Homework 04, UST AIP Edge Detection using Sobel and Canny Methods

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Summary—This report presents the Edge Detection methods on images such as Sobel and Canny Methods. Tools used in this project are OpenCV 3.2 Library which is a library used for Computer Vision, and Visual Studio 2015 (64 bit).

I. IMAGE OPERATIONS

Edge detection is an image processing technique for finding the boundaries of objects within images. Edge detection includes a variety of mathematical methods that aim at identifying points in a digital image at which the image brightness changes sharply or, more formally, has discontinuities. The points at which image brightness changes sharply are typically organized into a set of curved line segments termed edges. It works by detecting discontinuities in brightness. Edge detection is used for image segmentation and data extraction in areas such as image processing, computer vision, and machine vision. Edge detection is a fundamental tool in image processing, machine vision and computer vision, particularly in the areas of feature detection and feature extraction.

Common edge detection algorithms include Sobel, Canny, Prewitt, Roberts, and fuzzy logic methods.

The Sobel operator performs a 2-D spatial gradient measurement on an image and so emphasizes regions of high spatial frequency that correspond to edges. Typically it is used to find the approximate absolute gradient magnitude at each point in an input grayscale image.

Basic Steps followed in Sobel Edge Detection:

1. Obtain the gradient of the image.

2. Find the magnitude

3. Threshold the gradient image.

Calculates the first, second, third, or mixed image derivatives using an extended Sobel operator.

The Canny edge detector is an edge detection operator that uses a multi-stage algorithm to detect a wide range of edges in images.

II. OPENCV SOURCE OF BOTH PROGRAMS

The following source code reads an input image and then do the following tasks i) Detect Edges using Sobel Operator ii) Detect Edges using Canny Method.

```
Mat     src1     =     imread("..\\data\\lena.jpg",
CV_LOAD_IMAGE_COLOR);
//Load Image
Mat sobelx;
Sobel(grey, sobelx, CV_32F, 1, 0);

//Applying Sobel Operator

// Convert Image to Grayscale
cvtColor(image, gray_image, CV_RGB2GRAY);

cv::Canny(image, contours, 10, 350);
// Applying Canny Operator
```
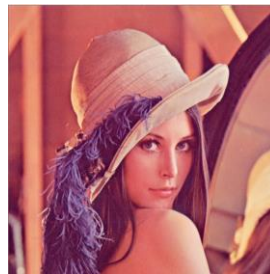
III. RESULTS

Fig. 1. Original Image

Fig. 2. Edge Detected Using Sobel

Fig. 4. Gray Scale Image

Fig. 4. Edge Detected Using Canny

CONCLUSION: - OpenCV provide a lot of functions for Edge Detection in image and video processing, in which two of the basic functions implementation on images were discussed in this report.