Homework 06, UST
Line and Circle Detection using Hough Transform

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Summary—This report presents the Line and Circle Detection using Hough Transform Method. 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. INTRODUCTION

The Hough transform is a feature extraction technique used in image analysis, computer vision, and digital image processing. The purpose of the technique is to find imperfect instances of objects within a certain class of shapes by a voting procedure. Hough Transform used to detect any shape, if you can represent that shape in mathematical form. It can detect the shape even if it is broken or distorted a little bit. In this project I will discuss and practically implement that how it works for lines and Circles.

II. OPENCV SOURCE CODE

The basic steps of Hough Transform Method for Line detection are:

1. Load image and convert to gray-scale.
2. Apply the Hough Transform to find the lines.
3. Draw the detected lines.
4. Show the result

And the basic steps of Hough Transform Method for Circle detection are:

1. Load image and convert to gray-scale.
2. Blur (low pass filter) the image to reduce noise.
3. Apply the Hough Transform to find the circles.
4. Draw the circles detected.
5. Show the result

For Line Detection

```
//Load Image
Mat src = imread("..\\data\\table.jpg");
// detect the lines
HoughLinesP(dst, lines, 1, CV_PI / 180, 50, 50,
// draw the lines
line(cdst, Point(l[0], l[1]), Point(l[2], l[3]),
Scalar(0, 0, 255), 3, CV_AA);
```

For Circle Detection

```
// Load image
src = imread("..\\data\\world.jpg");
// Convert it to gray
cvtColor(src, src_gray, CV_BGR2GRAY);
// Reduce the noise to avoid false circle
detection
GaussianBlur(src_gray, src_gray, Size(9, 9), 2,
2);
// Apply the Hough Transform to find the circles
HoughCircles(src_gray, circles,
CV_HOUGH_GRADIENT, 1, src_gray.rows / 8, 200,
100, 0, 0);
```

III. RESULTS

Fig. 1. Original Image

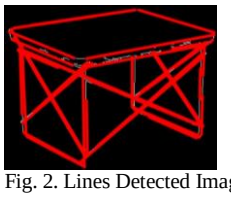

Fig. 2. Lines Detected Image

Fig. 3. Original Image

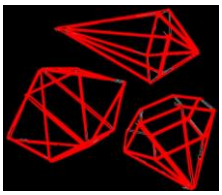

Fig. 4. Lines Detected Image

Fig. 5. Original Image

Fig. 6. Circle Detected Image

CONCLUSION: - Hough Transform built-in function is a powerful function for detecting geometric objects, here I only discussed this method for two kinds of objects i.e. Lines and Circles but it can be used for detecting many more objects too with some little modification.