

# A Study of Edge Detection Method for different Climate Condition Images using Digital Image Processing

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## Abstract

Human eye can sense different weather conditions as same as the sensor. The human eye gives good result. In this proposal work the six different edge detection methods are applied to analyze weather condition. In this work the special kind of changes in the picture for different weather condition are observed. The six different edge detection method like sobel, prewitt, Robert, canny, laplacian of Gaussian and zero crossing are used to analyze the weather condition and finally the result of three methods are compared for best result.

**Key words:** edge detection, human eye, picture, sensor, weather condition.

## 1. Introduction

Image processing has been applied in wide areas like computer vision, face detection, medical imaging, microscope image, raster operation and forensic etc. Human eye could analyze weather condition just by seeing the environment and location. By nature, Human eye have some sensing ability to find the weather condition by differentiating the brightness. Similar to that, different instruments are being used to find the weather condition as sunlight falls on the earth. Different changes occur in the intensity of sunlight radiations. These variations in the intensity of sunlight make changes in the pixel rating of

the picture. When intensity of sunlight increases, the sharp edge of a picture also increases. In same way when the intensity falls, the sharp edge falls. The natures of human eyes analyze the two different conditions such as dark room and bright room. The human eye finds more sharp edge in the bright room than dark room. In the same way, this proposal work analyzes the images of different weather condition using six edge detection methods such as sobel, prewitt, Robert, canny, laplacian of Gaussian, and zero crossing.

## 2. Process

For processing, the pictures of the object for different climatic condition are taken on a rainy day at location *GPS* Longitude, 76 deg 51' 7.00" E in the same angle and distance. Time interval for each picture is one hour. The pictures of seven samples are taken from morning 6.00 am to 11.59 am. The different type edge detection methods are used for finding the area of each edge detected picture. These methods give the output by increasing intensity of light which in turn the area of the edge detected picture increases. The edge detected images are displayed below.



