Image Processing & Analysis Toolkit

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1. Introduction

This report covers the implementation and functionalities of the Streamlit Image Toolkit, a GUI-based application for performing fundamental image processing operations using Python, OpenCV, and Streamlit. The application provides an intuitive interface to apply color conversions, image transformations, filtering, morphology, enhancements, edge detection, and compression while allowing easy download of processed images.

2. Objective

Design and implement a GUI application for image processing that enables interactive image manipulation, supporting functionalities such as color space conversion, geometric transformations, filtering, morphology operations, image enhancement, edge detection, and saving processed images in various formats.

3. Features Implemented

- Image Info: Displays resolution, channels, shape, filename.
- Color Conversions: RGB ↔ BGR, RGB/BGR → HSV/YCrCb, Grayscale.
- Transformations: Rotate, Scale, Translate, Affine Transform, Perspective Transform.
- Filtering & Morphology: Gaussian, Mean, Median filters, Sobel, Laplacian, Dilation, Erosion, Opening, Closing.
- Enhancement: Histogram Equalization, Sharpening, Contrast Stretch.
- Edge Detection: Canny, Sobel, Laplacian.
- Compression & Save: Save processed images in PNG, JPG, BMP formats.
- Comparison Mode: Split-screen original vs processed images.
- Status Bar: Dynamic display of image metadata.

4. Installation Instructions

1. Install dependencies:
   pip install streamlit opencv-python pillow numpy

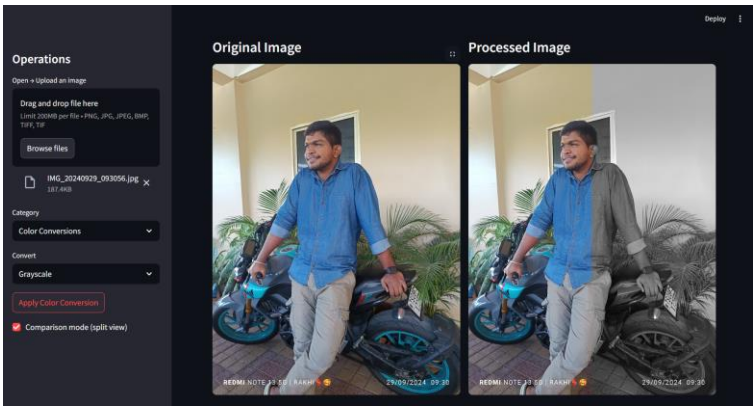
2. Run the application:
   streamlit run app.py

5. Usage Instructions

1. Upload an image using the sidebar file uploader.
2. Select an operation category from the dropdown.
3. Adjust parameters using sliders or options.
4. Click 'Apply' to execute the operation.
5. Optionally enable comparison mode to view split-screen.
6. Download processed image using 'Save as PNG' or 'Save as JPG' buttons.

6. Example Use Cases

- Convert a color image to grayscale.
- Apply Gaussian Blur to reduce noise.
- Sharpen image edges.
- Perform Canny Edge detection.
- Resize or rotate images.
- Download final processed images.



7. Conclusion

The Streamlit Image Toolkit effectively simplifies the process of applying essential image processing operations. It provides an easy-to-use web interface, supports interactive parameter adjustments, and allows convenient image downloads. This toolkit is ideal for educational purposes, rapid prototyping, and small-scale image manipulation tasks.

8. APPLIED IMAGES :-


Original Image
Processed Image


Original Image
Processed Image
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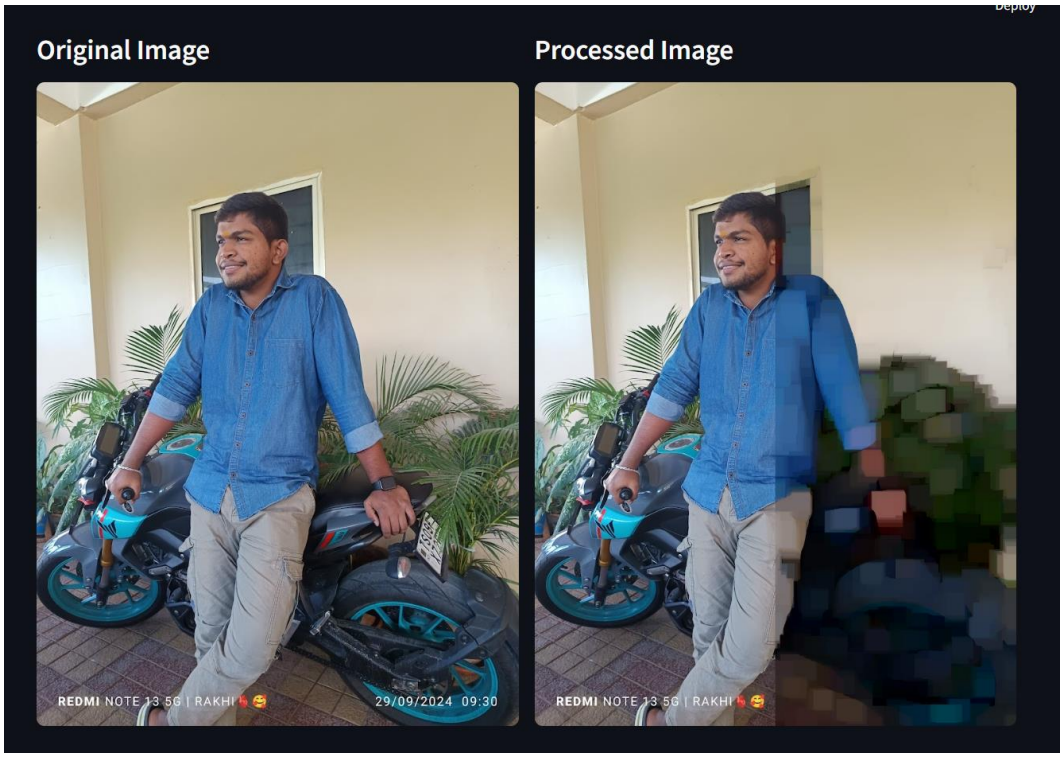
29/09/2024 09:30


Original Image
Processed Image
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