

## Colour Detection from Image

Ranjini Arali<sup>1</sup>, Sumitha M<sup>2</sup>, Swathi P<sup>3</sup>, Vismaya Halawal<sup>4</sup>, Arvind Naik<sup>5</sup>

UGStudents<sup>1,2,3,4</sup> Department of Computer Science and Engineering Assistant Professor<sup>5</sup> Department of CSE  
Srinivas Institute of Technology, Mangalore

Submitted: 01-07-2021

Revised: 13-07-2021

Accepted: 16-07-2021

**ABSTRACT**-Colour detection is the process of detecting the name of any colour. We are going to build an application through which we can automatically get the name of the colour by clicking on them. So for this, we will have a data file that contains the colour name and its values. Colours are made up of 3 primary colours: red, green, and blue. In our dataset, we need to map each colour's values with their corresponding names. We will be using a dataset that contains RGB values with their corresponding names. OpenCv is a Computer Vision library. It is a collection of C functions with a few C++ classes that implement popular Image Processing and Computer Vision algorithms. Computer vision is the science that means to give a comparative, if not better, capacity to a machine or PC. Some of the basic image processing capabilities include filtering, edge detection, corner detection, sampling and interpolation, color conversion, morphological operations, histograms and many more. Colour detection using opencv has many advantages like, it allows the detection of a specific colour in a livestream video content. In this opencv colour detection system there are four major modules, activated webcam, scan object, match frame parts and system results. Users can open webcam by clicking the webcam button. Then the algorithm analysis the pattern of the framed part of webcam. Pattern is matched with defined color pattern by RGB color model. If the pattern matched with the potential pattern of RGB colour model then the system results with the correct output.

### I. INTRODUCTION

Colour detection is a process of detecting the name of any colour. In this project we are going to build an application through which we can automatically generate the name of the colour by clicking on the object. So for this, we will have a data file that contains the name of the colour and its values. Colours are made up of 3 primary colours: red, green, and blue. In our dataset, we need to map each colour's value with their corresponding

names. We will be using a dataset that contains RGB values with their corresponding names.

Colour is a feature that has been exploited to a great extent in digital image processing, since it is a powerful tool that often facilitates the classification and identification of objects, which can be discriminated based on the large number of appreciable colour tones. In the area of computer vision it is common to find problems in which it is required to use the colour information to carry out the detection of reference points that allow the tracking and definition of the behaviour of objects that present particular characteristics and that are observed through sequence of images, obtained in a controlled environment.

### II. LITERATURE SURVEY

#### [1] A Colour Edge Detection Algorithm in RGB Colour Space

In this paper it is said that edge detection is one of the most commonly used operations in image processing and pattern recognition, the reason for this is that edges form the outline of an object. An edge is the boundary between an object and the background, and indicates the boundary between overlapping objects. This means that if the edges in an image can be identified accurately, all of the objects can be located and basic properties such as area, perimeter, and shape can be measured. Since computer vision involves the identification and classification of objects in an image, edge detection is an essential tool. Efficient and accurate edge detection will lead to increase the performance of subsequent image processing techniques, including image segmentation, object-based image coding, and image retrieval. A colour image edge detection algorithm is proposed in this paper. Average maximum colour difference value is used to predict the optimum threshold value for a colour image and thinning technique is applied to extract proper edges. The proposed method is applied over large database of color images both synthetic and real life images and performance of the algorithm is evident from the results and is

comparable with other edge detection algorithms.

### **[2] Colour detection in RGB-modeled images using MATLAB**

This is research work that describes regarding the colour science ideas and strategies. The RGB show is used here to acknowledge the shading within the image. The RGB show could be a shading model that joins red, inexperienced associated blue lights in numerous approaches to create an assortment of hues. Alasdair McAndrew (2004) in his paper provides an in depth introduction to Digital image process with Matlab.M.