Figure 1. Original image

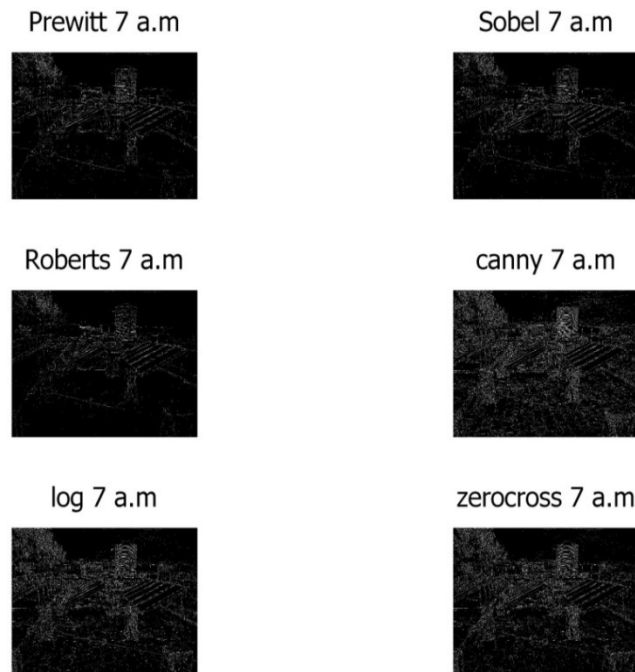


Figure 3. Result for 7.00 a.m sample image

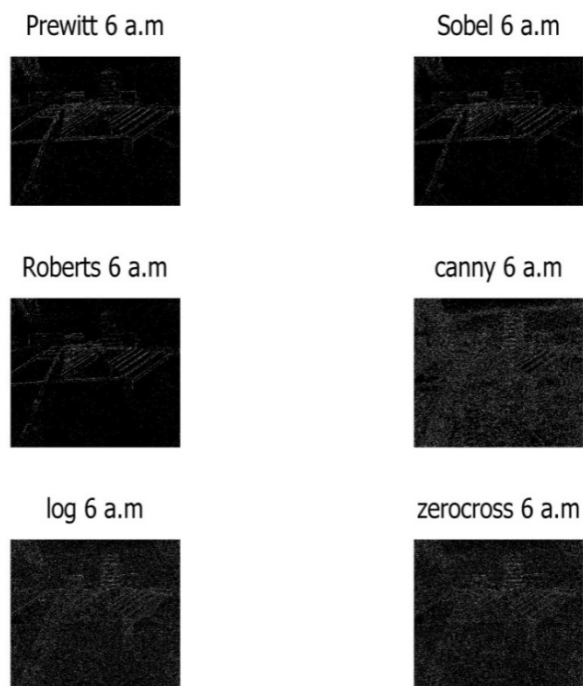


Figure 2. Result for 6.00 a.m sample image

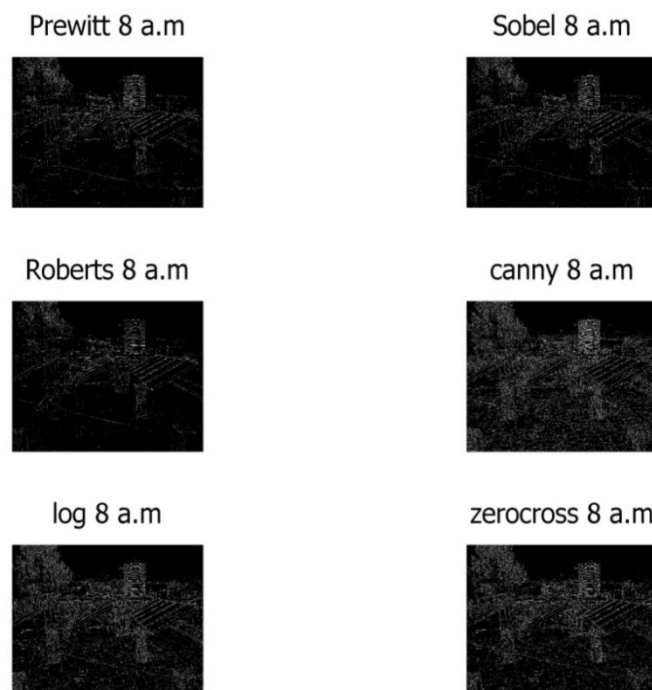


Figure 4. Result for 8.00 a.m sample image

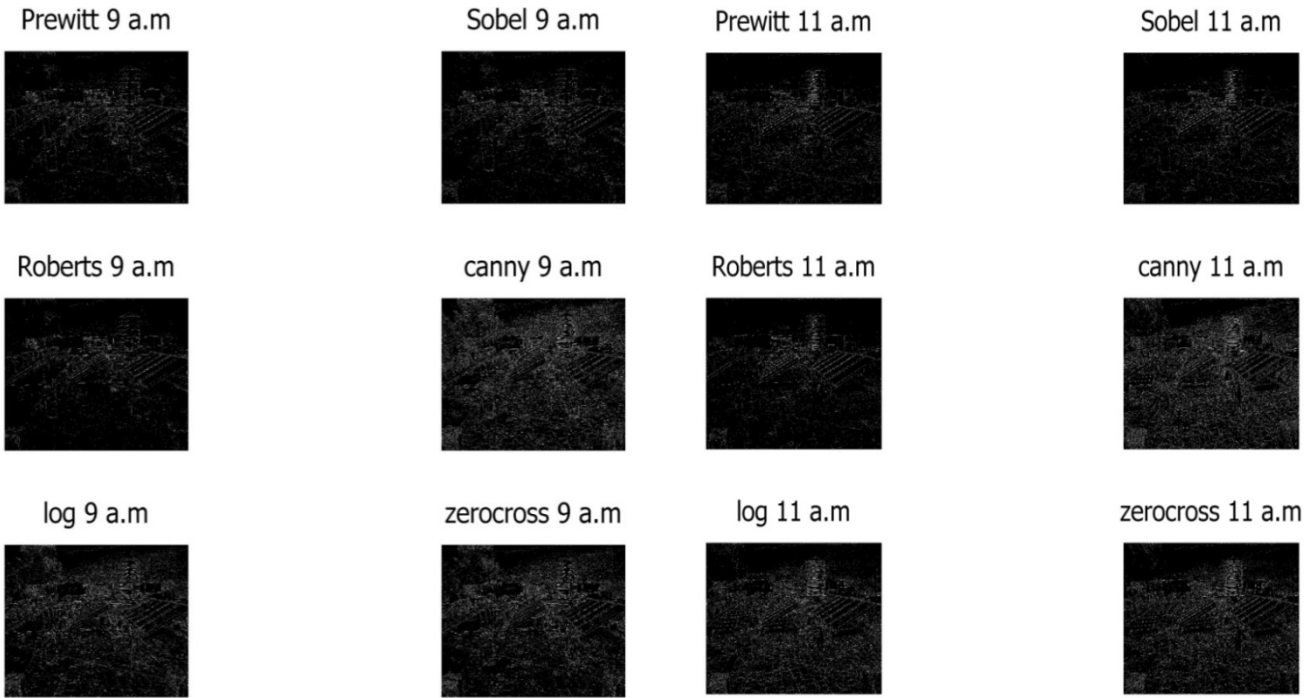


Figure 5.Result for 9.00 a.m sample image

Figure 7.Result for 11.00 a.m sample image

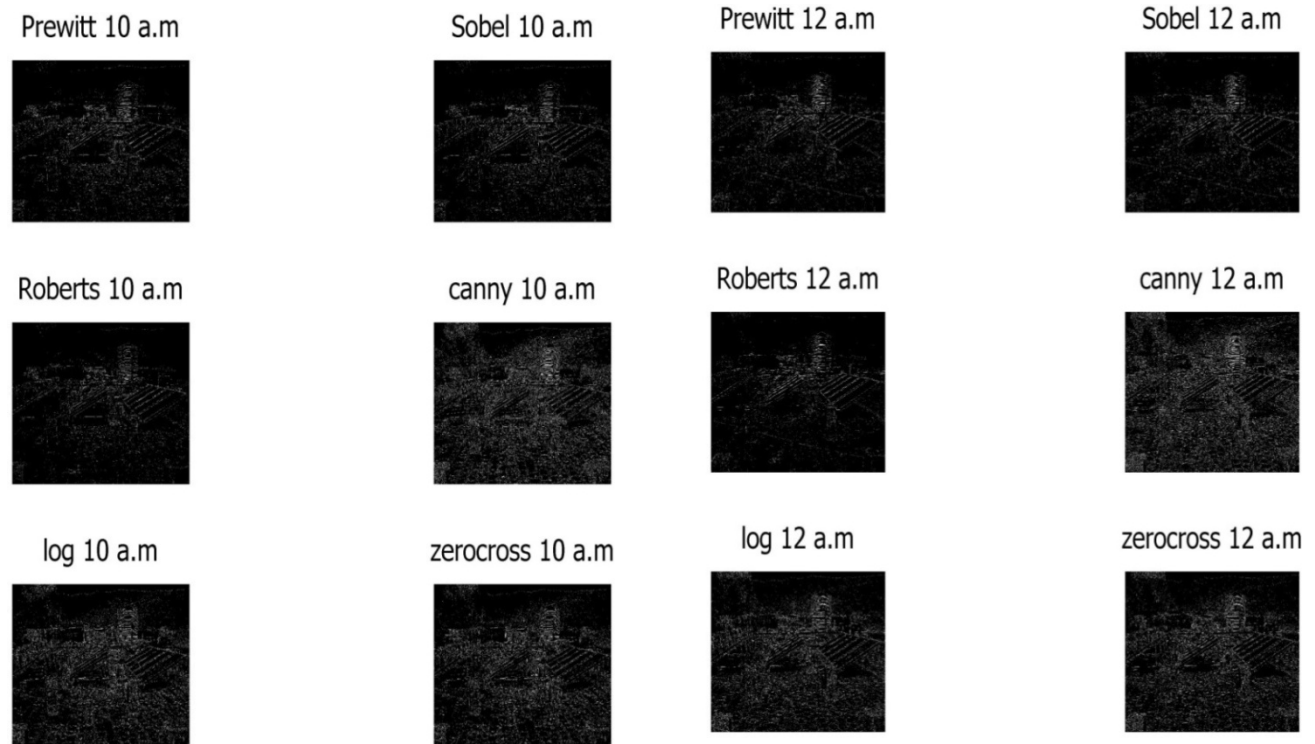


Figure 6.Result for 10.00 a.m sample image

Figure 8.Result for 12.00 p.m sample image

### 3. Result and Discussions

Edge detection method is used for different images in regular interval. It gives different area of edge detected images and results. Figure (2) gives low area value because of the low intensity of light at that time. Basically in early morning, sunlight has low intensity. When the time get increase the light intensity, area of the edge detected picture also randomly increase. Suppose cloud around the place causes decrease in light intensity, also the area of image causes reduction. Here picture area is directly proportional to light intensity.

