

Task 3 Report

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1. Introduction

This project, *Image Processing and Analysis Toolkit*, is a web-based application built using Python, OpenCV, NumPy, and Streamlit. Its objective is to provide an interactive platform for experimenting with various image processing operations such as color conversions, transformations, filtering, morphological operations, enhancement, and edge detection.

2. Technologies Used

- Python: Core programming language
- OpenCV: Image processing functions
- NumPy: Numerical computations
- Streamlit: Interactive web-based user interface

3. Features Implemented

- Color Conversions: RGB \leftrightarrow BGR, RGB \leftrightarrow HSV, RGB \leftrightarrow YCrCb, RGB \rightarrow Grayscale
- Transformations: Rotation, Scaling, Translation
- Filtering: Mean, Gaussian, Median
- Edge Detection: Sobel, Laplacian, Canny
- Morphological Operations: Dilation, Erosion, Opening, Closing
- Enhancement: Histogram Equalization, Contrast Stretching, Sharpening

4. Results

Below are sample results of applying color conversions using the toolkit:

Operations

Open → Upload an Image

Drag and drop file here
Limit 200MB per file • PNG, J...

Browse files

Optional: Second Image (for bitwise ops)

Drag and drop file here
Limit 200MB per file • PNG, J...

Browse files

Show Status Bar

Split Comparison (half original, half processed)

Real-time (Webcam) [Experimental]

Image Processing & Analysis Toolkit

Module 1 – Image Processing Fundamentals & Computer Vision | Streamlit + OpenCV

Open

Upload an image ???

Original

Processed

Upload an image from the sidebar to get started.

Deploy ⋮

Optional: Second Image (for bitwise ops)

Drag and drop file here
Limit 200MB per file • PNG, J...

Browse files

Show Status Bar

Split Comparison (half original, half processed)

Real-time (Webcam) [Experimental]

Select Category

Color Conversions

Conversion

RGB+BGR

RGB→HSV

RGB→YCrCb

RGB→Grayscale

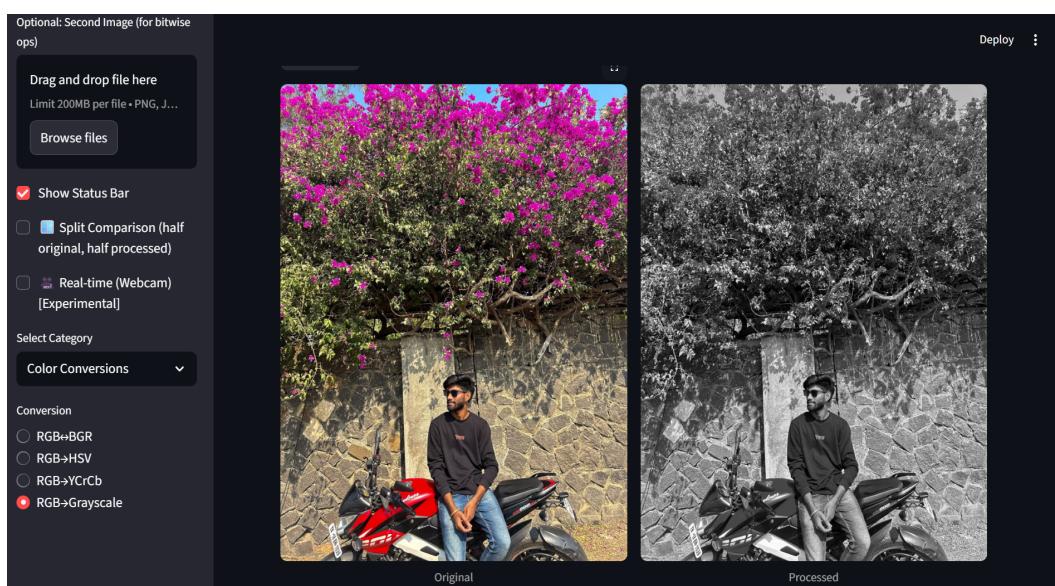
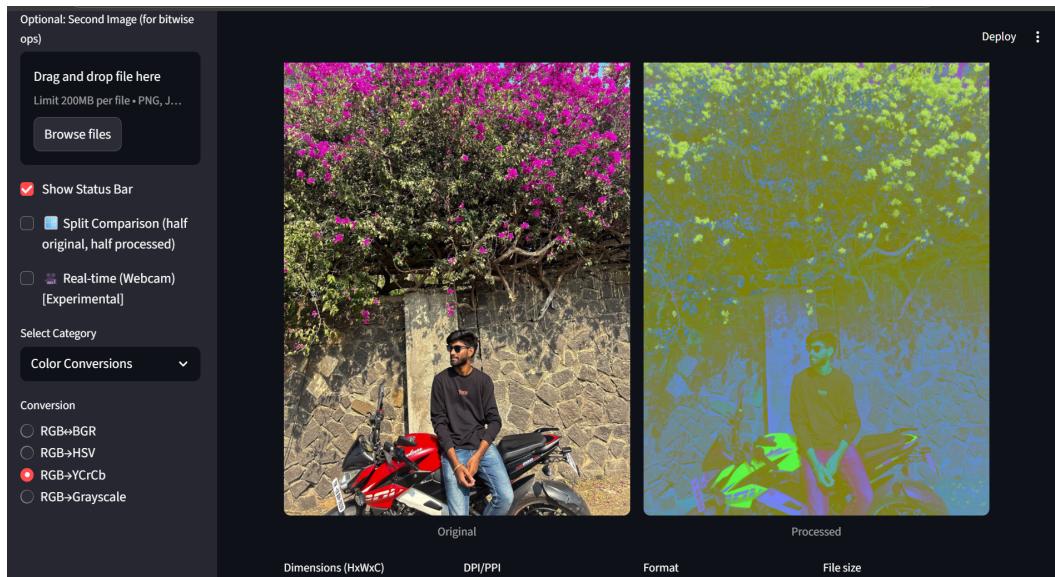


Original



Processed

Deploy ⋮



5. Conclusion

The Image Processing and Analysis Toolkit provides an effective and user-friendly environment to experiment with various image processing techniques. It helps in visual learning and practical implementation of computer vision concepts, making it valuable for students and researchers in AIML.