Sezgin., et al (2004) In hiswork, he conducted an intensive study of image threshold ways, categorizing them, presenting their formulas in a consistent notation, and eventually comparing performance. The threshold technique is classified by bar graph form, spatial cluster, entropy, object attribute, spatial correlation, and native grayscale surface. It additionally identifies higher threshold algorithms than NDT and document image applications. Abadpour, A. et al (2005) in his paper color image process using principal element analysis describes the Colour recognition involves comparison of every pixel within the metric and leads to the dominant colour because the colour of the given object are explained.

### **[3] An efficient colour detection in RGB space using hierarchical neural network structure**

In this paper it is said that colour detection is generally a primary stage in most of the image processing application, if the application is based on the colour information, such as road sign detection, face detection, skin color detection, object detection and object tracking etc. As the performance of subsequent modules in an image processing application is adversely affected by the previous modules, the accuracy of colour detection with a high performance inevitably becomes crucial in some applications. This paper introduces a method for an efficient colour detection in RGB space using an ensemble of experts in hierarchical structure. In this structure, a set of experts is assigned to evaluate R, G and B components of a pixel and then constructs a degree of membership to the set of predefined class of colours for the given pixel. Then a master neural network constructs its final decision based on the membership probabilities provided by the set of experts. Qualitative and quantitative evaluations of the results show that the proposed hierarchical structure of neural networks is superior over the conventional neural network classifier in colour

detection.

### **[4] Modeling and Designing of Colour Detector using Arduino**

In this paper the utility model discloses a colour detector and a colour recognition device, wherein the colour detector comprises a luminous source which emits detecting light to to-be measured objects, and a sensor which is used for receiving reflected light to measuring colour information, wherein the colour recognition device comprises the color detector, a data processing unit which is used for recognizing colour through collecting data, storing data and comparing data and is used for judging relative cases, and an output unit used for outputting colour recognition results. The colour detector and the colour recognition device can be applied in electronic whiteboards, when writing on the whiteboards, the detector and the device can automatically recognize the colour of a writing pen, which is convenient for writers as writing on common blackboards or whiteboards, and the color of the handwritings depends on the colour of writing pens. The colour detector and the color recognition device are also can be applied to other situations which need to recognize colors. For the colour recognition we refer to the basic rgb pattern or the hue or colour circle.

## **III. IMPLEMENTATION**

System Implementation is that the stage wherever the theoretical style is reborn into a operating system, the new system is also whole new, replacement Associate in Nursing existing manual, or machine-controlled system or it's going to be a serious modification to Associate in Nursing existing system The system is enforced exploitation OpenCV, Python, pyttax3 API, numpy and pandas libraries, and Tkinter module for GUI interface.

### **OpenCV**

OpenCV (Open Source Computer Vision Library) may be a library of programming functions mainly aimed toward real-time computer vision. Originally developed by Intel, it had been later supported by Willow Garage then Itseez (which was later acquired by Intel). The library is cross-platform and free to be used under the open-source Apache 2 License. Starting with 2011, OpenCV features GPU acceleration for real-time operations. OpenCV project was initially an Intel Research initiative to advance CPU-intensive applications, a part of a series of projects including real-time ray tracing and 3D

display walls. OpenCV is written in C++ and its primary interface is in C++, but it still retains a less comprehensive though extensive older C interface. All of the new developments and algorithms appear within the C++ interface. There are bindings in Python, Java and MATLAB/OCTAVE. The API for these interfaces are often found within the online documentation. Wrappers in several programming languages have been developed to encourage adoption by a wider audience. In version 3.4, JavaScript bindings for a specific subset of OpenCV functions was released as OpenCV.js, to be used for web platforms. OpenCV runs on the subsequent desktop operating systems: Windows, Linux, macOS, FreeBSD, NetBSD, OpenBSD. OpenCV runs on the subsequent mobile operating systems: Android, iOS, Maemo, BlackBerry 10.