Every one hour time operator value for first three hours randomly increased and four and six hour slightly decreased in operator value and five and seven hour shows increase in operator value. Because of the five and seven hours image is taken when the cloud covered. Hence using this variation we can find what is climate condition and approximate climatic temperature at particular location by referring predefine measures of it Sobel and Prewitt Edge detecting method which gives good result whereas Laplacian of Gaussian and zero cross edge detection method gives same result but these methods approximately similar with sobel and prewitt. Roberts and canny edge detection methods do not match with other edge detection methods.

Table 1(different edge detection method results)

Time/ Operator s	Sobel	Prewitt	Robert s	Canny	Laplacian of Gaussian	Zero crossing s
6	1.8662	1.8615	1.3736	1.0341	7.8482	7.8482
7	2.8993	2.9004	2.2346	8.1532	6.0531	6.0531
8	3.0915	3.0878	2.3414	8.9793	6.5442	6.5442
9	2.6257	2.6253	2.1797	9.5311	6.3965	6.3965
10	2.9988	3.0028	2.3109	9.5647	6.7115	6.7115
11	2.7728	2.7743	2.2879	8.8621	6.1226	6.1226
12	2.8643	2.8670	2.2042	1.0175	6.7839	6.7839

Table 1 shows the result for edge detection image. In sobel and prewitt edge detection method are increasing the light intensity causes increasing operator value and decrease in light intensity lead to decrease operator value.

