Lab 3: Feature Detection and Matching

CPV301

Nguyen Hoang Hai[1]

[1]FPT University

October 2023

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1 Algorithms

2 Designing Application

Harris Corner Detection

Harris Detector

Algorithm:

1. Compute Gaussian derivatives at each pixel
2. Compute second moment matrix M in a Gaussian window around each pixel
3. Compute corner response function R
4. Threshold R
5. Find local maxima of response function (nonmaximum suppression)

Figure: Harris Corner Detection

HOG

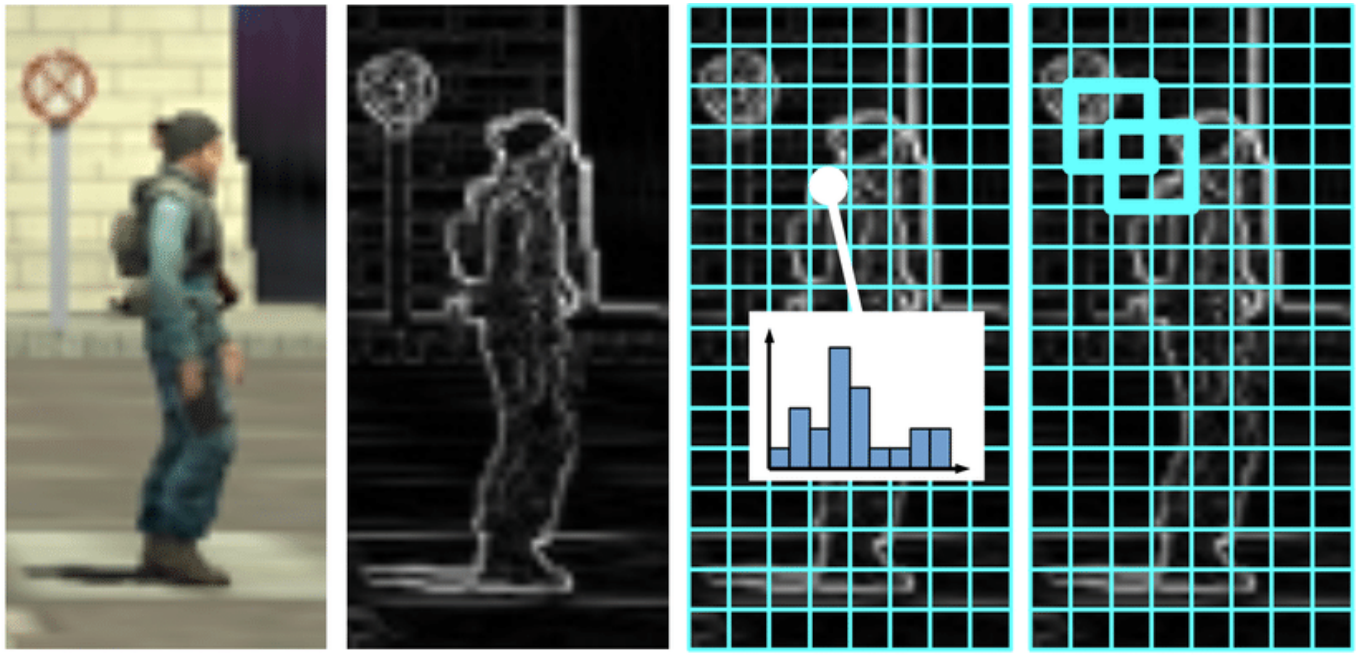

Figure: Histogram of Oriented Gradients

