar','n

while (true)
    frame=step(obj)
    bbox=step(faceD


    boxInserter  = vision.ShapeInserter('BorderColor','Custom',...
    'CustomBorderColor',[255 255 0]);
videoOut = step(boxInserter, frame,bbox);

    imshow(videoOut,'border','tight');

    f=findobj('tag','webcam');
```

Name	Value
bbox	[552,159,407,407]
Ctrain	[1;1;1;1;1;6;6;6;6;6]
db	10x3 double
det_class	6
dist	[73.9697;82.4894;83.6...
faceDetector	1x1 CascadeObjectD...
fname	'C:\Users\saini\OneD...
Ftest	[155.6212,6.8960]
Ftrain	10x2 double
i	10

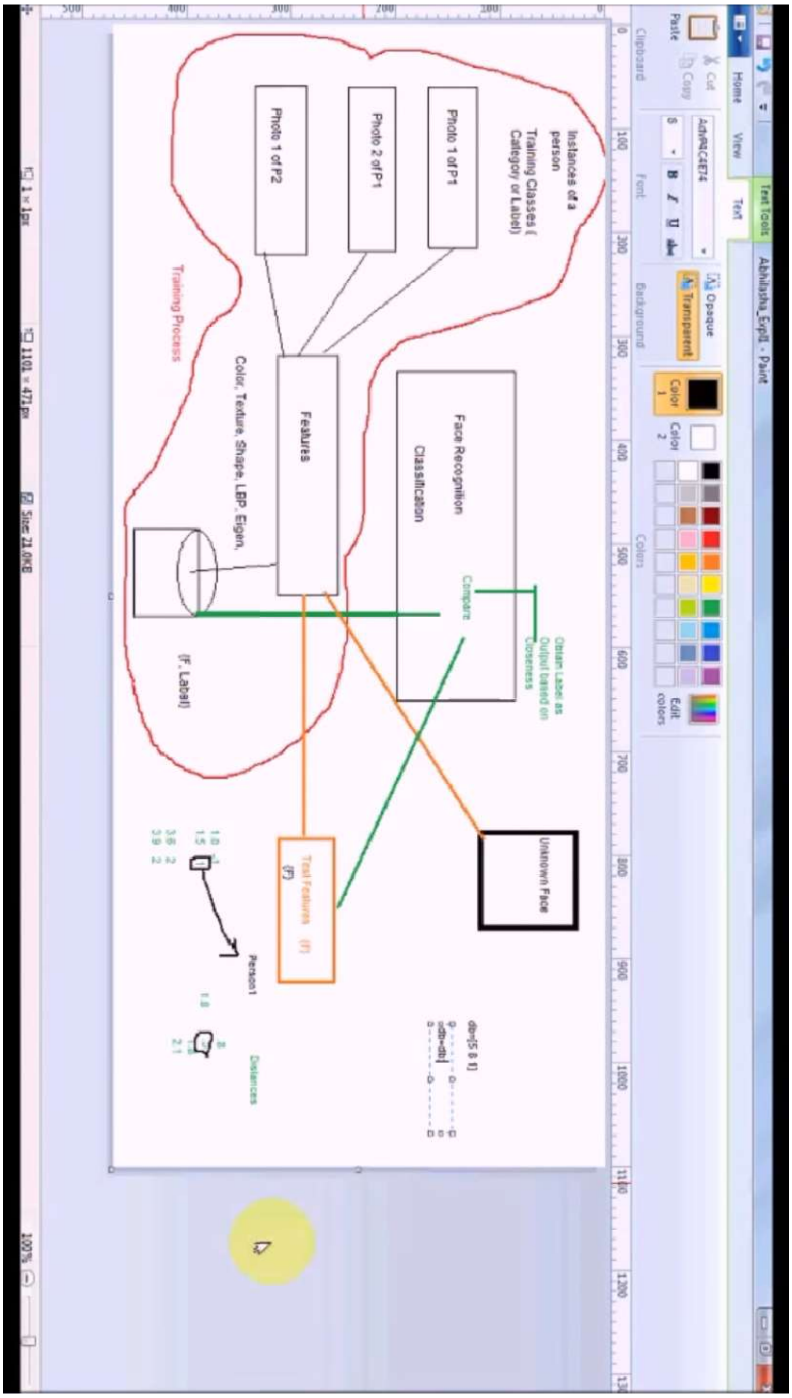
New to MATLAB? See resources for Getting Started.

