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Object Color Code Combination Detection in Machine Learning using Python

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Abstract: This groundbreaking application aims to achieve real-time color shade identification, offering precise predictions of colour names—a task that poses inherent challenges for computers despite humans excelling in this domain. Leveraging the powerful NumPy and OpenCV libraries in Python, this paper employs unique methodologies. OpenCV, known for its optimized Computer Vision tools and crucial hardware support, forms the backbone of this technology, pivotal not just in Artificial Intelligence applications but also in transformative fields like self-driving cars, robotics, and photo correction apps. This endeavour seeks to narrow the gap between human color perception and computational capabilities, revolutionizing computer vision and enhancing various industries' efficiency in color identification and prediction.

INDEX- RGB Colour Extraction, OpenCV GUI, Image Processing Interface.

I. INTRODUCTION

Color detection is the process of identifying the names of colors from images and videos. While humans effortlessly recognize colors from various sources, computers encounter challenges in this task. The human eye and brain collaborate to convert light into color, with light receptors transmitting signals to the brain for color recognition. In our paper, we adopt a similar strategy, mapping specific lights to their corresponding color names. The focus is on detecting three primary colors—Red, Green, and Blue—utilizing fundamental computer vision principles.

This paper aims to bridge the gap between human-perceived colors and computational analysis. In an era where human discernment of colors is innate but computationally challenging, this initiative leverages the robust NumPy and OpenCV libraries in Python. OpenCV, renowned for its optimized Computer Vision tools and hardware support, forms the backbone of this technology, essential not only in Artificial Intelligence but also in revolutionary domains like self-driving cars, robotics, and photo correction apps. The paper's primary goal is to enable precise color shade identification, providing accurate predictions of color names—a feat that holds immense promise across diverse industries and computational vision advancements.

II. LITERATURE REVIEW

[1] Berns, RS & Reiman DM, In our investigation, we availed ourselves of commercially procurable ICC-compliant color-management software to fabricate CMYK-encoded images meticulously tailored for the third edition of Principles of Color Technology. Specifically, we meticulously crafted bespoke profiles for both a Scitex Ever smart Pro flatbed scanner and a Kodak Approval proofing device. These profiles served as the linchpin for the faithful reproduction of various objects, including intricate color-order systems and intricately rendered computer-generated graphical images imbued with colorimetric data, thereby ensuring an exceptional degree of colorimetric fidelity. To independently corroborate our findings, we judiciously employed the GretagMacbeth Color Checker Color Rendition Chart as an esteemed verification benchmark. [2] T Joy, Deborah, et al. This paper proposes a detection algorithm. The idea of teaching a computer to detect and define a color well enough to have useful applications.

The proposed algorithm uses the advantage of the camera and fed in data to detect even the color based on RGB values. The algorithm involved calls on a function that runs loops on readjusting the distance based on a nearest match.
[3] Arash Abadpour et al. In this paper, A novel approach to color image segmentation is introduced in this study. The method we propose involves identifying principal colors, which are defined as the points of intersection within the cylindrical representations of homogeneous blocks extracted from the image. By leveraging this approach, instead of relying on individual pixels prone to noise and outliers, our method utilizes the coherent linear representation of these homogeneous blocks. The paper provides an in-depth mathematical exposition elucidating the intricacies of the proposed method, accompanied by experimental findings that showcase the efficacy and efficiency of the algorithm under consideration.

[4] Senthamaraikannan D, et al. The present paper introduces innovative real-time color recognition functionalities aimed at facilitating vision-based human-computer interaction. These features primarily involve the extraction of primary colors to enable seamless interactions between users and computer systems. By analyzing segmented primary color regions, vision-based human-computer interaction can be effectively realized. The paper delineates our exploration into various aspects of color-based image segmentation, including non-stationary color-based target tracking, the development of a color-based mouse pointer, the integration of color-based virtual music instruments, and the implementation of a color-based virtual calculator.

