

This project demonstrates real-time edge detection using OpenCV, a powerful computer vision library in Python. The tool allows users to input any image and observe how edge detection algorithms identify boundaries and shapes within the image. This is especially useful in computer vision applications such as object recognition, motion detection, and image segmentation.

### **Why It Matters:**

Edge detection is a fundamental step in image processing that helps machines understand the structure of visual data. By highlighting regions of contrast, it allows us to extract meaningful features from images for further analysis. Understanding how different algorithms (like Canny and Sobel) process visual information is key to building intelligent systems.

### **How It Works:**

- The user provides the path to an image file.
- The image is converted to grayscale to reduce complexity.
- Canny edge detection is applied using interactive sliders to adjust sensitivity in real time.
- Sobel filters are used to compute gradients in horizontal and vertical directions, then combined to show edge intensity.
- The original, Canny, and Sobel views are displayed side-by-side for comparison.

**Technologies Used:** Python, OpenCV, NumPy