Canny Operator

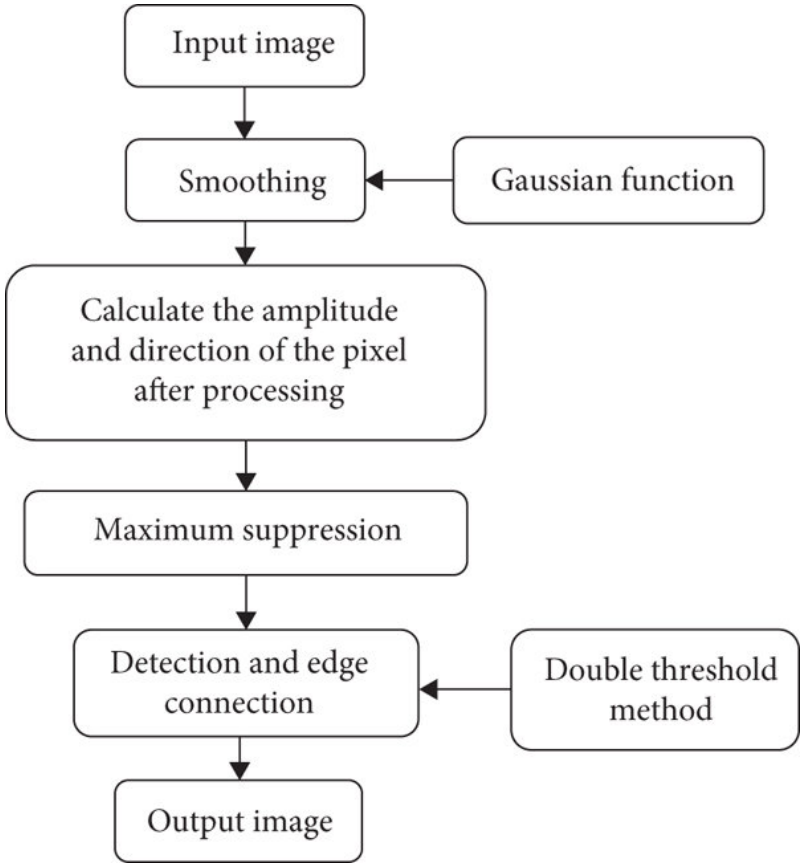

Figure: Process steps of Canny Operator

Hough Transform

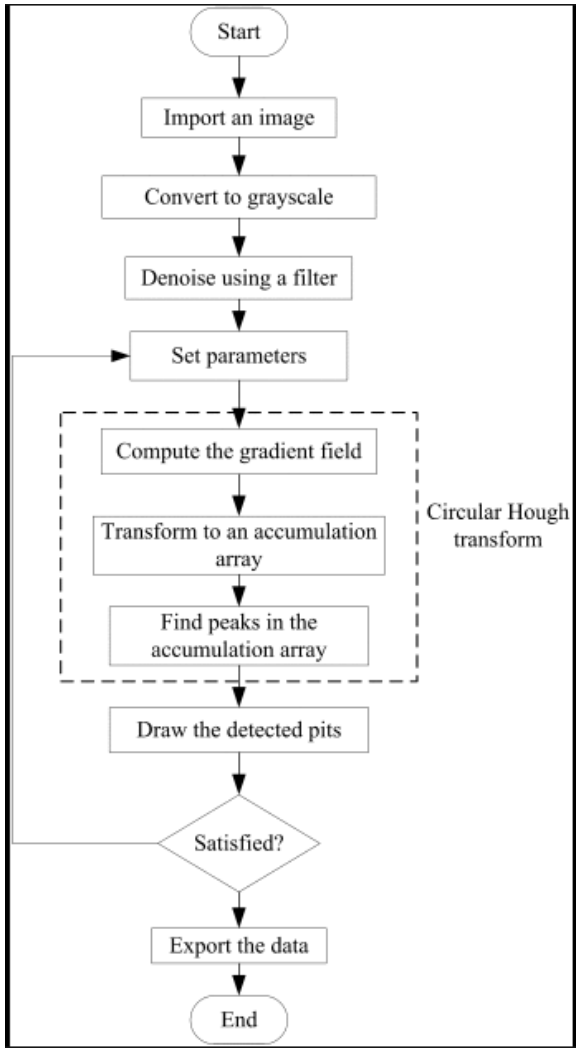

Figure: Process steps of Hough Transform

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Dependencies

Tkinter is the library be chosen to design GUI for this app. It is the standard GUI library for Python. Tkinter provides a fast and easy way to create applications.

Dependencies

NumPy is imported for mathematical calculations, matrices operations. And OpenCV and Scikit-Image are used for loading, processing and exporting images.

