STUDENT ATTENDANCE SYSTEM USING IRIS DETECTION

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ABSTRACT

Iris recognition is regarded as the most reliable and accurate biometric identification system available. Most commercial iris recognition systems use patented algorithms developed by Daugman, and these algorithms are able to produce perfect recognition rates. However, published results have usually been produced under favourable conditions, and there have been no independent trials of the technology. The iris recognition system consists of an automatic segmentation system that is based on the Hough transform, and is able to localise the circular iris and pupil region, occluding eyelids and eyelashes, and reflections. The extracted iris region was then normalised into a rectangular block with constant dimensions to account for imaging inconsistencies. Finally, the phase data from 1D Log-Gabor filters was extracted and quantised to four levels to encode the unique pattern of the iris into a bit-wise biometric template.

Keyword : - *Iris biometrics, Active Camera, User biometrics, Radius Calculation, Authentication, Pattern recognition, Segmentation*

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1. INTRODUCTION

In the entire globe any educational organization is concerned in relation to the attendance of individuals because this has an effect on their overall performances. In conventional method attendance[1] of students are taken by calling student names or signing on paper which is extremely time overwhelming. To eliminate this problem one of the solutions is a biometric-based attendance system that can automatically capture student's attendance by recognizing their iris. The objective will be to implement an open-source iris recognition system[3] in order to verify the claimed performance of the technology. The development tool used will be JAVA, and emphasis will be only on the software for performing recognition, and hardware as Active camera for capturing an eye image. A rapid application development (RAD) approach will be employed in order to produce results quickly.

The future system will be developed using Face detection Algorithm using SSR filter mechanism[4] and Skin Pixel detection [2] using RGB model.