Robert edge detection method may gives output similar to the sobel and prewitt edge detection methods. But operator value changes are small, compared with sobel, prewitt edge detection methods. Canny edge detection method is totally different with all others edge detection methods. Laplacian of Gaussian and zero crossing methods are initially different from sobel prewitt and Robert. But increasing in the operator values gives same result as other methods. Finally three methods are suitable for finding weather conditions. They are Robert, sobel and prewitt methods.

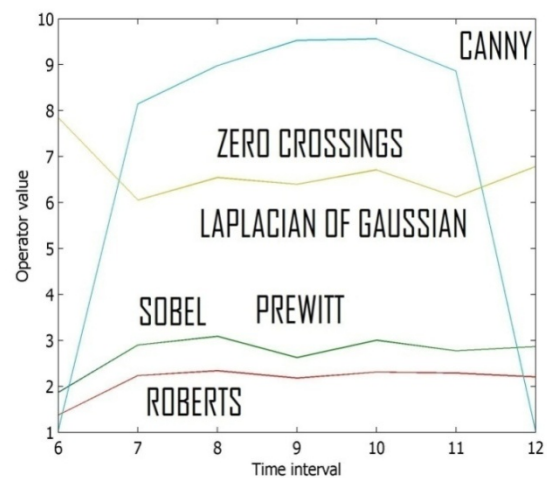


Figure 9 Graph model for different edge detection method

Graph model is drawn between operator value and time intervals. Each time interval has different weather condition. Sobel, Prewitt and Robert edge detection method have same track. Canny edge detection method have different track so it's not included for consideration. Laplacian of Gaussian and zero crossings methods give same value but they are different from other three methods such as Sobel, Prewitt and Robert.

### 4. Conclusion

After analyzing various edge detection methods prewitt and sobel methods produces best result.

## Reference

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