Harris Corner Detection

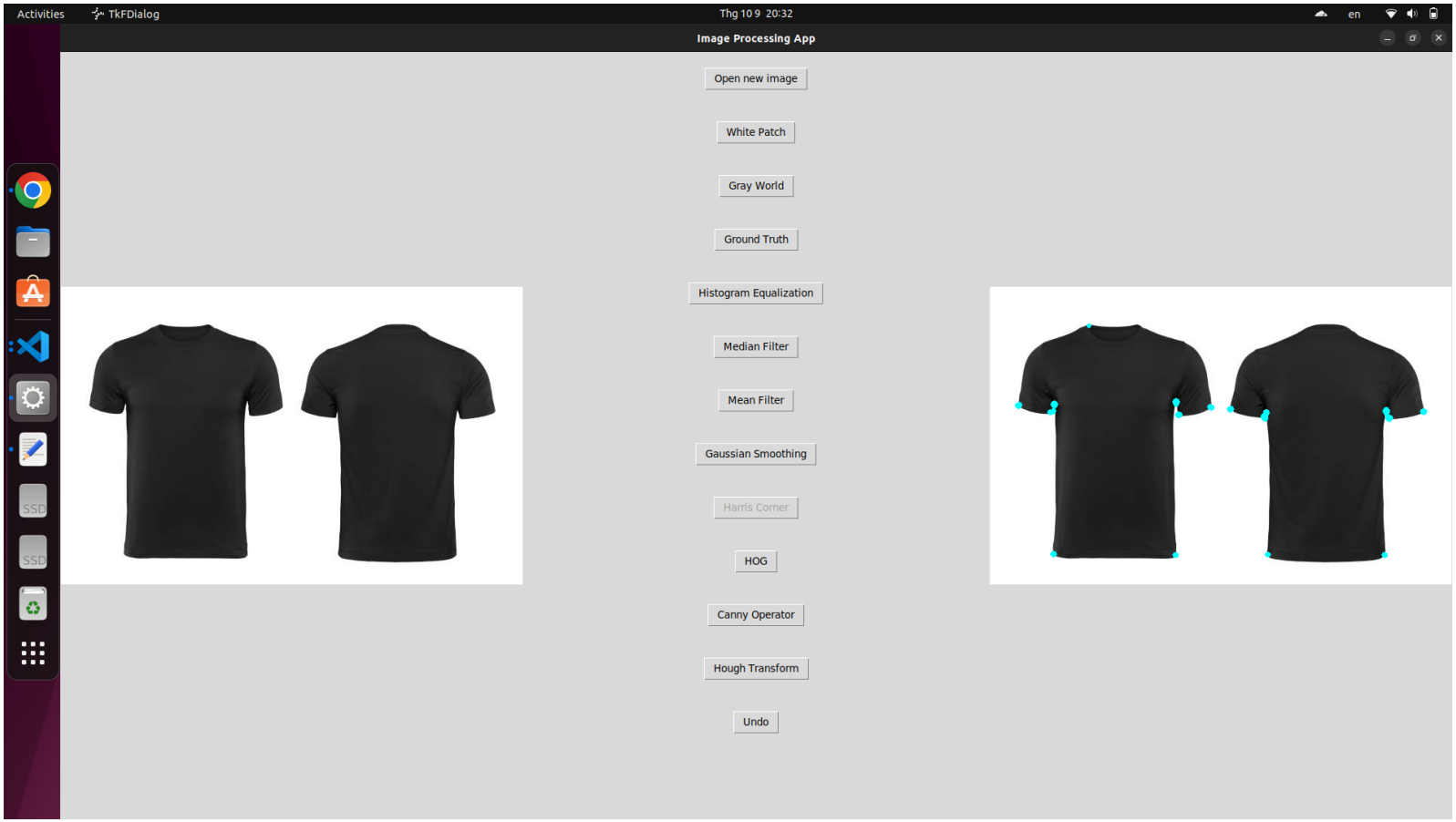


Figure: Harris Corner Detection

HOG

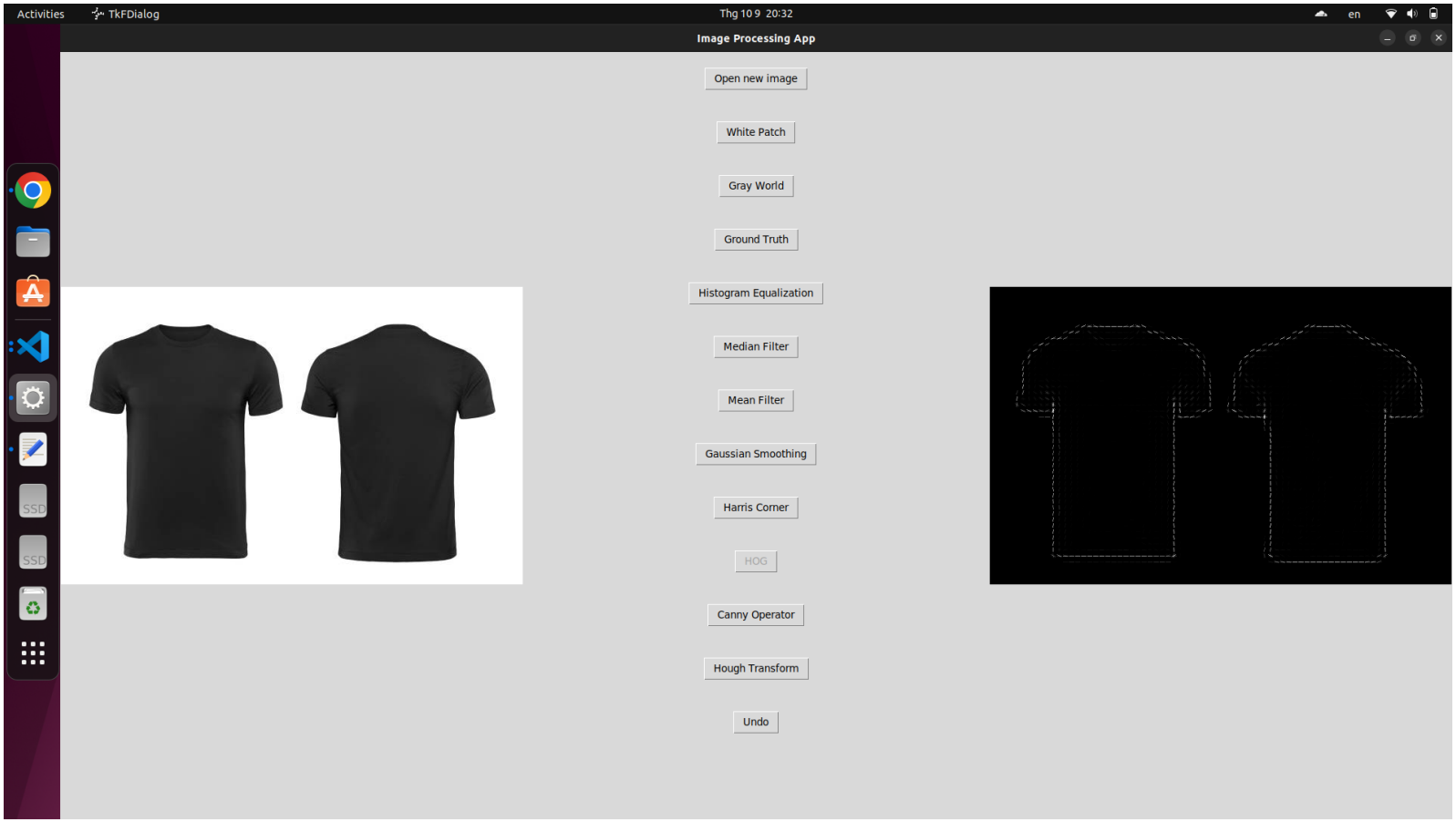