```
Error in maina1 (line 4)
obj =imaq.VideoDevice('winvideo', 1, 'YUY2_320x240','ROI', [1 1 320 240]);

>> maina1
```

Busy   script   Ln 4   Col 51

ENG 07:59

Coding Overview:



Designing face Recognition System

Here In the diagram we have a database of photo graphs of different people.

Different Photos of the same person can be classified into a class and now all these photos can be called as part of this class.
To recognise an unknown face if we subtract two photo graphs we might get many difference even if they are of the same person.
So, to remove this redundancy we use Features.
Here in this case we assume that the mean and the standard deviation as the unique characteristic feature of a photograph.

In our case, we have to first extract the photo from the CCTV footage and store it.
Then extract it features and store it on database.
Now this feature function will be available to both the unknown face and the face extracted from the footage.

Features extracted will be stored on a database.
Now for the facial recognition system firstly the feature extraction function works on both the unknown face and the known face.
Now these extracted features are compared while finding the distances between the features and finding the least amongst them and declaring the class with which it finds the least distance.

Feature extraction code

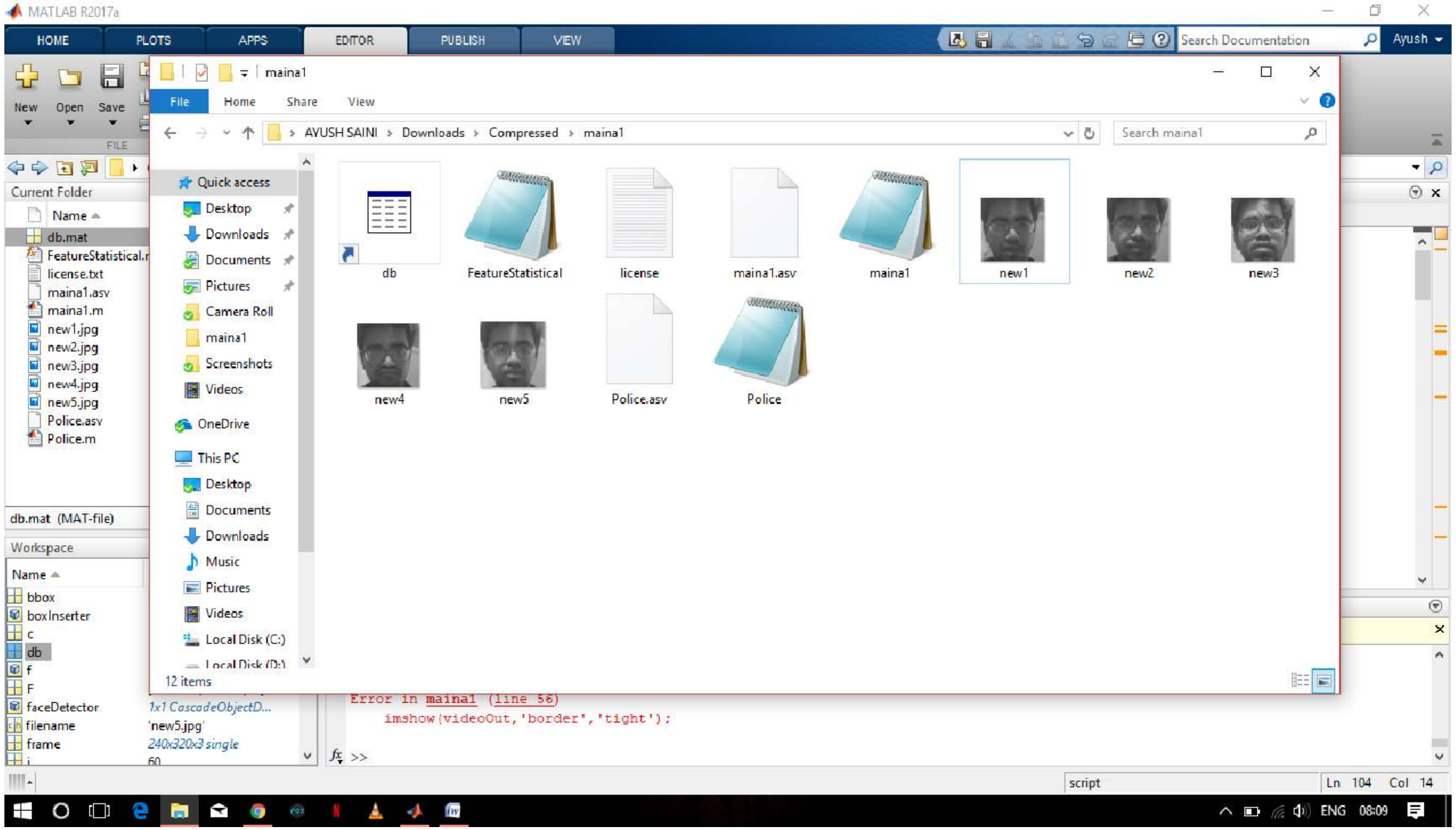
```
function [F]=FeatureStatistical(im)
im=double(im);
m=mean(mean(im));
s=std(std(im));
F=[m,s];
```

Final Code for storage