1.1 System Architechture

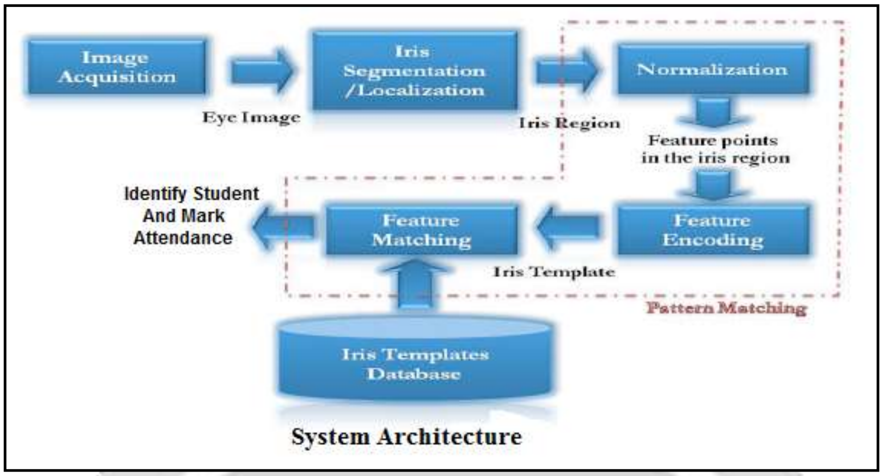


Fig1 : System Architecture

1.2 Modular Structure

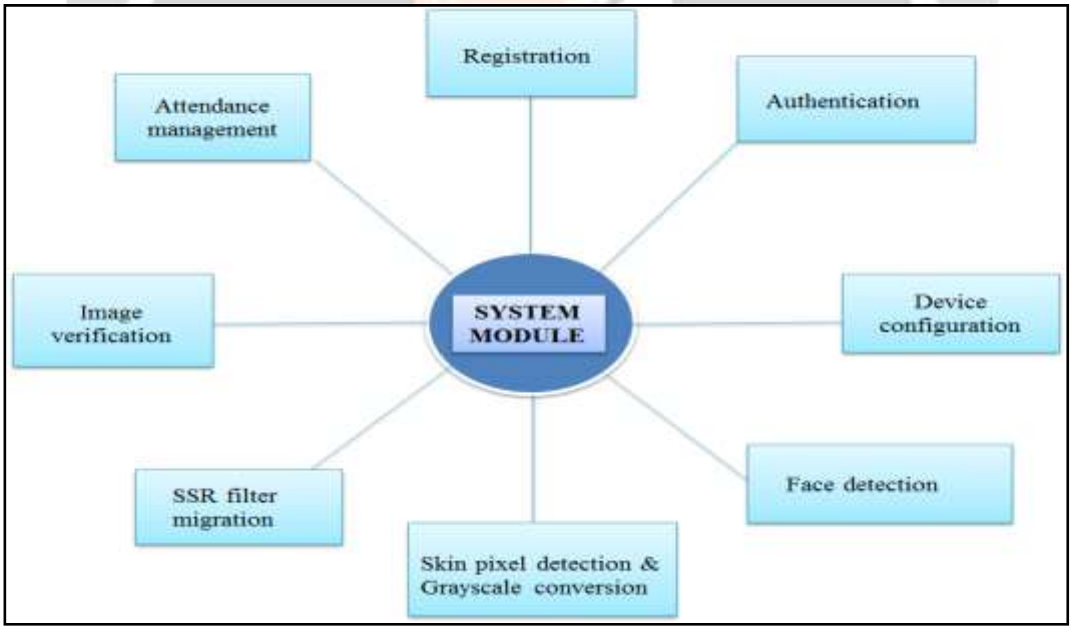


Fig 2: Modular Structure

2. ALGORITHM USED

2.1 Gray Scale Conversion

Grayscale as the brightness dimension of the HSB scheme[5] (or the axis of the HSB cone)—with saturation held to zero, and hue therefore meaningless. The grayscale is used by photographers, and it is also useful in many documents where variations in gray can be used in place of costly color printing.

• **Black** = 0% brightness, 100% gray.

• **White** = 100% brightness, 0% gray.

• **Gray** is most often specified from white = 0, thus 10% grey = 90% brightness

- Hue Based
- Saturation Based
- Brightness Based

2.2 Six Segment Rectangular Filter

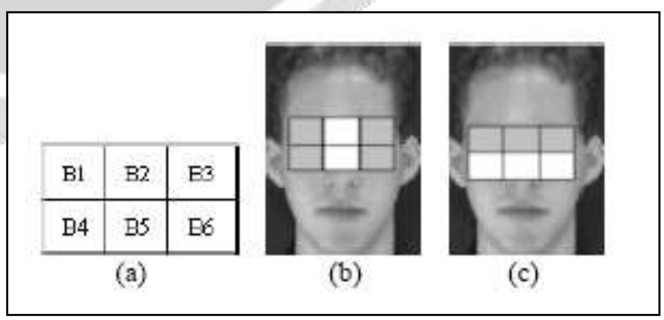
In order to achieve high speed and reliable face detection system, we propose the method combine both feature-based and image-based approach to detect the point between the eyes (hereafter we call it Between-the-Eyes) by using Six-Segmented Rectangular filter (SSR filter) [2].

At the beginning, a rectangle is scanned throughout the input image. This rectangle is segmented into six segments as shown in Fig.2 (a).

We denote the total sum of pixel value of each segment (B1 ¡ B6) as 1 6 b b S S ¡ . The proposed SSR filter[6] is used to detect the Between-the-Eyes based on two characteristics of face geometry.

(1) The nose area (n S) is brighter than the right and left eye area (er S and el S , respectively) as shown in Fig.2 (b), where

$S_n = S_{b2} + S_{b5}$
$S_{er} = S_{b1} + S_{b4}$
$S_{el} = S_{b3} + S_{b6}$



Then,

$S_n > S_{er}$ (5)
$S_n > S_{el}$ (6)

(2) The eye area (both eyes and eyebrows) (e S) is relatively darker than the cheekbone area (including nose) (c S) as shown in Fig. 2 (c), where

$S_e = S_{b1} + S_{b2} + S_{b3}$

$S_c = S_{b4} + S_{b5} + S_{b6}$

Then,

$S_e < S_c$ (7)

When expression (5), (6), and (7) are all satisfied, the center of the rectangle can be a candidate for Between-the-Eyes.

3. SKIN PIXEL DETECTION

The skin color detection[7] significantly depends on the chosen color model. The RGB color space is default in many image formats. Color space transformation can be applied to reduce the overlap between skin and non-skin pixels and will thereby aid skin pixel classification and achieve high accuracy in varying illumination conditions.

1. The HSV Color Space

Hue-saturation based color spaces were introduced when there was a need for the user to specify color properties numerically. Hue defines the dominant color (such as red, green, purple and yellow) of an area; saturation measures the colorfulness of an area in proportion to its brightness. The “intensity”, “lightness” or “value” is related to the color luminance. Hue can be used as a decision parameter to detect human skin.

