Hackathon Submission Template (Level-1 Solution)

Use Case Title: Color Detection from Images

Student Name: BALA DEVIKHA M

Register Number: 731123106006

Institution: Government College of Engineering -Erode

Department: B.E Electronics and communication Engineering

Date of Submission: 20-05-2025

---

1. Problem Statement

Build a Color Detection Application that lets users upload an image and click anywhere on it to detect the color at that point. The application should extract the RGB values of the selected pixel and match them with a predefined dataset of color names to display the closest known color. The UI should visually display both the color name and its RGB values in real-time.

2. Proposed Solution

This application provides a **fast, intuitive, and accessible** way to:

- Upload any image (PNG, JPG, JPEG).

- Click anywhere on the image to get real-time colour data.
- Instantly view:
    - RGB values.
    - Closest colour name from a reference dataset.
    - A colour preview block for visual confirmation.

3. Technologies & Tools Considered

Language:

- Python – easy to use, great for image processing and GUI apps.

Libraries/Frameworks:

- **CustomTkinter** – modern, responsive desktop UI.
- **Pillow (PIL)** – image handling and pixel colour extraction.
- **ImageTk** – displaying images in Tkinter.
- **Pandas** – reading and processing colour data (colours.csv).
- **math** – for calculating RGB distance.

Data Format:

- CSV – stores known colour names and RGB values.

4. Solution Architecture & Workflow

User Interface (UI Layer)

- Built with CustomTkinter.
- Allows users to:
  - Upload an image.
  - Click on any point in the image.
  - View the detected colour name and RGB values.
  - See a live preview of the colour.

Image Processing

- Uses Pillow (PIL) to:
  - Load and resize images.
  - Convert images to RGB format.
  - Extract pixel colour data at the clicked coordinates.

Colour Matching Logic

- Loads a colour dataset (colours.csv) using Pandas.
- When a pixel is clicked:
  - The RGB value is compared to the dataset.
  - Euclidean distance is calculated for colour similarity.
  - The closest named colour is selected.

Display Output

- UI updates in real-time to show:
  - RGB values
  - Closest colour name
  - Colour swatch using the detected RGB value

[User Uploads Image]

↓

[Image Loaded & Displayed on UI]

↓

[User Clicks on a Point in the Image]

↓

[Pixel Colour (RGB) Extracted from Original Image]

↓

[Compare RGB with Known Colours Dataset]

↓

[Find Closest Colour Name]

↓

[Update UI → Show RGB, Name, and Colour Box]

5. Feasibility & Challenges

- **Feasibility:** High – Minimal dependencies, local-only, and fast to develop.

- **Challenges:** Manageable – Mostly UI scaling and dataset quality, which can be improved with basic safeguards and enhancements.

6. Expected Outcome & Impact

Expected Outcomes

- Functional Desktop Application
  A lightweight, user-friendly tool that lets users upload an image and instantly identify the name and RGB values of any colour by clicking on the image.

- Real-Time Colour Detection
  Immediate feedback on clicked colours, displayed both visually (colour swatch) and textually (name + RGB).

- Accurate Colour Matching
  Uses Euclidean distance on RGB values to find the closest known colour from a predefined dataset.

Benefit	Description
👩‍🎨 **For Designers & Artists**	Quickly identify and reuse specific colours from images or artwork.
🌐 **For Web Developers**	Match UI elements to image-based brand colours or extract hex/RGB codes for styling.
🧪 **For Students & Learners**	Helps understand colour theory and RGB models through hands-on interaction.
👷 **For Accessibility Testing**	Enables quick checks of colour contrasts and naming for visual accessibility.
🧰 **No Need for Heavy Tools**	Provides a simple alternative to large design software like Photoshop for colour picking.

7.Future Enhancements

Feature	Description
Hex Code Output	Display the hex colour code alongside RGB values for web-friendly use.
Copy to Clipboard	Allow users to copy RGB/Hex values or colour name with one click.
Colour History Panel	Show a list of recently detected colours for quick reference and comparison.
Zoom & Pan Functionality	Enable users to zoom into detailed parts of an image for more accurate colour picking.
Live Colour Hover Detection	Show RGB/colour name dynamically as the user hovers over the image (without clicking).