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EYE DETECTION USING MATLAB

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Abstract – *The user security for performing an official work is at risk due to authentication loop holes. Many ways are introduced to get the authentication correct, but many of that fail to recognize the correct identity only the eye remains the only source which can counter the ill-effects of the same. Various eye detection software's are present, out from which by doing the review, Matlab which has the most advanced image processing toolbox and image acquisition toolbox has been selected for the mentioned work.*

Key Words: Image processing, eye detection, Matlab.

1. INTRODUCTION

From ages there are various places where the security is a subject to be concerned of, for legally bypassing such security comes with great risk, which includes correct identification of respected person. There are various authentication tech which identifies with help of the body parts most which are by using Fingerprint, Face and Eyes. Only one body part which is more secure to be accounted for identifying the correct person are the eyes which consist of unique pattern and shape.

There are lot of platforms available at the moment but only of them two are the most used and offer wider scope in eye detection and have most of features associated with providing best security measures which are Python and Matlab. Matlab is used in this project for its advantages but the need to use this platform will be cleared by having both the platforms reviewed.

The scope of this project is only until the Eye detection the patterns and other security features are out of scope and will be dealt separately.

1.1 Review of Technologies.

Before we begin the actual discussion on the series of procedures done for making this projects the review of platforms is to be understood at the basic level which is done is the following table[1].

Table-1: Basic difference between Python and Matlab

Python	Matlab
It is a general purpose programming language used to develop fully fledged applications and other software tools.	It is a commercial programming language and interactive environment for computing and programming.
It uses 0 based indexing meaning the arrays are indexed from 0.	It uses 1based indexing meaning the arrays are indexed from 1.
It determines the scope of block based indentation.	It uses end statements as closures.
No interactive UI development platform.	Interactive UI development platform.
More expressive and readable than Matlab Scripts.	More comprehensive numerical functionality.
Graphics relies on external packages.	Graphical capabilities are more convenient.

The comparison can be summarized by knowing that Matlab and Python are High level programming languages. However Matlab is a programming language and computing environment for scientists and engineers alike, whereas Python is a general-purpose programming language used for web and app development.

1.2 Review of Methodologies

In previous section the difference between two platforms is clear expressed, but in this review we are going to do a comparison on basis of the project on why Matlab is far better than python in terms of image processing[2].

Table-2:Difference based on Image Processing

Python	Matlab
It does not have any image toolbox.	It has both image processing and image acquisition toolbox.
It offers less scope but has big potential to grow further quickly.	It offers a better scope than python.
Libraries need to be downloaded.	Libraries are inbuilt.
Documentation is needed to be searched.	Documentation is already provided in Matlab.

Large Numeric operations cannot be carried out on image.	Large amount of numeric operations can be carried out on image
It is free and things can be done easily with the help of Open CV.	It is expensive but has already defined inbuilt functions.

From the above comparison it is justified that even if the Matlab is expensive than python it offers wider scope in image processing. So which is why attained the mentioned aimin the abstract of this project Matlab platform will be used.

2. DOCUMENTATION

2.1 Image Processing Toolbox

It provides a set of standard reference algorithms, functions and app for image processing, analyzing and visualization.

Following things can be performed with the help of this toolbox:

1. Image analysis
2. Image segmentation
3. Noise reduction
4. Geometric transformation
5. Image registration

2.2 Image Acquisition Toolbox

It enables us to acquire images and videos from cameras and frame grabbers directly into the Matlab and Simulink.