Figure: Histogram of Oriented Gradients

Canny Operator

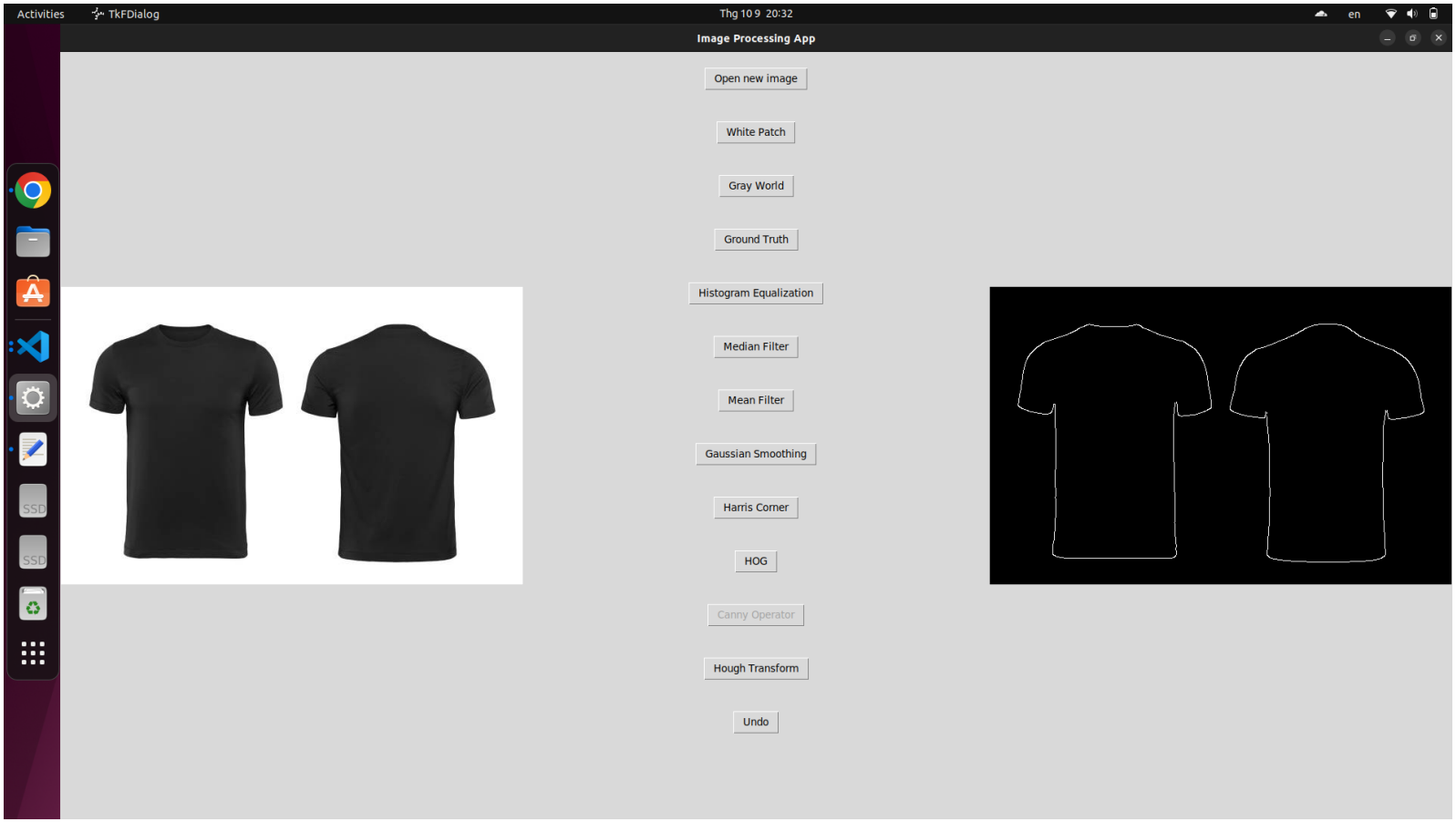


Figure: Canny Operator

Hough Transform

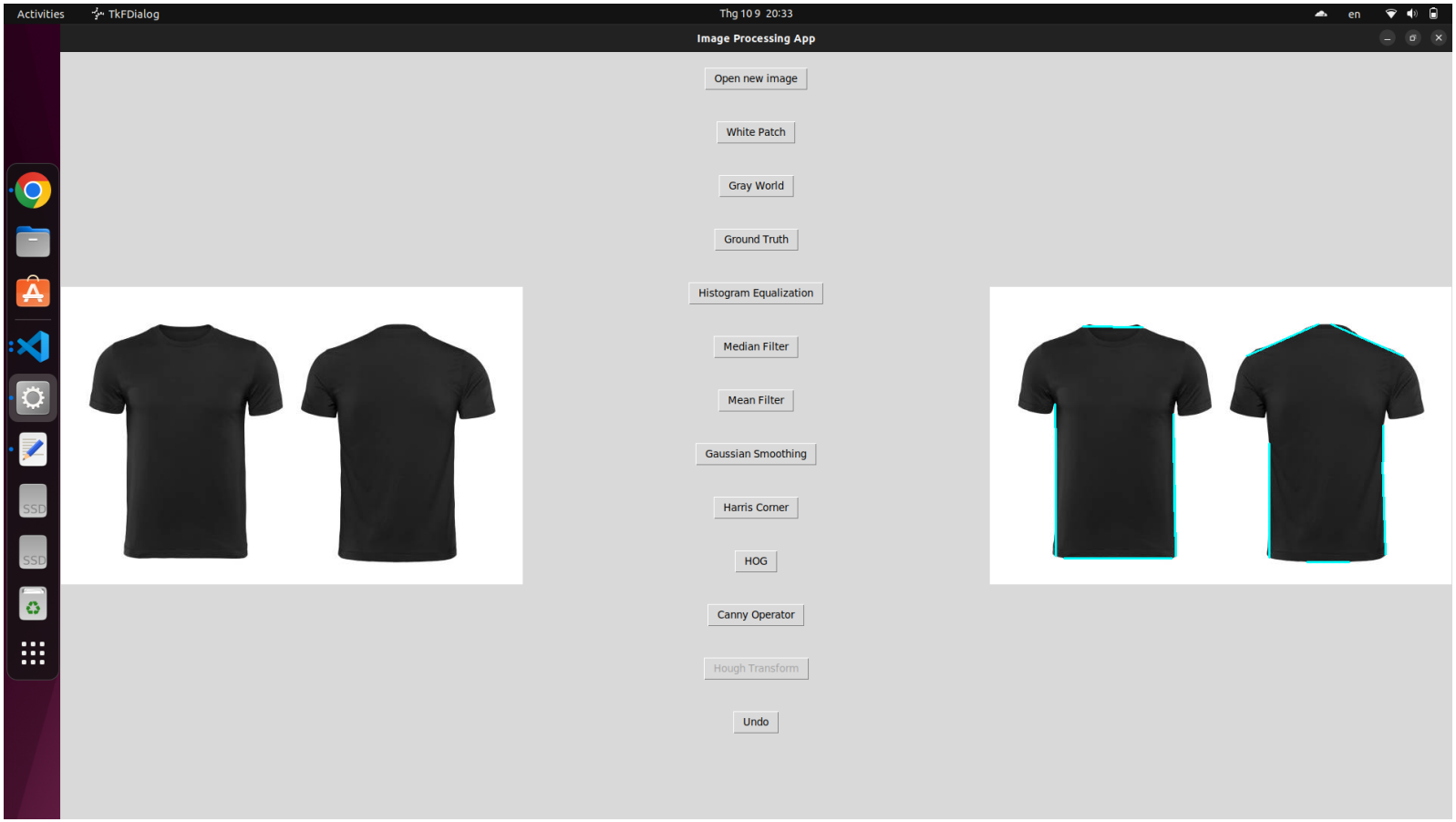