[5] Goel, Vishesh, et alThe current manuscript unveils an innovative methodology for discerning colors within two-dimensional image arrays, leveraging a sophisticated color thresholding technique implemented through MATLAB. This method harnesses the intricacies of the RGB color model to ascertain user-specified hues within the image corpus. Operational protocols entail the transformation of three-dimensional RGB imagery into a monochromatic scale, succeeded by a differential operation to yield a binary image representation. Furthermore, the integration of a median filter serves to mitigate the influence of noise artifacts embedded within the resultant image structure. Following this, the utilization of connected components labeling facilitates the identification of coherent regions within the binary domain, while the exploitation of bounding box characteristics facilitates the derivation of intrinsic metrics for each delineated region. Such a multifaceted approach not only ensures precise color discrimination but also engenders a comprehensive understanding of the spatial distribution and attributes of the identified color regions, thereby enriching the analytical depth and interpretative capacity of image processing endeavors.

[6] Duth, P. Sudharshan, The present investigation unveils a novel technique for the identification of two-dimensional image content through the utilization of color thresholds within the MATLAB environment, leveraging the RGB color model to discern user-specified color preferences within the visual data. Methodological procedures encompassing color detection entail the conversion of a three-dimensional RGB image representation into a monochromatic grayscale format, followed by the application of a subtraction operation between the two images to yield a binary representation capturing color presence. Further refinement of the binary image is achieved through the employment of a median filter aimed at suppressing noise artifacts. Subsequent to noise reduction, the connected component labeling technique is deployed to delineate coherent regions within the binary image, while the extraction of bounding box properties facilitates the computation of metrics for each delineated region, thus augmenting the quantitative analysis of color distribution within the image corpus.

[7] R. D. Dony et al. The present study proposes a novel edge detection methodology tailored specifically for color images. Central to this approach is the computation of vector angles between neighboring pixels, in stark contrast to traditional edge detection techniques reliant on Euclidean distances within the RGB color space. By leveraging vector angles, the method effectively discriminates variations in chromaticity, independent of luminance or intensity considerations. This characteristic renders it particularly advantageous for applications where discrepancies in illumination hold no relevance, thus enhancing its applicability across a spectrum of image processing tasks.

[8] Dutta, Soumya, et al. introduces an innovative algorithm designed for edge detection in color images. It employs the average maximum color difference value to forecast the optimal threshold value, thus facilitating precise edge delineation. Additionally, a thinning technique is implemented to refine and extract edges accurately. The efficacy of the proposed method is demonstrated through its application across a diverse database comprising both synthetic and real-life images. Comparative analysis with existing edge detection algorithms attests to the algorithm's robust performance and efficacy in capturing intricate edge features across varied image datasets.

[9] Fleyeh, Hasan The objective of this paper is to introduce three novel approaches for the detection and segmentation of road signs based on color analysis. The images utilized in this study are captured by a digital camera installed within a vehicle. Initially, RGB images are transformed into the IHLS color space, following which the newly devised methodologies are implemented to isolate and extract the colors corresponding to the road signs of interest. Extensive testing is conducted across a substantial dataset comprising hundreds of outdoor images captured under varying lighting conditions. The results obtained underscore the high degree of robustness exhibited by the proposed methods, thereby affirming their efficacy in reliably detecting and segmenting road signs across diverse environmental contexts..

[10] H. Altun, R. Sinekli, et al. The paper presents a novel approach for enhancing color detection efficiency within the RGB color space through the deployment of an ensemble of experts organized in a hierarchical structure. Within this hierarchical framework, a cohort of experts is tasked with evaluating the individual red (R), green (G), and blue (B) components of each pixel, subsequently assigning a degree of membership to predefined color classes based on their assessments. Subsequently, a master neural network amalgamates these membership probabilities furnished by the expert ensemble to arrive at its final decision regarding color classification. Through both qualitative and quantitative assessments, the study demonstrates the superiority of this hierarchical neural network architecture over conventional neural network classifiers in terms of color detection performance.

