EYE COLOUR DETECTION

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Abstract: *The purpose of this paper is finding an efficient way for classifying eye colour using only a photo of the eye. This could be helpful in various situations, and make tasks like surveys and researches very easy.*

Keywords: C*lassification, digital image processing , eye colour, MATLAB*

I. INTRODUCTION

This project revolves around the paper Image Processing, this Project topic was particularly chosen because of the reforms in the Security and analysis industry. This particular industry has grown so much that it started from mere lock and keys, but it has seen a shift from biometric thumb impression to retina scanning and still going forward.

Since that path was not explored by us, Eye colour detection seemed the right entry point, as this was related to retina scanning. This was also fascinating because, we achieved the functionality by using MATLAB only and not fancy yet useful OpenCV. The project contains various verticals or processes that we have studied but also which were new. This further will be explained the Proposed method part.

II. LITERATURE REVIEW

These are the literature reviews of some of the research papers that we consulted.

1. In [1], the authors have taken a 2 step approach for eye detection. The two stages are: eye candidate selection stage and validation stage. In the first stage, 99% of the pixels are rejected through an eye colour distribution analysis. And in the second stage, the remaining 1% are further processed by 2D Haar wavelets analysis.
2. The [2] paper takes a different approach for detecting eye and mouth in an image. The method includes detecting iris coloured pixels in the image, grouping these pixels into clusters, detecting eye positions using these clusters, generating

signature curve using salient pixels, and using these to detect the positions.

3. Paper [3] concerns more about eye colour classification. The system entails automatic iris localisation, followed by classification based on Gaussian Mixture Models with Expectation maximisation. It also provides real-world detection results.

4. In [4], This work studies eye colour as a soft biometric trait and provides a novel insight about the influence of pertinent factors in this context, like colour spaces, illumination and presence of glasses. A motivation for the paper is the fact that the human iris colour is an essential facial trait for Caucasians, which can be employed in iris pattern recognition systems for pruning the search or in soft biometrics systems for person re- identification.

5. In [5], This paper proposes a novel technique for eye detection using colour and morphological image processing. It is observed that eye regions in an image are characterised by low illumination, high density edges and high contrast as compared to other parts of the face

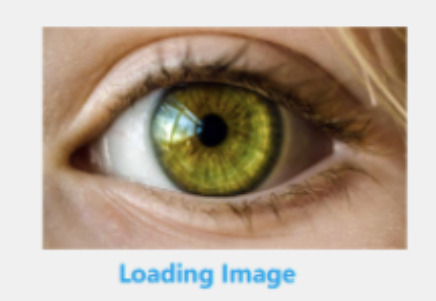
III. PROPOSED METHOD

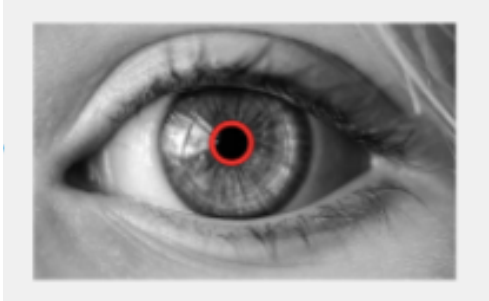
Detection of eye colour in a general populace can be a challenging task, mostly due to the huge population. Using DIP, we can simplify the process and use previous already available photos to detect the eye colour of an individual.

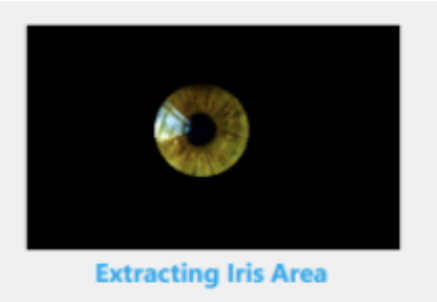
For accomplishing this, we have developed an algorithm to detect eye colour using only a photo of the eye. The proposed algorithm works in these steps:

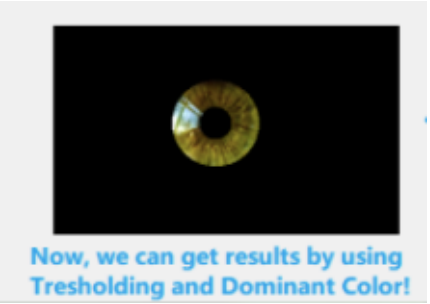
1. The pupil area is extracted. To do this, the picture is first binarised, this makes the pupil stand out, which is then extracted using thresholding.
2. Then, using the extracted pupil, we can extract the whole iris, using connected component labelling.
3. In our algorithm, we remove the pupil, because it can cause deviations in the resulting colour.
4. Now, only the iris remains. We can use dominant colour technique to find the colour of the iris.