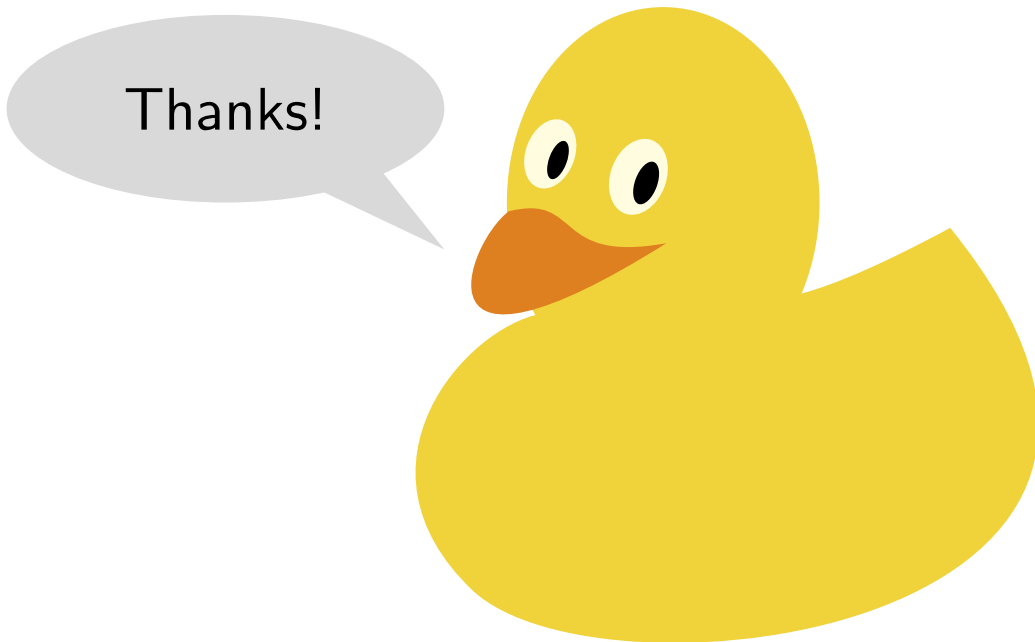
Figure: Hough Transform

GUI Overview

After loading image, we can perform many effect on it. Each effect can only be used once, after using that button it will be disabled. We can undo the effects.

Source code

https://github.com/hoanghai1803/CPV301/tree/main/lab3


Thanks!