III. RESEARCH METHODOLOGY:

"Color Detection of RGB Images Using Python and OpenCV," is a Python based paper platform designed for image processing. Utilizing the OpenCV library, the system enables users to select an input image through a graphical user interface (GUI). The interface includes a pointer feature for precisely selecting the RGB color tone of a specific part of the image. Upon selection, the system processes the image and displays the corresponding RGB number output. This approach leverages the power of Python and OpenCV, offering a user-friendly and efficient solution for accurate color detection in RGB images.

IV. FLOWCHART

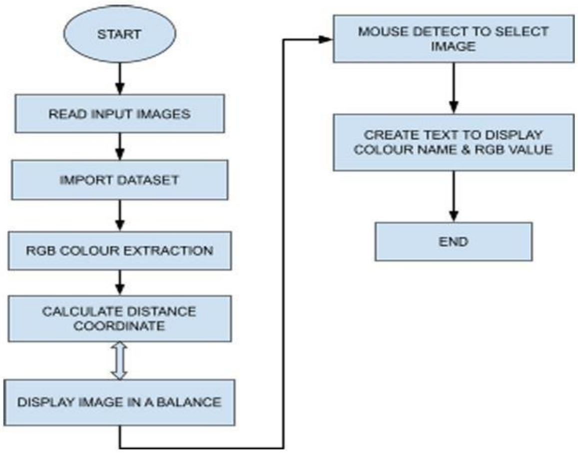


Fig 1.2 flowchart

V.WORKING

The paper entails the development of a comprehensive Python-based platform for color detection in RGB images, leveraging the capabilities of OpenCV, PIL, and Tkinter libraries. Through an intuitive graphical user interface (GUI), users can select an input image, enabling precise identification of regions of interest within the image. Once a specific area is selected, the system utilizes OpenCV's robust computer vision functionalities to analyze the color composition, while PIL facilitates efficient image handling and processing. Tkinter, on the other hand, provides the framework for creating an interactive interface, allowing seamless interaction with the application's features. Upon selection, the system promptly processes the chosen region, extracting and displaying the corresponding RGB values. This integration of Python libraries streamlines the color detection process, offering users an accessible and user-friendly solution for accurately analyzing RGB images. By merging the strengths of OpenCV, PIL, and Tkinter, the paper aims to cater to a diverse range of users, from beginners to experienced practitioners in image processing and computer vision, providing a versatile platform for color analysis tasks.