```
clear all;
faceDetector = vision.CascadeObjectDetector();

%Get the input device using image acquisition toolbox,resolution = 640x480 to
improve performance
obj =imaq.VideoDevice('winvideo', 1, 'YUY2_320x240','ROI', [1 1 320 240]);
set(obj,'ReturnedColorSpace', 'rgb');
figure('menubar','none','tag','webcam');


i=0;
k=1;

try
load db;
c=size(db,1);
c=c+1;

catch
disp("not yet");
end

while true
frame=step(obj);
bbox=step(faceDetector,frame);
i=i+1;
disp(i);
if i == 10 || i == 20 || i == 30 || i == 40 || i == 50
out = imcrop(frame,bbox);
imshow(out);
out1 = rgb2gray(out);

filename=sprintf('new%d.jpg',k)
imwrite(out1, filename);
im=imread(filename)


F=FeatureStatistical(im);

k=k+1;
try
load db;
F=[F c];
db=[db;F];
save db.mat db
catch
c=1;
db=[F c];
save db.mat db
end
end
```

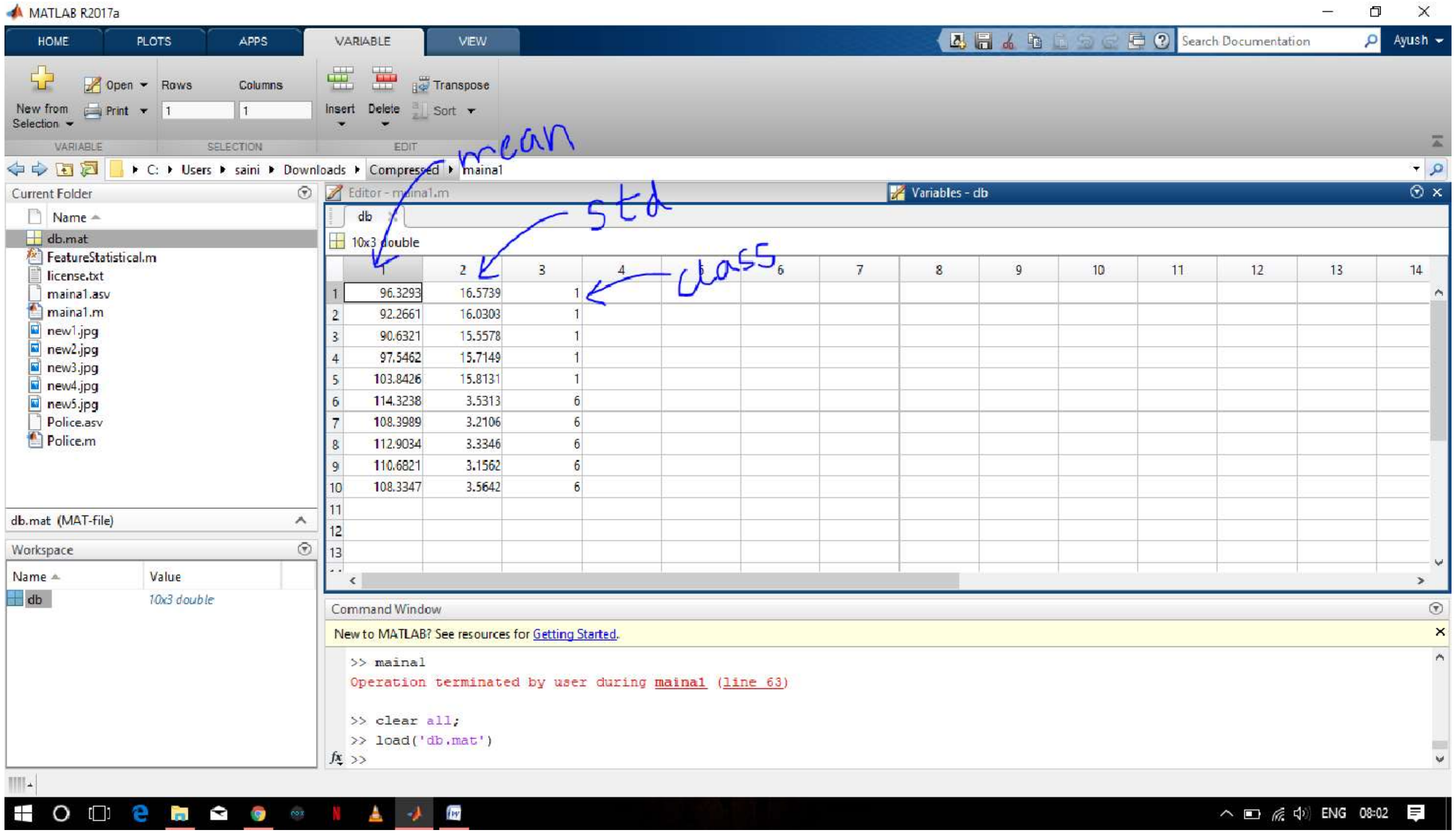
```
boxInserter  = vision.ShapeInserter('BorderColor','Custom',...
'CustomBorderColor',[255 255 0]);
videoOut = step(boxInserter, frame,bbox);