### Python

Python is an interpreted, high-level and general-purpose programming language. Python's design philosophy emphasizes code readability with its notable use of great indentation. Its language constructs and object-oriented approach aim to assist programmers write clear, logical code for little and large-scale projects. Python is dynamically-typed and garbage-collected. It supports multiple programming paradigms, including structured (particularly, procedural), object-oriented and functional programming. Python is usually described as a "batteries included" language because of its comprehensive standard library. Python may be a multi-paradigm artificial language. Object-oriented programming and structured programming are fully supported, and lots of its features support functional programming and aspect-oriented programming (including by meta programming and meta objects (magic methods)). Many other paradigms are supported via extensions, including design by contract and logic programming. Python uses dynamic typing and a mixture of reference counting and a cycle-detecting dustman for memory management. It also features dynamic name resolution (late binding), which binds method and variable names during program execution. Python strives for an easier, less-cluttered syntax and grammar while giving developers a choice in their coding methodology. In contrast to Perl's "there is over a way to try and do it" motto, Python embraces a "there should be one— and preferably just one—obvious thanks to do it" design philosophy. Alex Martelli, a Fellow

at the Python Software Foundation and Python book author, writes that "To describe something as 'clever' isn't considered a compliment within the Python culture."

### Visual Studio Code

Visual Studio Code may be a ASCII text file editor which will be used with a spread of programming languages, together with Java, JavaScript, Go, Node.js and C++. it's supported the negatron framework, that is employed to develop Node.js internet apps that run on the Blink layout engine. though it uses the negatron framework, the software system doesn't use Atom and instead employs an equivalent editor part (codenamed "Monaco") employed in Azure DevOps (formerly known as Visual Studio on-line and Visual Studio Team Services). It supports variety of programming languages and a collection of options that differs per language. Unwanted files and folders are often excluded from the project tree via the settings.

### Pyttxs3

pyttxs3 is a text-to-speech conversion library in Python. Unlike alternative libraries, it works offline and is compatible with both Python 2 and 3. An application invokes the pyttxs3.init() factory function to get a reference to a pyttxs3.Engine instance. it is a very easy to use tool which converts the entered text into speech. The pyttxs3 module supports two voices first is female and the second is male which is provided by "sapi5" for windows. It supports three TTS engines sapi5 – SAPI5 on Windows, nsss – NSSpeechSynthesizer on Mac OS X and espeak – eSpeak on every other platform.

### Tkinter

Tkinter is the most commonly used library for developing GUI (Graphical User Interface) in Python. It is a standard Python interface to the Tk GUI toolkit shipped with Python. As Tk and Tkinter are available on most of the Unix platforms as well as on the Windows system, developing GUI applications with Tkinter becomes the fastest and easiest. Tkinter is the inbuilt python module that is used to create GUI applications. It is one of the most commonly used modules for creating GUI applications in Python as it is simple and easy to work with. You don't need to worry about the installation of the Tkinter module separately as it comes with Python already. It gives an object-oriented interface to the Tk GUI toolkit. Some other Python Libraries available for creating our own GUI applications

areKivy, Python Qt, wxPython among all Tkinter is most widely used.

**Procedure for Workflow of Project**

**Step 1:** Loading the main window frame from tkinter module , which is responsible for rendering the Graphical User Interface for the proposed system which has two buttons both attached to onClick() call back functions .

**Step 2:** On click of Static Image button in GUI ,a new window loads with browse and run buttons attached to it. On click on browse button input image can ne uploaded to proposed system via help of browseFiles() method.

**Step 3:** On click of run button the input image opens on a new window and user can double click on image window to get the color name. This is accomplish by colour Detection for StaticImage(filename) method which takes a

filename as argument and in chain runs a nested call of draw\_method\_static() method followed with getColourName() methods .

**Step 4:** On click of webcam button on main GUI window the webcam() method is invoked and it then loads the webcam window of the connected user system.

**Step 5:**On double clicking on the webcam feed the dra\_function() mouse callback function is triggered which in turn calls a chain of subsequent functions in order of getColourName() which provides the color name with RGB codes and this function will turn call a textToSpeech() method which takes a argument of text which is passed via getColourName() method.

**Step 6:** On click of esc button on keyboard exits the webcam feed and returns to main window GUI and the same workflow is continued until user exists the main window frame i.e GUI .