IV.SYSTEM REQUIREMENT SOFTWARE REQUIREMENT

➢ Python3.8.4 Language .i

MODULES

❖OpenCV
❖Tkinter
❖PIL

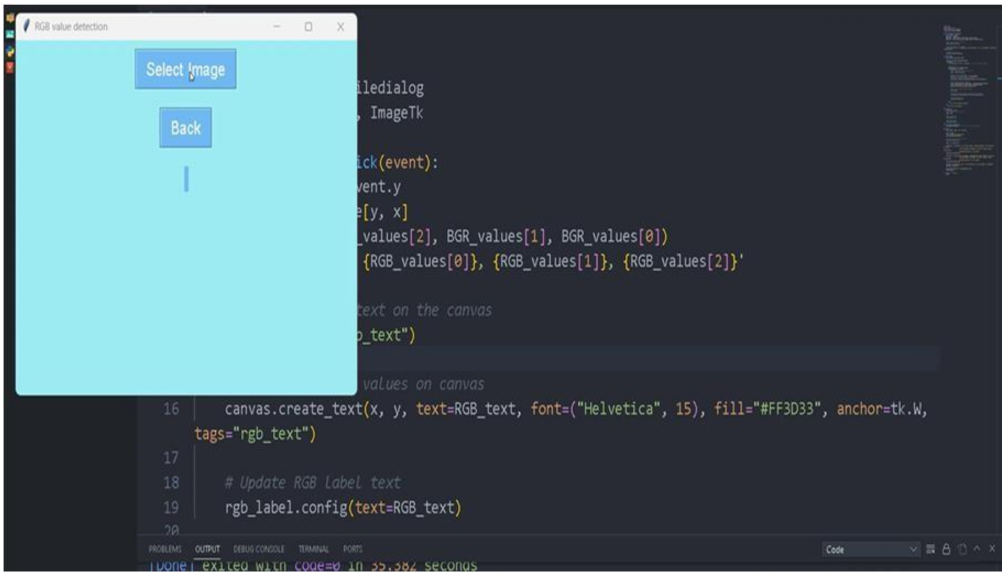
V. IMPLEMENTATION & RESULT

STEP BYSTEP IMPLEMENTATION

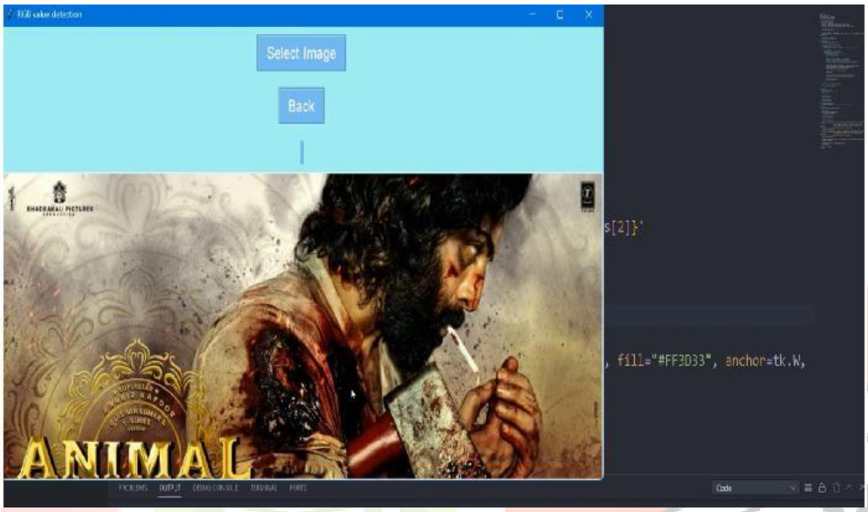
STEP 1: Install OpenCv, Tkinter, PIL libraries

```
import cv2
import tkinter as tk
from tkinter import filedialog
from PIL import Image, ImageTk

def display_RGB_on_click(event):
    x, y = event.x, event.y
    BGR_values = image[y, x]
    RGB_values = (BGR_values[2], BGR_values[1], BGR_values[0])
    RGB_text = f'RGB: {RGB_values[0]}, {RGB_values[1]}, {RGB_values[2]}'

    # Clear previous text on the canvas
    No definition founds.delete("rgb_text")

    # Display new RGB values on canvas
    canvas.create_text(x, y, text=RGB_text, font=("Helvetica", 15), fill="#FF3D33", anchor=tk.W,
tags="rgb_text")

    # Update RGB label text
    rgb_label.config(text=RGB_text)
```

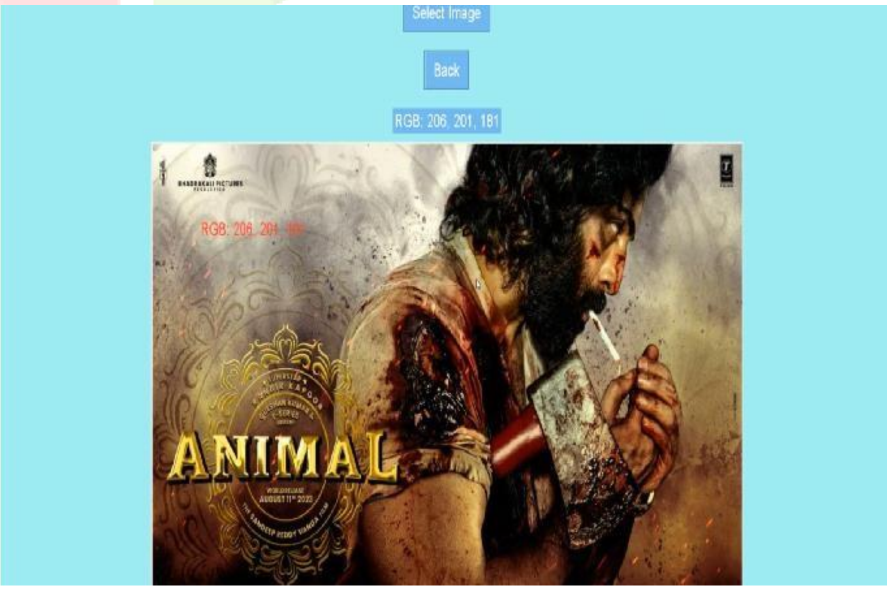
Step 2: Create a graphical user interface.