imshow(videoOut,'border','tight');

f=findobj('tag','webcam');

if (isempty(f));
[hueChannel,~,~] = rgb2hsv(frame);

% Display the Hue Channel data and draw the bounding box around the face.
figure, imshow(hueChannel), title('Hue channel data');


rectangle('Position',bbox,'EdgeColor','r','LineWidth',1)
hold off
noseDetector = vision.CascadeObjectDetector('Nose');
faceImage    = imcrop(frame,bbox);
imshow(faceImage)
noseBBox     = step(noseDetector,faceImage);

noseBBox(1:1) = noseBBox(1:1) + bbox(1:1);
videoInfo    = info(obj);
ROI=get(obj,'ROI');
VideoSize = [ROI(3) ROI(4)];

videoPlayer  = vision.VideoPlayer('Position',[300 300 VideoSize+30]);
tracker = vision.HistogramBasedTracker;
initializeObject(tracker, hueChannel, bbox);

while (1)

% Extract the next video frame
frame = step(obj);
% RGB -> HSV
[hueChannel,~,~] = rgb2hsv(frame);

% Track using the Hue channel data
bbox = step(tracker, hueChannel);

% Insert a bounding box around the object being tracked
videoOut = step(boxInserter, frame, bbox);

%Insert text coordinates

% Display the annotated video frame using the video player object
step(videoPlayer, videoOut);
pause (.2)
end

% Release resources
release(obj);
release(videoPlayer);
```

```
close(gcf)





break
end
pause(0.05)
end
release(obj)
```



Name	Value
bbox	
boxInserter	
c	
db	
f	
F	
faceDetector	1x1 CascadeObjectD...
filename	'new5.jpg'
frame	240x320x3 single
i	60