**Figure 1:** Flowchart for Workflow of Colour Detection from Image

**Procedure for User Interface**

**Step 1:** Select input options i.e. static image or realtime webcam feed from buttons attached in GUI.

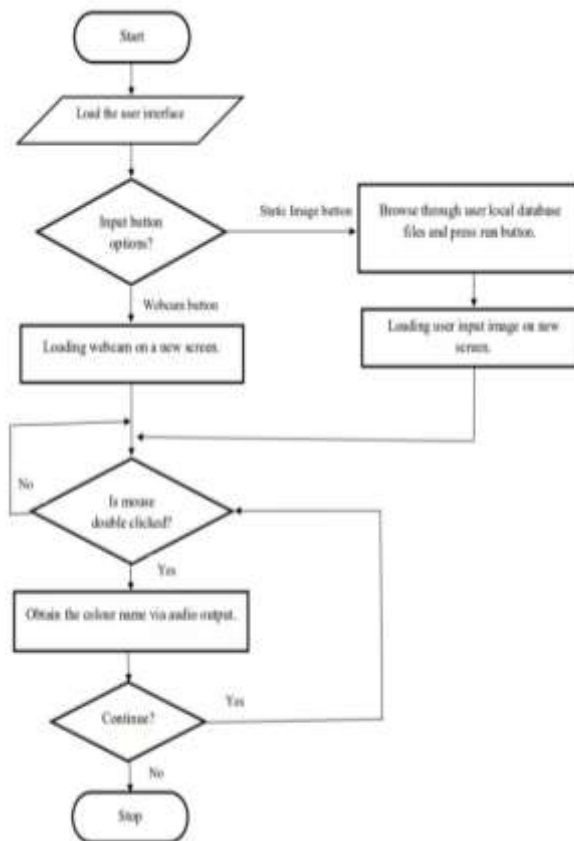
**Step 2:** If static image is selected ,browse through user system and feed the input to proposed system and press run button.

**Step 3:** Double click on the image frame to obtain

the colour name.

**Step 4:** For continuing with colour name detection repeat step 3 .For exit press esc key and return to main page press back button.

**Step 5:** If webcam option is selected . Webcam frame is popped in user screen . For detecting the colour ,follow step 3.



**Figure 2:** Flowchart for User Interface

**User Option Page**

The figure 3 shows user two options , one to detect colour with live image or with a static image feed.



**Figure 3:** Training Initial gesture Page

### Static Image Colour Detection Page

The figure 4 shows option to choose images from local system to upload to the system. User need to press the run button once the image is selected.

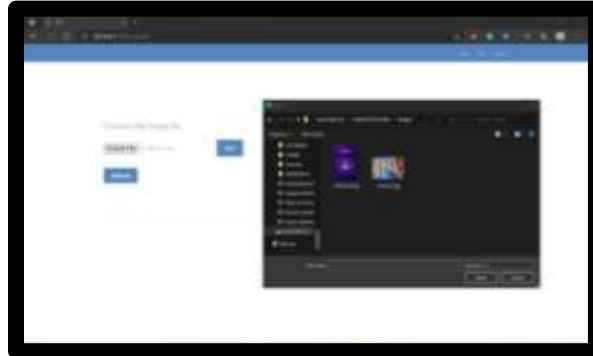


Figure 4: Adding gesture Page

### Live Image Colour Detection Page

The figure 5 shows the system opens a webcam window. The user needs to double click any part on webcam window to detect the colour In the Figure 6 user can hear the colour name via system audio.

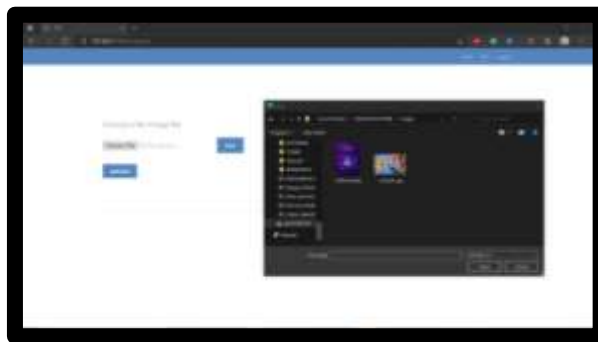


Figure 5: Live Image Colour Detection page

## V. RESULT ANALYSIS

A **true positive** test result is one that detects the condition when the condition is present.

