Real-Time Automated System to Recognize Label Print Quality and Correctness using Rasbperry Pi

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***Abstract*—Colour blindness is commonly known as Colour Vision Deficiency (CVD), the vision defect which presented in our eye ball recognition of colour is the major problem for the people who are having colour blindness. There is no cure for colour blindness. Diagnosis may allow a person's teacher to change their method of teaching to accommodate the decreased ability to recognize colours. Special lenses may help people with red-green colour blindness when under bright conditions. There are also mobile apps that can help people to identify colours. We are proposing a hand held real-time automated system to detect and label the colour name for colour blind persons that will help to identify and label colour which they can't do using natural eyes. We designed this Real-time application using Matlab Simulink model. This Project mainly focusing and developing the users interface it can detect the colour and label the colour name which is shown by using video glasses. This system mainly consists of Computer, Raspberry pi B, Camera module, Card reader and HDML cable.**

Keywords — Colour blindness, Colour vision deficiency, MATLAB Simulink.

I. INTRODUCTION

The colour vision deficiency is known as visual weakness is the kind of vision deserted in our eye ball. The greater part of the individuals experiencing shading vision shortage they can see types, yet difficult to separate between red, green, blue and yellow colours (hues). Is not totally visual deficiency it is a gentle handicap to recognize certain colours in their everyday life and it causes real issue in now a day. Photoreceptor cells which are displayed in our retina are described as sensitive to light.

Protonopia can't see red light and Deuteronopia can't see green light and persons experiencing this kind of lack can't recognize red and green colour. Achromatopsia is absolute visual deficiency the persons suffering over this can just see dark, white and having lazy eyes, not able to distinguish in bright lights. This happens by poor working of rods and the cones in our eyes it is not appealing it is genetic problem, it can't be spread. CVD is caused by the deficiency in our eyeball which is either the defects or completely missing of certain photoreceptor.
For example; a red object might appear as yellow for red-green colourblind people.

There are two different types of photoreceptors in our eyeballs that allow us to see everything. They are called rods and cones. The rods receptors are very sensitive to low light level but not to colour while cones are sensitive to colours. There are three types of colour blindness that is monochromatic, dichromatic and anomalous thricomatism. Monochromatism is either the absence of cones or only one type of them in the eyes. Dichromatism is a occurrence of two different types of colouring whereas for trichromatism is a occurrence for three colours. A person with this type of colour-blind is very rare and his/her vision is equivalent of a black-and-white movie. In the human retina we have four photoreceptors three are red, green and blue the other is rod photoreceptor which don't distinguish shading. The cone comprises of three wave lengths they are red or L cone (long wavelength), green or M cone (medium wavelength), and blue or S cone (short wavelength).

II.RELATED WORK

In [1], the paper proposed the replacement colour maps that allow a designer to check the colours seen by protonopoes and deuteranopes.

In [2], the paper describes the introduction for general reader into the topic of colour vision deficiencies and discusses many different topics related to colour blindness. This paper also compiles and excellent over view with details regarding colour vision deficiency.

In [3], the paper describes that the colour is an extremely important component of the information that they gather with our eye. Most of us use colour so automatically that they fail to appreciate how important it is in our daily activities. Example; we know when fruit is rip; the ripe banana is yellow not green.

In [4], the paper describes the development of genetics models of normal and defective human colour vision that can be traced using a genetic model that postulated an allelic series of two X linked colour vision loci.

In [5], the paper describes the development of a device which can detect different colours by using sensor. Th3e target group of the device are blind people or people who cannot colours. They were already different systems in market but were very expensive. The new device developed was compact, simple and cheap.

In [6], the paper describes that colour blindness is a genetic mutation that alters the colour vision by decreasing sensitivity to certain colour wavelengths depending on the defects. This paper also describes many forms of colour blindness ranging from monochromacy (black white) to the most common form red-green.

In [7], the paper presents a simple colour recognition algorithm using neural network model to determine ripness of banana. The captured image of banana is resized and colour components are extracted.

In [8], the paper describes that colour-blind is a physical defect causing patient loses the ability to recognize colours either particular or whole of them. This paper also proposes a vision aid kit with improved user experience, such a finger pointer and voice command-and-response.

In [9], the paper describes raspberry pi processing module and its peripherals implementing based on this platform finally actualized the image capturing using raspberry pi system. This paper also shows that the designed system is fast enough to run the image capturing, algorithm and data stream can flow smoothly between camera and raspberry pi board.