```
Error in maina1 (line 56)
    imshow(videoOut,'border','tight');
>>
```



	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	96.3293	16.5739	1											
2	92.2661	16.0303	1											
3	90.6321	15.5578	1											
4	97.5462	15.7149	1											
5	103.8426	15.8131	1											
6	114.3238	3.5313	6											
7	108.3989	3.2106	6											
8	112.9034	3.3346	6											
9	110.6821	3.1562	6											
10	108.3347	3.5642	6											
11														
12														
13														

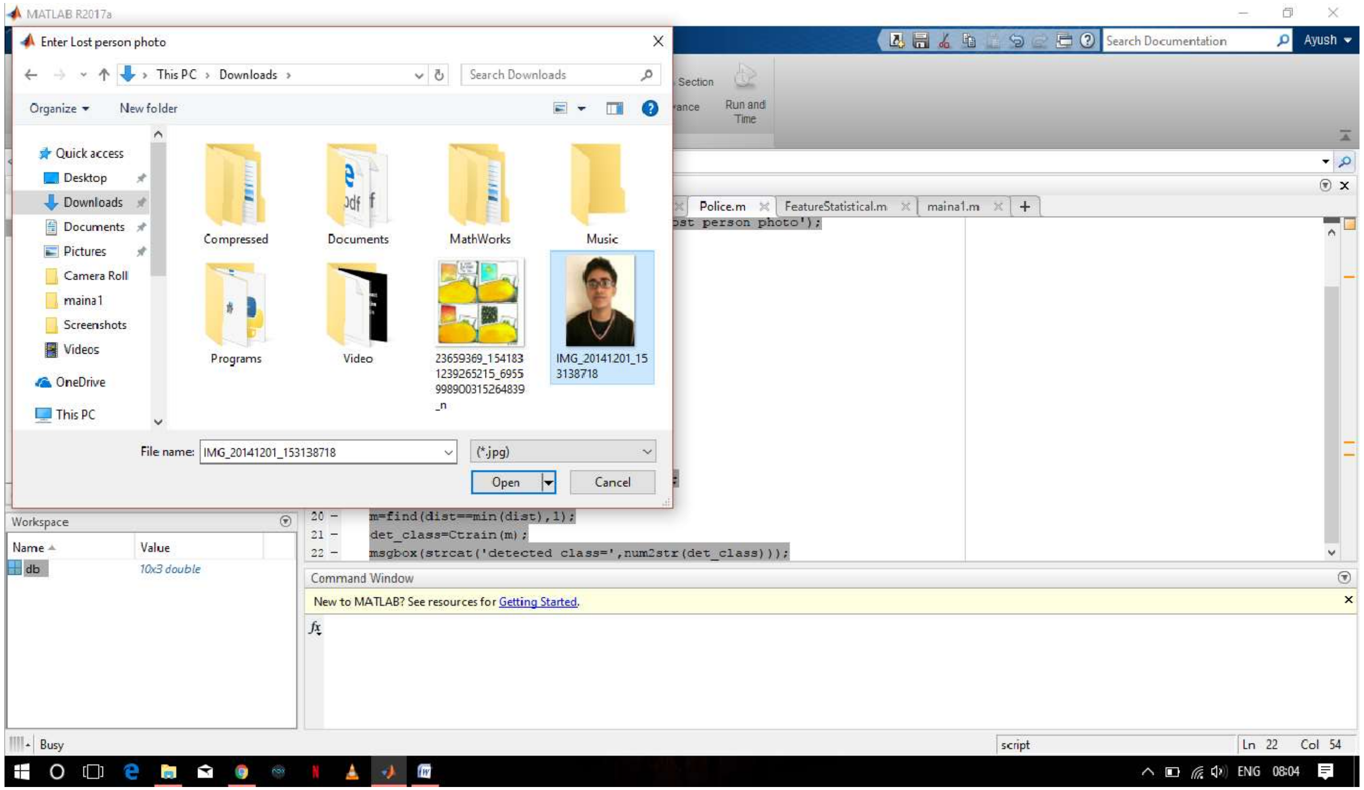
Command Window

New to MATLAB? See resources for Getting Started.

```
>> maina1
Operation terminated by user during maina1 (line 63)

>> clear all;
>> load('db.mat')
>>
```

Police Detection Code

```
clc;
close all;
faceDetector = vision.CascadeObjectDetector();
[fname path]=uigetfile('.jpg','Enter Lost person photo');
fname=strcat(path,fname);
im=imread(fname);
bbox=step(faceDetector,im);
im1 = imcrop(im,bbox);
im2 = rgb2gray(im1);
imshow(im2);