STEP 3: Image Loading

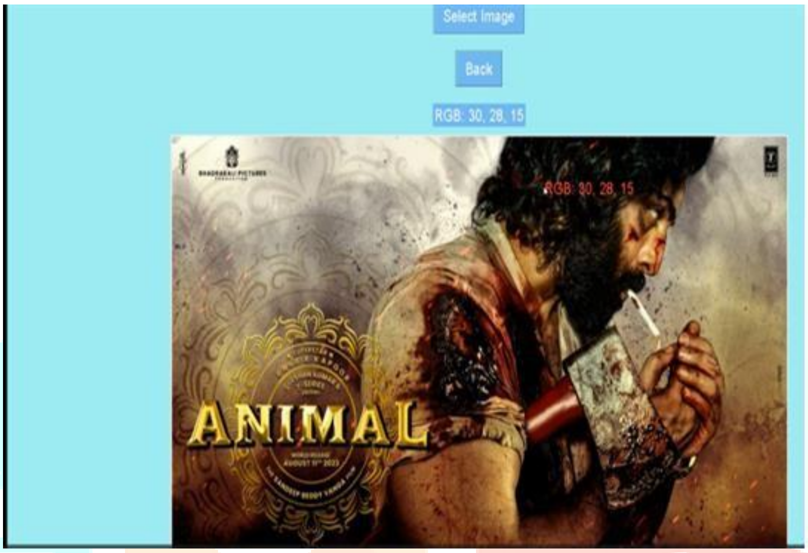


Step 4: Integrate pointer feature and develop color detection algorithm.



RESULT:

The "Color Detection of RGB Images Using Python" paper discusses the integration of PIL, Tkinter, and OpenCV libraries to create a robust platform for image processing and computer vision tasks. This system allows users to open files, manipulate images, and accurately detect RGB colors. The integration of OpenCV for computer vision operations, PIL for efficient image handling, and Tkinter's GUI framework enables intuitive interaction with the application. The paper provides a comprehensive solution for RGB color detection in images, bridging the gap between user-friendly interfaces and advanced image processing capabilities.
Upon launching the application, users are presented with a graphical user interface created using Tkinter, providing various options and functionalities."When you open files, you can perform image processing tasks. After loading an image, you can use the pointer feature to click on specific regions of interest. This will prompt the system to display the corresponding RGB values. The integration of PIL and OpenCV allows for these functionalities."CV libraries ensures efficient handling and processing of images, while Tkinter facilitates seamless interaction with the application's functionalities. Overall, the system streamlines the process of RGB color detection in images, catering to both novice and experienced users in the field of computer vision and image processing



Result shows the RGB values on the interface for user visibility

VI.CONCLUSION

This paper will delineate a methodology for extracting the desired colour field from an RGB image, utilising various steps to be implemented on the OpenCV platform. A noteworthy strength expected from this approach will be its effectiveness in colour differentiation within a monochromatic setting.
This innovative paper marks a significant step towards enhancing computational colour identification, a task traditionally challenging for computers despite human proficiency. Leveraging the powerful capabilities of NumPy and OpenCV in Python, alongside the foundational support from OpenCV's optimised Computer Vision tools and hardware integration, this endeavour aims to narrow the gap between human colour perception and computational analysis. By enabling real-time identification of colour shades and providing precise predictions of colour names, this initiative holds tremendous potential in revolutionising diverse industries and advancing the frontiers of computer vision technology.

VII. REFERENCE

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