A **true negative** test result is one that does not detect the condition when the condition is absent.

A **false positive** test result is one that detects the condition when the condition is absent.

A **false negative** test result is one that does not detect the condition when the condition is present.

Let TP denote the number of true positives, TN the number of true negatives, FP the number of false positives, and FN the number of false negatives.

**Sensitivity** measures the ability of a test to detect the condition when the condition is present. Thus,

$$\text{Sensitivity} = \frac{TP}{TP+FN}.$$

**Specificity** measures the ability of a test to correctly exclude the condition (not detect the condition) when the condition is absent. Thus,  $\text{Specificity} = \frac{TN}{TN+FP}$ .

**Predictive value positive** is the proportion of positives that correspond to the presence of the condition. Thus,  $\text{Predictive value positive} = \frac{TP}{TP+FP}$ .

**Predictive value negative** is the proportion of negatives that correspond to the absence of the condition. Thus,  $\text{Predictive value negative} = \frac{TN}{TN+FN}$ .

$$\text{Accuracy} = \frac{TP+TN}{TP+TN+FP+FN}.$$

		Reference variant set	
		Positive	Negative
Variants called by the Algorithm	Positive	<b>True Positive(TP)</b> Correct variant allele or position call	<b>False Positive(FP)</b> Incorrect variant allele or position call
	Negative	<b>False Negative(TN)</b> Incorrect reference genotype or no call	<b>True Positive(TP)</b> Correct reference genotype or no call

**Table 1:**Correlation Table

The training dataset consist of any number of live or static images. In non-real time the datasets consists of 1 live or staticimage with

dimensions 277\*277 webcam capture window size. The horizontal and vertical resolution is 96dpi.

**Table 2:** Result Analysis Table

Gesture Name	No. of Testing Images	TP	TN	FP	FN	Result
Violet	30	29	1	0	0	0.91
Blue	30	29	1	0	0	0.91
Green	10	9	1	0	0	0.91
Yellow	10	8	2	0	0	0.82
Red	10	9	1	0	0	0.91
Orange	10	9	1	0	0	0.91
Indigo	10	8	1	1	0	0.81
Cyan	10	8	1	1	0	0.81
Dark Green	10	9	1	0	0	0.91
Light Pink	10	8	1	0	1	0.81

**Average overall accuracy**=0.871=87.1%

### CONCLUSION

The proposed system provided a sophisticated way of detecting colour which can be used by professional artist as well as design personal for finding colour name from an image or in real time. Also the proposed system can be used in educational institute like children’s for learning different colours in an around them via this application This web app results in efficient usage of time. The system helps to improve the performance. Maintaining the project is easy and manageable. It is easily understandable by the user.

Future work that can be added to this project may be, the web app can be converted into android applications. It can be modified in such a way that application can be used by organizations other than educational institutions. Organizations

can add functionalities depending on their needs.

### REFERENCES

- [1]. Soumya Dutta and Bidyut B. Chaudhri. “A Color Edge Detection Algorithm in RGB Color Space.” International Conference on Advances in Recent Technologies in Communication and Computing, 2009.
- [2]. P. Sudharshan Duth and M. Mary Deepa. “Color Detection in RGB- modeled images using MATLAB.” International Journal of Engineering & Technology, 7 (2.31) (2018) 29-33
- [3]. H. Altun, R. Sinekli, U. Tekbas, Fuat Karakaya and Murat Peker. “An Efficient Color Detection in RGB space using Hierarchical Neural Network Structure.”



- International Symposium on Innovations System and Applications. 2011. (DOI: 10.1109/INISTA.2011.5946088)
- [4]. Shubham Gupta, Abhishek Rathee, Abhishek Kathariya, Ashish, Harpreet Kaur Channi. "Modeling and Designing of Color Detector using Arduinio." International Journal of Scientific Reseaarch in Computer Science,Engineering and Information Technology 2017. DOI:10.13140/RG.2.2.26143.87203.