

Image Processing GUI Toolkit

1. Problem Statement

The objective of this project is to design and implement a user-friendly graphical interface for performing basic image processing operations such as enhancement, filtering, and transformation. The toolkit allows users to upload, process, and analyze images without requiring deep programming knowledge.

2. Introduction

Image processing is an essential domain in computer vision and artificial intelligence. This project introduces a GUI-based toolkit developed using Python, OpenCV, and Streamlit, allowing users to perform real-time image operations. The interface provides functionalities like histogram equalization, filtering, edge detection, and more.

3. Requirements

The system requires Python 3.10 or above along with essential libraries like OpenCV, NumPy, Pillow, and Streamlit. Hardware requirements include a standard PC with minimum 4GB RAM. The toolkit is lightweight and runs in any modern browser.

4. Methodology

The methodology involves four main steps: 1. Uploading an image using the GUI file uploader. 2. Selecting operations such as enhancement, histogram equalization, or edge detection. 3. Applying transformations using OpenCV and NumPy functions. 4. Displaying results side-by-side for comparison. Streamlit is used for frontend interface, while OpenCV handles the backend image processing tasks.

5. Results

The following screenshots demonstrate the working of the Image Processing Toolkit. Users can upload an image, perform operations such as Histogram Equalization, and view processed results instantly.

Original vs Processed Images:

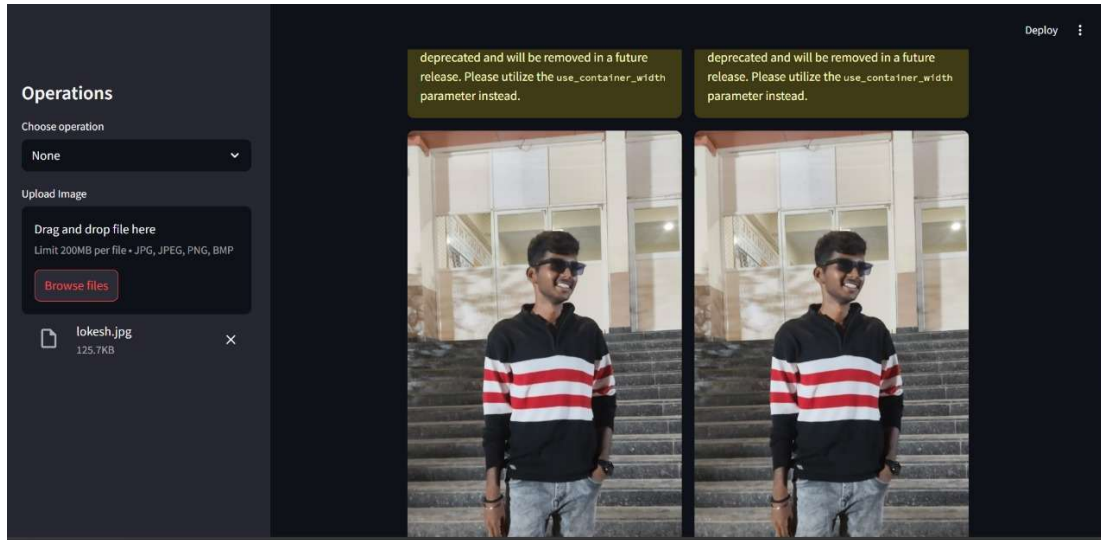
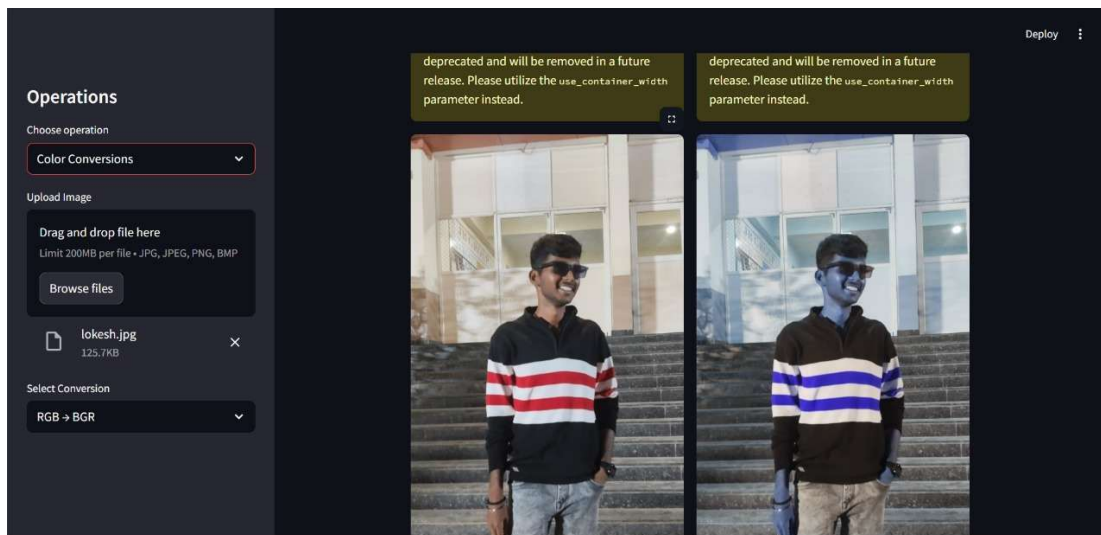
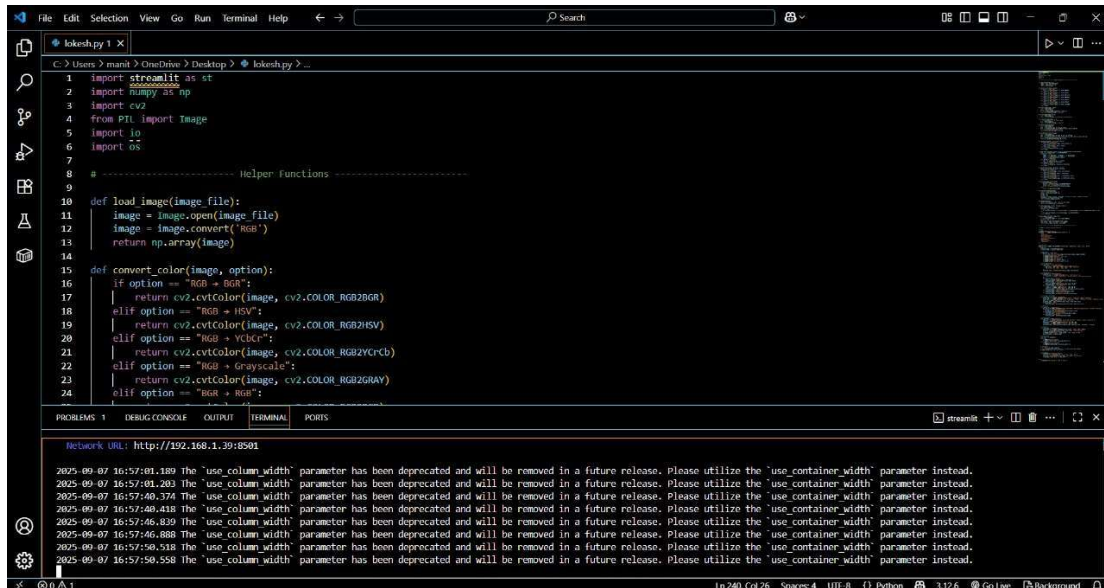


