BAHRIA UNIVERSITY KARACHI CAMPUS

DEPARTMENT OF COMPUTER ENGINEERING

Bahria University
Discovering Knowledge

COLOR DETECTION SYSTEM

ARTIFICIAL INTELLIGENCE LAB

CSL-411

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List of Context

Acknowledge

We would like to express our special thanks of gratitude to our course instructor, Ma'am Tahira Afridi as well as our lab instructor, Sir. Tariq , who gave us the golden opportunity to do this wonderful project on the topic ***Color Detection System****, which also helped us in doing a lot of Research and we came to know about so many new things, we are really thankful to them.*

ABSTRACT:

The main objective of this application is the methodology for identifying the shades of colors with an exact prediction with their names. A study says, a normal human can able to clearly identify nearly 1 million shades of colors. But in the case of human having "enchroma", could be able to see only 1% (i.e.10,000 colors) from the normal humans. While painting pictures, a painter needs to identify the color patterns exactly or else the reality of image is not clear.

Introduction:

Before going into the speculations of the project it is important to know the definition of color detection. It is simply the process of identifying the name of any color. It is obvious that humans perform this action naturally and do not put any effort in doing so. While it is not the case for computers.

Human eyes and brain work in co-ordination in order to translate light into color. Light receptors that are present in eyes transmit the signal to the brain which in turn recognizes the color. There is no exaggeration in saying that humans have mapped certain lights with their color names since childhood. The same strategy is useful in detecting color names in this project.

Three different colon Red, Green and Blue are being tracked by utilizing the fundamentals of computer vision. After successful compilation when we execute the code a window redirects to the image displayed on it whose path is given as an argument.

Additionally, we obtain the color name of the pixel along with the composition of three different colors red, blue and green values. It is helpful in recognizing colors and in robotics. One of the applications of color detection by computer vision is in driver less cars. This system is useful in detecting traffic and vehicle backlights and takes decision to stop, start and continue driving. This also have much application in industry to pick and place different colored object by the robotic arm. Color detection is also used as a tool in various image editing and drawing apps.

Problem and solution:

A Color detection technique is a program that gives the color of what user asks for as output. In this method the color codes already provided in the program are compared it with the image whose colors we want to know. Let us first began with why is it needed? We know of a disability

in humans very commonly found “color blindness” it is very common in humans but mostly people manage with it, as if you don’t go deeply about the colors it won’t cause any problem to you in general activities.

What is color Blindness?

It is a disability in which the person suffering from it is unable to see some colors (fun fact: his/her vision is not black and white) the colors not visible depends on type of Color Blindness. This disability makes a person impaired from doing task which involves selection of colors like choosing clothes, buying vegetables, fruits or even while travelling (Traffic lights or other cars lights).

Self-drive cars are the future and they require color detection to easily commute on road. It is true that, there is no cure for color blindness currently and it is also true that no one has seen the future. But right now what we can do to at least is to solve this issue temporarily (not close to reality but start is always small). Recognition of colors from an image and then from live video has been done by many, we have also tried to do the same. We have successfully detected color in the image, now in the next step we are going to implement the live video color detection. In the program the R,G,B values of colors are to be compared with the that of the image and then display the name of the color that will be easily visible to the user, this system can help in knowing the colors to normal people(especially men) and hence this system can be very useful and it do have the future use for like connecting this system in the goggles or specs and also in helmet for those driving motorcycle, these all things might seem of no use now or to most people but all those people suffering from it most probably find it very useful. As it will help them recognize the color (even if not by seeing them but recognizing them). Hence it can be easily said that this program will help many people if implemented.

Index Terms- Color detection, color blindness

Workflow:

Colors information plays an important role in image and real time color sensor detection. Which affects the results of video segmentation and correct real time temperature value.

According to the color information in RGB color space, the dominant color is determined at first. In the color image segmentation, the primary step is to settle on color space. The color model we all know contains RGB, HSI, HSV, CMYK, CIE, YUV, and so on. The RGB model is that the most ordinarily used for hardware color model while the HSI model is that the most ordinarily used color model for color processing. They’re often utilized in image processing technology.

Module I

Capturing and Storing Image:

• In this module, the capturing of image takes place. The image stored in this process is later used for detecting the color.

• The program stores the image and resizes it to 800*600 pixels of image the user gives in as input. The reduction of image size and leads to judicial use of the storage provided.

Module II:

Image Processing

• In this module, when the program is executed the program opens a window of size 800*600 image pixel are processed an the program loads the image in the window.

• In this module, the programs run over gives the image for further operation.

• When all the images are perfectly processed and the program is ready to detect the color.

Module III:

Color Detection

• In this module, the programs has completed the Image Processing and is ready to take the input of the user.

• The program which is already displaying the window can now be clicked anywhere and it will display the color present there.

• The user Clicks on the image anywhere of whose color he wants to know.