2. The YUV Color Space

YUV is the color space used in the PAL system of television broadcasting which is the standard inmost of Europe and some other places. The RGB values are transformed into YUV values using the formulation given below:

$$\begin{bmatrix} Y \\ U \\ V \end{bmatrix} = \begin{bmatrix} 16 \\ 128 \\ 128 \end{bmatrix} + \begin{bmatrix} 0.257 & 0.504 & 0.098 \\ -0.148 & -0.291 & 0.439 \\ 0.439 & -0.368 & -0.071 \end{bmatrix} \begin{bmatrix} R \\ G \\ B \end{bmatrix}$$

The chromaticity information is encoded in the U and V components (Bourke, 1994). Hue and saturation are gotten by the following transformation[8].

$$ch = \sqrt{|U|^2 + |V|^2} \quad \text{and} \quad \theta = \tan^{-1}\left(|V| / |U|\right)$$

θ represents hue, which is defined as the angle of vector in YUV color space. ch represents saturation, which is defined as the mode of U and V.

3. *The YIQ Color Space*

Like YUV color space, YIQ is the color primary system adopted by NTSC for colorTV broadcasting[9]. Conversion from RGB to YIQ may be accomplished using the color matrix:

$$\begin{bmatrix} Y \\ I \\ Q \end{bmatrix} = \begin{bmatrix} 0.299 & 0.587 & 0.114 \\ 0.596 & -0.274 & -0.322 \\ 0.211 & -0.523 & 0.312 \end{bmatrix} \begin{bmatrix} R \\ G \\ B \end{bmatrix}$$

It is the red-orange axis, Q is roughly orthogonal to I. The less I value means the less blue-green andthe more yellow (Bourke, 1994). Through some experiments[10], we find that the combination of YUV and YIQ color space is more robust than each other.

3.1 Mathematical Modelling

Input : {Human Face image with proper eye region}

Output : {Absenty and Presenty of specific student}

Methodology : {Image Processing, Divide and Conquer, Segmentation}

Function : {F1,F2,F3,F4,F5}

F1 : {Capture Device object}
F2 : {Face componenet object}
F3 : {Eyes region object}
F4 : {Database object}
F5 : {Motion}

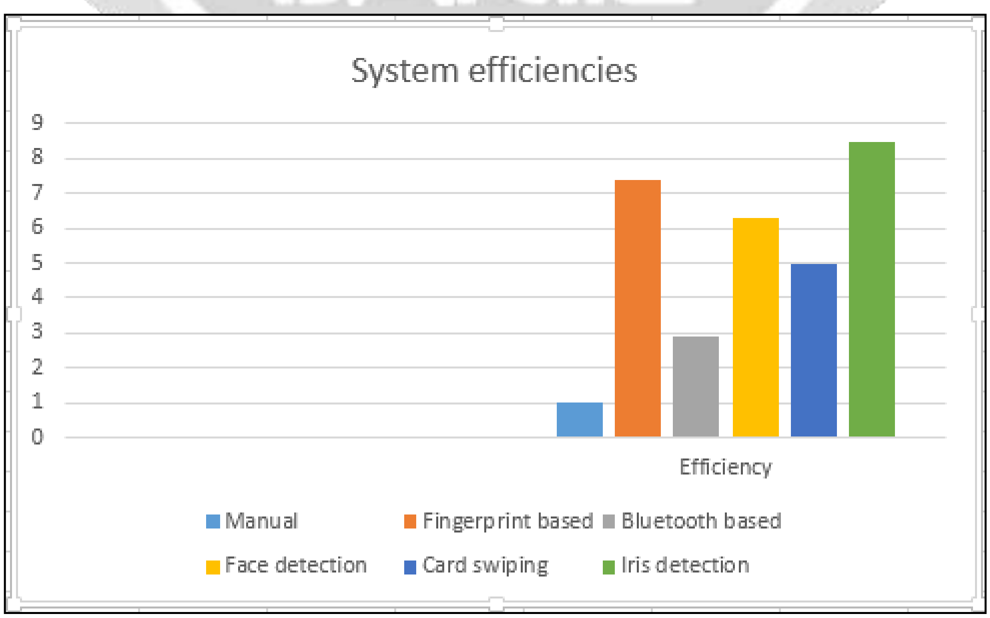
Formula :
1] Hough Transform
$x^2_c + y^2_c - r^2 = 0$

x_c = Centre coordinate (x-axis)
y_c = centre coordinate (y-axis)
r = radius value

2] Iris Optimal Analysis
$[S,R]=d * f^2/f^2+fcd$

d = stand-off distance
c = circle of confusion
s = far point
r = near point
Depth of field=S-R (DOF)

4. RESULTS



5. CONCLUSION

The Design of student attendance system is based on biometric system. it is in which student has to stand in front of the camera to mark the attendance. This system is used to prevent the proxy issues and it help to keep the student records safe.

6. REFERENCES

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