2.3 Description of different Functions

A. Snapshot
Acquire single image frame from a Webcam
img = snapshot(cam);

B. Imshow
Display image
Imshow(I);

C. Viola Jones algorithm
vision.CascadeObjectDetector('I')

D. Imcrop
Crop image
Imcrop(I);

E. Imresize
Resize image
B = imresize(A, scale)

F. Rgb2gray
Convert RGB image or colormap to grayscale
I = rgb2gray(RGB)

G. Zeroes
Create array of all zeros
X = zeros(sz1,...,szN)

H. Medfilt2
2-D median filtering
B = medfilt2(A

I. Imfill
Fill image regions and holes
new=imfill(new,'holes');

J. Subplot
Create axes in tiled positions
subplot(m,n,p)

K. Bwareaopen
Remove small objects from binary image
BW2 = bwareaopen(BW, P)

L. Pause
Halt execution temporarily
pause(n);

M. Clc
Clear Command Window

N. Clear
Remove items from workspace, freeing up system memory

O. For loop
Execute statements specified number of times
for *index* = *values*
statements
end

3. CODE AND OPERATION

```
clc
clear
cam=webcam;
for i=1:100
  I = snapshot(cam);
  imshow(I);
  bodyDetector = vision.CascadeObjectDetector('EyePairSmall');
  bboxBody = step(bodyDetector, I);
  if(~isempty(bboxBody) && size(bboxBody,1)==1)
    bboxBody(3)=bboxBody(3)/2;
        b=imcrop(I,bboxBody);
    b1=imresize(b,[100 200]);
    b=rgb2gray(b1);
    b=b1(:,:,1);
    s=size(b);
    new=zeros(s(1),s(2));
    ind=find(b<50);
    new(ind)=1;
    new=medfilt2(new);
    new=imfill(new,'holes');
    subplot(1,2,1);
    imshow(b);
    subplot(1,2,2);
    bw=bwareaopen(new,500);
    imshow(bw)
    pause(0.000001);
  end
end
```

First the command window is cleared and then the workspace is cleared. A video recording is started from which a snapshot is taken at regular intervals. This snapshots are then passed to the viola jones algorithm which is used for

detection body parts from which we detected the Pair of Eyes and after getting the image we resized it so as to get only one eye this image is colored one, futher to just detect the eye pupil the image is converted into grayscale image and then passed on to be converted into black and white in which there are little amount of white holes, in order to eliminate this holes the medfilt2 and find functions are used. At the end both the results are plotted one grayscale image and other black-white image with the help of subplot function.

4. Result

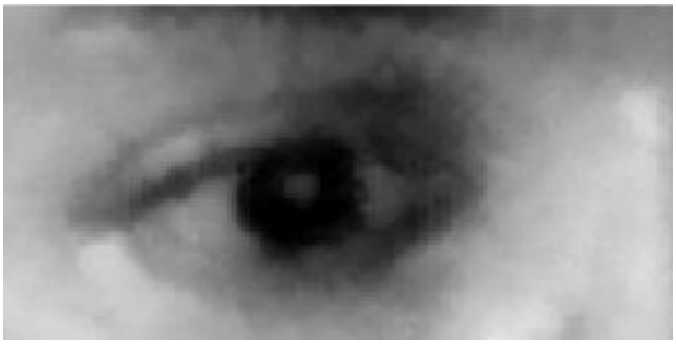

Fig no1: Gray scale image

Fig no2: Black-white Image

5. CONCLUSIONS

Hence from the above problems eye detection is an absolute necessity for overcoming the difficulties encountered during security. Various method implemented so far have their pros and cons where only one methodology which is achieved using Matlab whose pros heavies its cons and because of this it has become the best way for achieving the solution for the mentioned stated problem of this project. With the help of Matlab image processing and image acquisition toolbox the a single eye can be detected, the resolution and the clarity of the image can be improved by using high pixel and best aperture cameras.

REFERENCES

[1] http://www.differencebetween.net/technology/internet/difference-between-python-and-matlab/M. Young, The Technical Writer's Handbook. Mill Valley, CA: University Science, 1989.

[2] https://in.mathworks.com/products/matlab/matlab-vs-python.html.

[3] https://in.mathworks.com/help/

[4] https://www.youtube.com/watch?v=NX5aQ9egA60&feature=emb_logo