III. PROPOSED METHODOLOGY

This method is proposed to provide the convenience to the patients suffering from achromatopsia. In this method fuzzy colour discrimination method is used to provide the details of colour that is identified in video streaming. This video streaming is displayed on video glasses and the processing for identification and labelling of colour is done by using raspberry pi. The work is carried to provide a handheld device for the patients suffering from achromatopsia to learn, identify and discriminate the different colours. The proposed method is to identify the colour regions and label the red, blue, green colours. The identification of object and labelling of colour is done in this method.

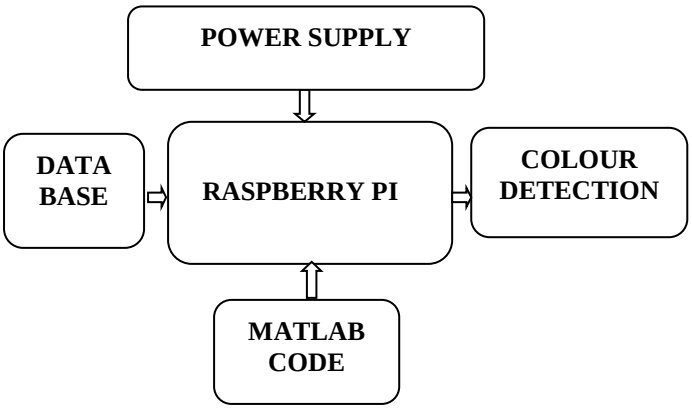

Figure 1: Block Diagram

The algorithm proposed in started below,
Step-1: Obtain the video stream using raspberry pi camera.
Step-2: The fuzzy logic depends upon the discrete values in the range from zero to one. In this context select the threshold values of three colours Red, Green and Blue.
Step-3: Now perform in subtract () function from the frame to obtain red component from the image.
Step-4: Apply median filter to remove noise component from image.
Step-5: Convert the image into binary image by considering the threshold values of red, green, and blue.
Step-6: Perform blob analysis to obtain the region of interest of object.
Step-7: Obtain the centroid values of the coloured object i.e., centroid value of red, green, and blue colour objects in the image.
Step-8: By using text inverter function of matlab, indicate the colour component identified.
Step-9: The result with indication of colour name on object is seen using video glasses.

These are the steps that are performed to obtain the colour name or object that will provide act as guiding handled device for patient suffering from achromatopsia. This handheld device will guide the colourblind people to justify the colour of object.

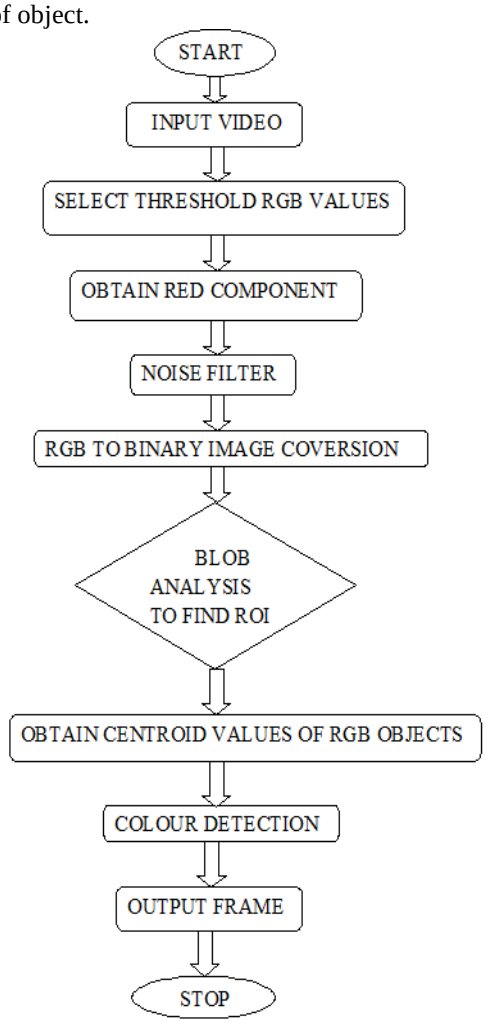

Figure 2: Flow Chart

V. RESULT

On assembling, configuring and executing the Simulink it is being identified that the hand held device designed provides the results that are expected by identifying the red, green, blue color objects and label the color name for the objects. The software implementation of the system is done by using MATLAB Simulink.

VI. CONCLUSION & FUTURE SCOPE

Colour blind is a serious and severe problem now-a-days. A robust real-time system is developed and tested to recognize and label colours by using Raspberry-pi B model which acts as a stand alone device, which is cheaper in cost easier to carry. MATLAB Simulink is utilized to develop the Simulink to recognize the colour of the object and also it labels out the object.

We are using fixed focus camera, due to this the camera captures only for fixed distances with low clarity images. Instead of this we use auto focus Cameras then it will capture the images for long distances and with high clarity.

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