The following images will illustrate these steps:

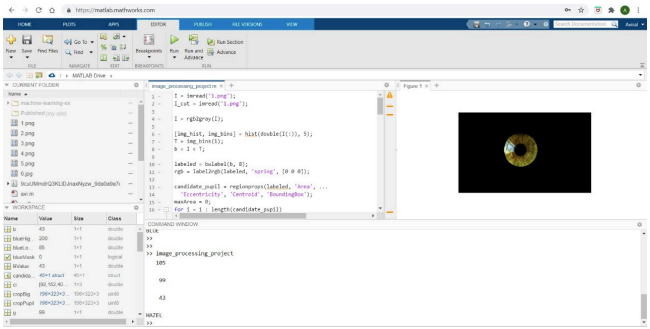


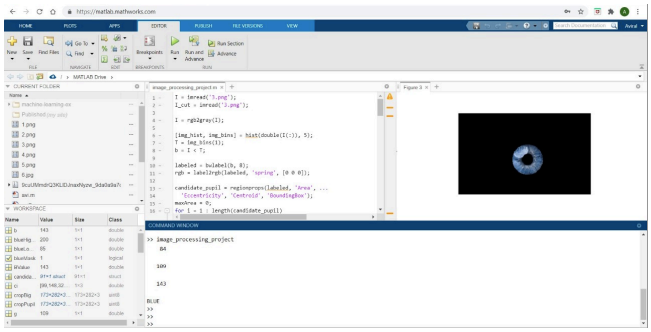


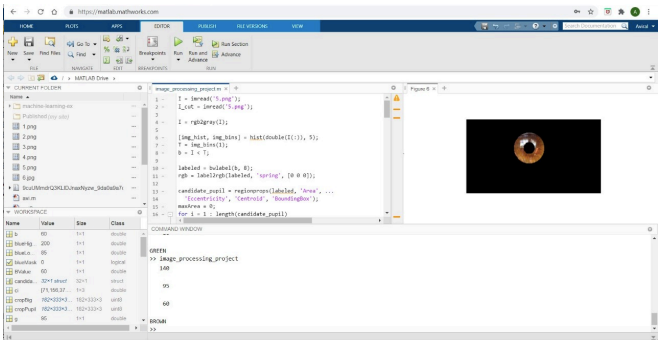


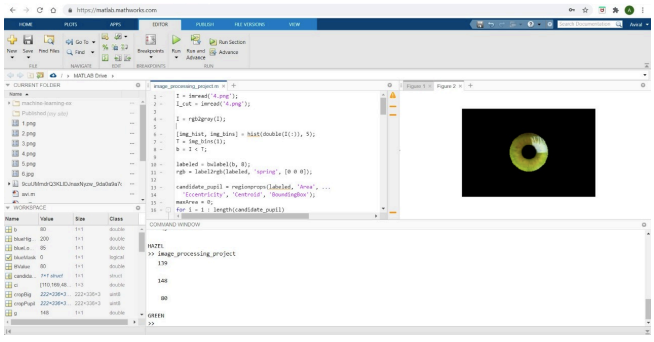


IV. SCREENSHOTS









IV. RESULTS AND ANALYSIS

We ran our algorithm on 4 sample images, and these are the results that we got:

SAMPLE IMAGE	EXPECTED COLOR	OUTPUT COLOR
	HAZEL	HAZEL
	BLUE	BLUE
	BLUE	BLUE
	BROWN	BROWN

TABLE 1. COMPARING EXPECTED AND RECEIVED OUTPUT

From the above results, it is pretty clear that the algorithm is very efficient in finding the colour of the eye.

But problems start to arise when the colour of the eye is not one the coded ones. That means that right now, the algorithm can only classify **Blue, Brown, Green or Hazel** eye colours (these colours do represent the majority of eye colours though).

Also, when the images are not focused on the eye, or are not clear, then the algorithm may face problems in classifying the right colour.

V. CONCLUSION

In this project a simple and efficient method for detecting eye colour is used. The code first extracts pupil of the eyes and increases its radius. After detecting the eyes the code compares it with the predefined colours blue, green, brown and hazel eyes and then shows the result written in the text field. For each colour, there are three ranges of the threshold have been saved for it in the code, red low threshold to red high threshold, blue low threshold to blue high threshold, green low threshold to green high threshold. when the extracted triple colour (red, green, blue) from the eye lies in the threshold ranges, the eye colour directly detected and recognised.

The code is robust in detecting the eye colour and open for the future modifications so that more variants of the eyes colours can be added.

VI. REFERENCES

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