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COMPARISON OF EDGE DETECTION METHOD

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ABSTRACT Within Image process edge detection well developed field on its own. The edge detected by detectors t quiet usually disconnected. However, we want complete the region boundaries to phase associate object from image. There's completely different approach for edge detection. This paper presents completely different edge detection methodology and compares result.

KEYWORDS : Sobel, Robert, Prewitt and canny

1. Introduction

Quite often we have found that there are sharp adjustments in the intensity at the region boundaries and perhaps that is the reason that the boundaries and edges are closely related. Due to this reason Edge detection techniques is used as the foundation of another techniques in segmentation [1].

2. Edge Segmentation method
SOBEL METHOD

Sobel Operator has 3×3 convolution kernels. That is shown in Figure 2.1. One kernel is straightforward the opposite turned by 90°. 1st is Gx and second is Gy.

-1	0	+1		+1	+2	+1
-2	0	+2		0	0	0
-1	0	+1		-1	-2	-1

Figure 2.1: Masks used by Sobel Operator

These kernels notice vertical and horizontal edge. Image may be severally applied to the kernels to made Gx and Gy orientation's gradient component's separate measurements. These values united along to search out absolutely the degree of the gradient at every purpose and orientation of that gradient [2]. The magnitude of gradient is given by

$$|G| = \sqrt{GX^2 + GY^2}$$

Magnitude is formulated as below

$$|G| = |Gx| + |Gy|$$

The angle of orientation of the edge is given below
q = arctan(Gy/Gx)   (1)

ROBERT'S CROSS METHOD

Robert's cross operator consists of a pair of two X two2 convolution kernels as shown in Figure 2.2 One kernel is just the opposite revolved by 90°[3].

+1	0		0	+1
0	-1		-1	0

Gx   Gy

Figure 2.2: Masks used for Robert operator.

These kernels are designed to reply maximally to edges running at 45° to the component grid. The gradient magnitude is given by:

$$|G| = \sqrt{GX^2 + GY^2}$$

$$|G| = |Gx| + |Gy|$$

The angle of orientation of the edge is given below
q = arctan(Gy/Gx)-3π/4   (2)

PREWITT METHOD

Prewitt's operator [4] is analogous to the Sobel operator and is employed for detection vertical and horizontal edges in pictures. Following figure 2.3 represents kernel.

-1	0	+1		1	+1	+1
-1	0	+1		0	0	0
-1	0	+1		-1	-1	-1

Gx   Gy

Figure 2.3: Masks for the Prewitt gradient edge detector

CANNY METHOD

Canny edge detection appearance for native maxima of the gradient of grey scale image. Derivative of Gaussian filter gradients is calculated. 2 thresholds are utilized in this methodology, detection weak and robust edges and as well as the weak edges within the output, provided there are robust connections to the edges [1].

Canny edge detection is basically based on three objectives.
- The error ratio is less. There should be no false response and all edges should be found. I.e. the detected edges should compulsorily be nearer to the true edge.
- The located edge must be close to true edges. That means that there should be nominal minimum distance between a point marked as an edge and the center of the true edge.
- Single edge point response, which means that instead of the existence of a single edge point, the detector should not identify multiple edge pixels.

In 1st finding of edge segments the regions were recognized then tried to converge those segments into boundaries.

The formula then tracks on these regions and suppresses any picture element that's not at the utmost. The gradient array is currently additional reduced by uses 2 thresholds and if the

magnitude is below the primary threshold, then set to zero. If the size is on top of the high threshold, it's created a edge. And if the size is between the two thresholds, then it's set to zero [5].

3. Implementation

Following figure 3.1 is taken by standard digital camera it shows my own face. Testing is done in MATLAB. Image size is 4.79 MB.

Figure 3.1: Original image

Original image is given to this model for further processing. Our first step is to find face part from image. For face extraction used ADABOOST and CASCADE classifier. Face image shown in following figure 3.2.

Figure 3.2: Face Extraction

After face extraction image is compare with different edge detection technique. Following figure 3.3 shows result of different method for edge detection.

(a)   (b)
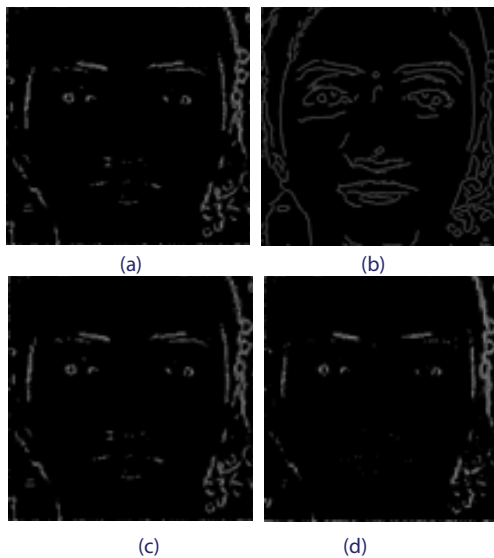
(c)   (d)

Figure 3.3: Edge detection by different methods (a) Prewitt edge detection (b) Canny edge detection (c) Sobel edge detection (d) Roberts edge detection. Clarity for edge result is good in canny method.

4. Conclusion

From this result decided to use best method for edge detection that is canny approach [6-8]. From above figure 3.3 image it was clear that the result obtained from edge detection looked good in figure 3.3(b) other edge detection methods were compared to canny method. Eventually the comparison resulted to a conclusion that the best method for edge detection is Canny.

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