Image Information Output:



Code Execution in VS Code:



The screenshot displays the Visual Studio Code interface with a Python file named `lakesh.py` open. The code defines a `load_image` function and a `convert_color` function. The `convert_color` function uses `cv2.cvtColor` to convert an image from RGB to various color spaces (BGR, HSV, YCrCb, Grayscale). The terminal output shows the execution of the script, which includes a network URL and several deprecation warnings for the `'use_column_width'` parameter.

```
1 import streamlit as st
2 import numpy as np
3 import cv2
4 from PIL import Image
5 import io
6 import os
7
8 # ----- Helper Functions -----
9
10 def load_image(image_file):
11     image = image.open(image_file)
12     image = image.convert('RGB')
13     return np.array(image)
14
15 def convert_color(image, option):
16     if option == "RGB -> BGR":
17         return cv2.cvtColor(image, cv2.COLOR_RGB2BGR)
18     elif option == "RGB -> HSV":
19         return cv2.cvtColor(image, cv2.COLOR_RGB2HSV)
20     elif option == "RGB -> YCrCb":
21         return cv2.cvtColor(image, cv2.COLOR_RGB2YCrCb)
22     elif option == "RGB -> Grayscale":
23         return cv2.cvtColor(image, cv2.COLOR_RGB2GRAY)
24     elif option == "BGR -> RGB":
25         return cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
```

PROBLEMS 1 DEBUG CONSOLE OUTPUT TERMINAL PORTS

streamlit + - - - - -

Network URL: http://192.168.1.39:8501

2025-09-07 16:57:01.189 The 'use_column_width' parameter has been deprecated and will be removed in a future release. Please utilize the 'use_container_width' parameter instead.

2025-09-07 16:57:01.203 The 'use_column_width' parameter has been deprecated and will be removed in a future release. Please utilize the 'use_container_width' parameter instead.

2025-09-07 16:57:40.374 The 'use_column_width' parameter has been deprecated and will be removed in a future release. Please utilize the 'use_container_width' parameter instead.

2025-09-07 16:57:40.418 The 'use_column_width' parameter has been deprecated and will be removed in a future release. Please utilize the 'use_container_width' parameter instead.

2025-09-07 16:57:46.839 The 'use_column_width' parameter has been deprecated and will be removed in a future release. Please utilize the 'use_container_width' parameter instead.

2025-09-07 16:57:46.888 The 'use_column_width' parameter has been deprecated and will be removed in a future release. Please utilize the 'use_container_width' parameter instead.

2025-09-07 16:57:50.538 The 'use_column_width' parameter has been deprecated and will be removed in a future release. Please utilize the 'use_container_width' parameter instead.

2025-09-07 16:57:50.558 The 'use_column_width' parameter has been deprecated and will be removed in a future release. Please utilize the 'use_container_width' parameter instead.

Ln 240, Col 26 Spaces: 4 UTF-8 Python 3.12.6 Go Live Background

6. Conclusion

The Image Processing GUI Toolkit successfully demonstrates how complex image operations can be simplified using a user-friendly interface. It eliminates the need for in-depth programming, making it useful for beginners, researchers, and students exploring image processing techniques.