title('Input Image');
Ftest=FeatureStatistical(im2);
load db.mat
Ftrain=db(:,1:2);
Ctrain=db(:,3);
for(i=1:size(Ftrain,1))
dist(i,:)=sum( abs(Ftrain(i,:)-Ftest));
end
m=find(dist==min(dist),1);
det_class=Ctrain(m);
msgbox(strcat('detected class=',num2str(det_class)));
```



File name: IMG_20141201_153138718

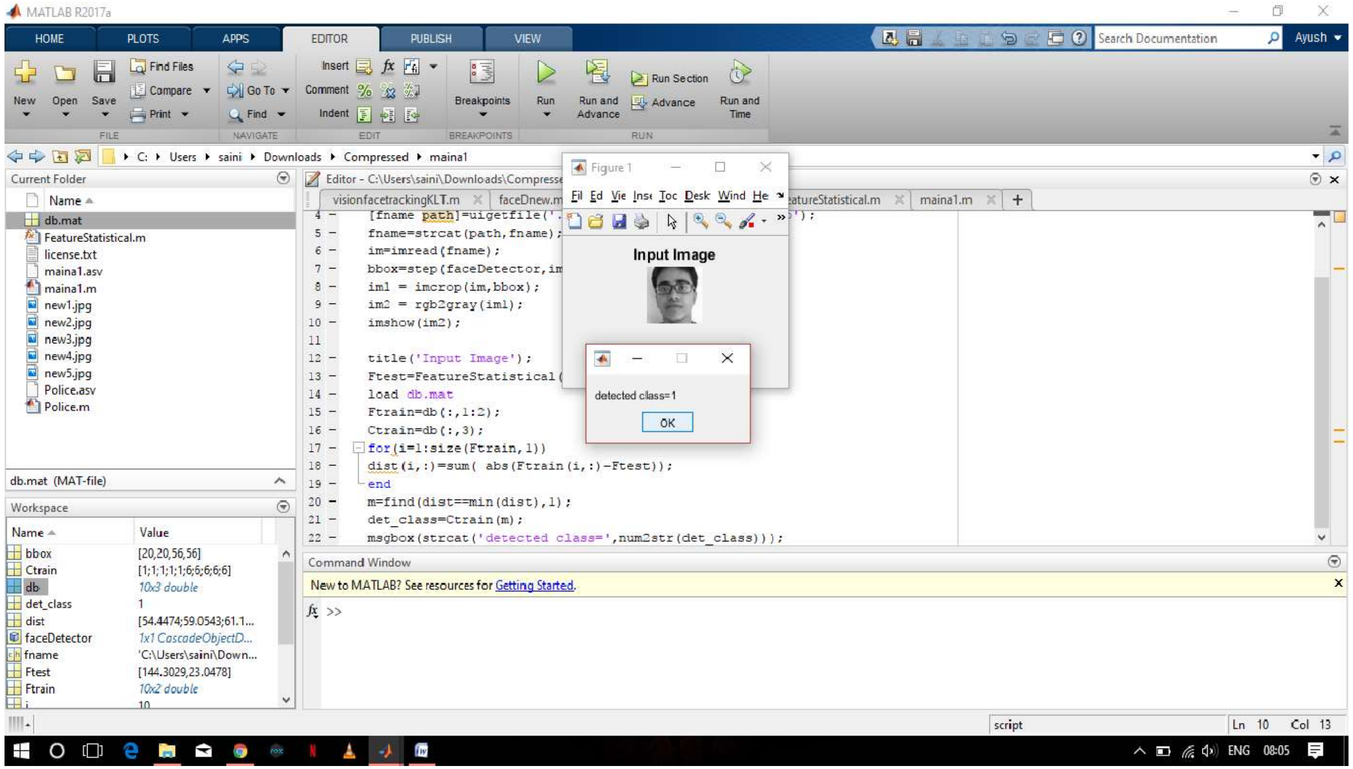
(*.jpg)

```
ost person photo');
```

```
m=find(dist==min(dist),1);
det_class=Ctrain(m);
msgbox(strcat('detected class=',num2str(det_class)));
```

Name	Value
db	10x3 double

New to MATLAB? See resources for Getting Started.



```
[fname path]=uigetfile('.                              ');
fname=strcat(path,fname);
im=imread(fname);
bbox=step(faceDetector,im
im1 = imcrop(im,bbox);
im2 = rgb2gray(im1);
imshow(im2);

title('Input Image');
Ftest=FeatureStatistical(
load db.mat
Ftrain=db(:,1:2);
Ctrain=db(:,3);
for(i=1:size(Ftrain,1))
dist(i,:)=sum( abs(Ftrain(i,:)-Ftest));
end
m=find(dist==min(dist),1);
det_class=Ctrain(m);
msgbox(strcat('detected class=',num2str(det_class)));
```

detected class=1

```
>>
```

Workspace

Name	Value
bbox	[20,20,56,56]
Ctrain	[1;1;1;1;1;6;6;6;6;6]
db	10x3 double
det_class	1
dist	[54.4474;59.0543;61.1...
faceDetector	1x1 CascadeObjectD...
fname	'C:\Users\saini\Down...
Ftest	[144.3029,23.0478]
Ftrain	10x2 double
i	10

FUTURE SCOPE

Now, we have successfully recognised the face at the Police Station, we can now implement it with the GPS device and the rest of the system. Police Officials then will be able to get the last location of the person, Name address of the Taxi driver, etc.
We also have to work on the security of the database system so not to allow anyone else the police officials to access the database