When the user double clicks anywhere he gets the color name along with their R, G, B values. This is the execution phase of the color detection system is completed. In this phase, the color is detected using image and the programs runs over after esc key is pressed. Here the face matches the stored images above 75%, therefore, it displays message ―Unlocked.

Overview of project:

The image below shows how the complete process of color detection is carried out.

1. Our project of Color detection System can work in any computer with minimum specification.
2. The detection process process takes less than a moment and this is very beneficial for companies.
3. The first thing to start with is observation. With the help of Color Detection, it will be easy to identify the color and give its name to the persons using it.
4. This project is made to reach each and everyone in the society suffering from color blindness so that everyone can get benefit from this.
5. Color Detection technology is very accurate and no one can doubt it.
6. The project designed by us can be used through basic camera also. No special cameras are required for its basic functioning,
7. But for using it as an assistant in self drive cars the camera should be good and more than one should be used for getting an overall view around the car. And all the cameras should be connected to each other.

Code:

```
# pip install matplotlib
# visit pyGuru on youtube
 import cv2 import
pandas as pd
# ------------------------------------------------------------------
--------

  img_path = 'pic1.jpg'
csv_path = 'colors.csv'

# reading csv file index = ['color', 'color_name',
'hex', 'R', 'G', 'B'] df = pd.read_csv(csv_path,
names=index, header=None)

# reading image img =
cv2.imread(img_path) img =
cv2.resize(img, (800,600))

#declaring global variables
clicked = False r = g = b =
xpos = ypos = 0
 #function to calculate minimum distance from all colors and get
the most matching color def get_color_name(R,G,B):
 minimum = 1000  for i in
range(len(df)):
   d = abs(R - int(df.loc[i,'R'])) + abs(G -
int(df.loc[i,'G'])) + abs(B - int(df.loc[i,'B']))
   if d <= minimum:           minimum = d
            cname = df.loc[i, 'color_name']
  return cname
#function to
get x,y
coordinates of
mouse double
click def
draw_function(
event, x, y,
flags,
params):  if
event ==
cv2.EVENT_LBUT
```

```
TONDBLCLK:
   global b,
g, r, xpos,
ypos, clicked
   clicked =
True    xpos =
x       ypos =
y       b,g,r
= img[y,x]    b
= int(b)      g
= int(g)      r
= int(r)

# creating window cv2.namedWindow('image')
cv2.setMouseCallback('image', draw_function)
 while
True:
 cv2.imshow('image', img)  if
clicked:
   #cv2.rectangle(image, startpoint, endpoint, color,
thickness)-1 fills entire rectangle
   cv2.rectangle(img, (20,20), (600,60), (b,g,r), -1)

         #Creating text string to display( Color name and RGB values
)    text = get_color_name(r,g,b) + ' R=' + str(r) + ' G=' +
str(g) + ' B=' + str(b)

   #cv2.putText(img,text,start,font(07),fontScale,color,
thickness,lineType )     cv2.putText(img, text, (50,50),
2,0.8,
(255,255,255),2,cv2.LINE_AA)

   #For very light colours we will display text in black
colour        if r+g+b >=600:            cv2.putText(img,
text, (50,50), 2,0.8,
(0,0,0),2,cv2.LINE_AA)
  if cv2.waitKey(20) & 0xFF == 27:
        break

cv2.destroyAllWindows()
```

Output:

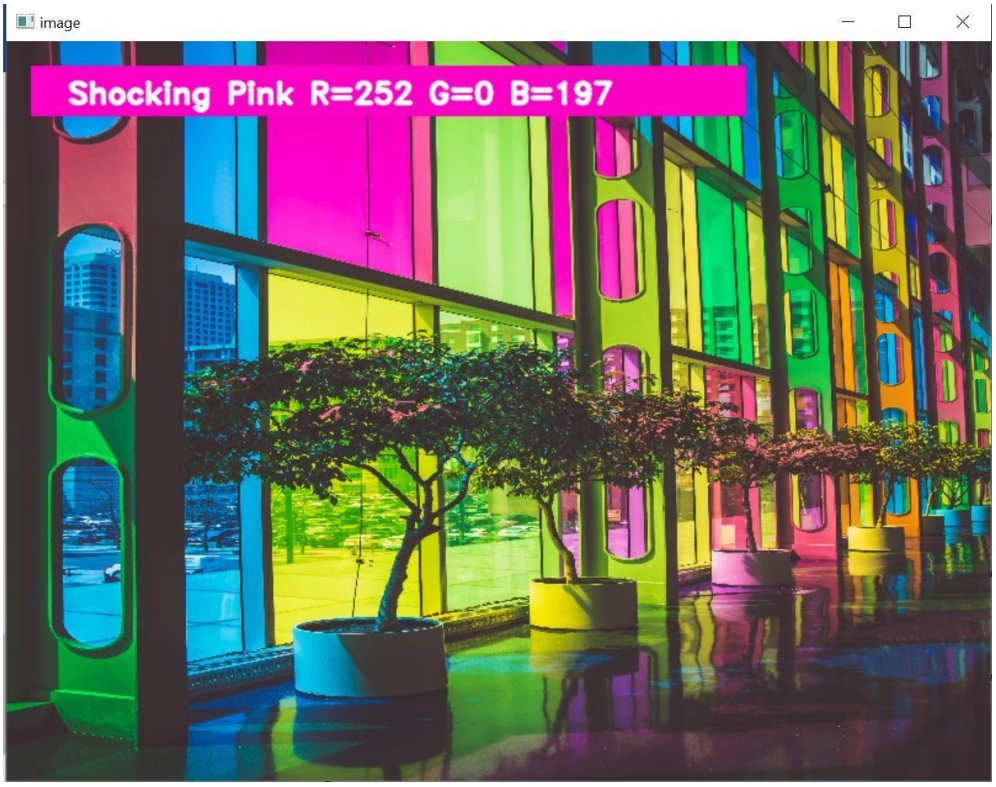
image
Shocking Pink R=252 G=0 B=197

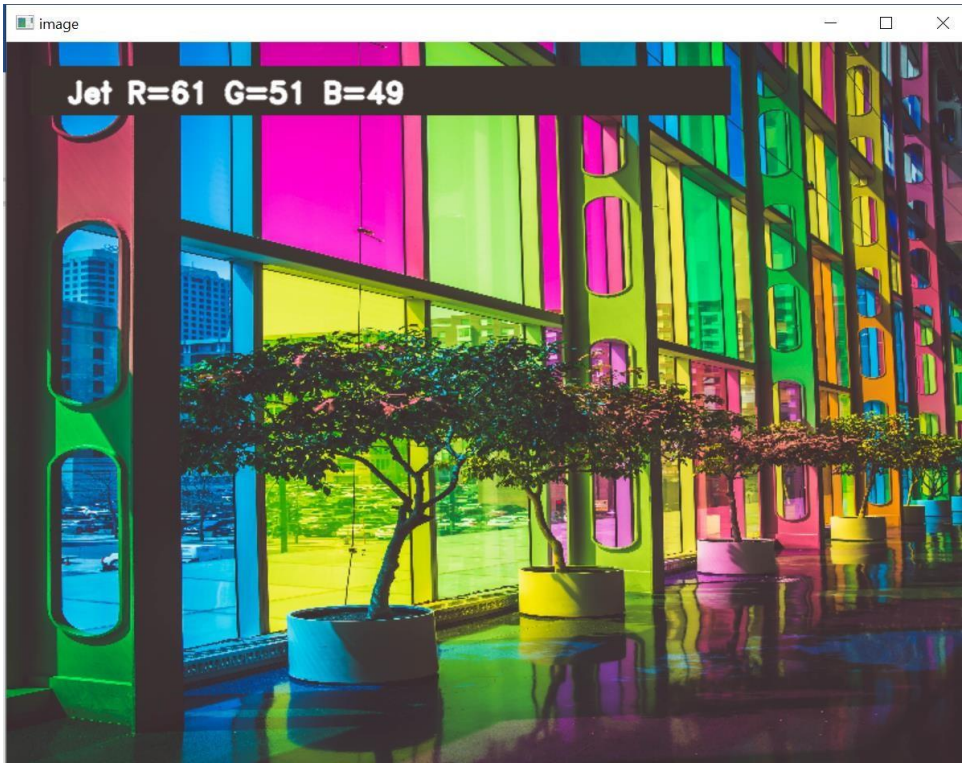
image
Jet R=61 G=51 B=49

Conclusion:

Color detection technology has come a long way and has a long way to go. When we see selfdrive cars running on roads by themselves following the traffic rules. Today, the machines are ready to for it. Tesla is a frontrunner in this technology. However, next-generation color detection programs will have more upgradations. The apps in smart environments - where computers and equipment are similar to assistant assistants.

To achieve this goal computers must be able to reliably identify nearby things and their basic properties like size shape and color (we can't forget that) in a manner that is naturally consistent within the normal human pattern. They do not require special interactions and should be in line with people's understanding of when recognition goes. This suggests that future intelligent environments should use the same methods as humans, and have the same limitations. These goals are now achievable.

References:

[1] The chemistry of john Dalton's color Blindness. https://pubmed.ncbi.nlm.nih.gov/

[2] López, Andrés Fernando Jiménez, Marla Carolina Prieto Pelayo, and Ángela Ramírez Forero. "Teaching image processing in engineering using python." *IEEE Revista Iberoamericana de Tecnologias del Aprendizaje* 11.3 (2016): 129-136.

[3] https://ieeexplore.ieee.org/abstract/document/7511766

[4] https://www.ijntr.org/download_data/IJNTR07050036.pdf

[5] Uppal, Anmol, et al. "Emotion recognition and drowsiness detection using Python." *2019 9th International Conference on Cloud Computing, Data Science & Engineering (Confluence)*. IEEE, 2019.