

# Edge Detection for 3-D Images Using Ensemble Approach

A Yuva Krishna<sup>1</sup>, B Vishnu Vardhan<sup>2</sup>, D Lokesh Sai Kumar<sup>3</sup>, V.Shariff<sup>4</sup>Asst Professor, Dept. of CSE, PVPSIT, Vijayawada India<sup>1,2,3</sup>Asst. Professor, Dept. of CSE, CR Reddy Collge of Engineering, Eluru, Vijayawada India<sup>4</sup>

**ABSTRACT:** Image processing means the processing of images using various mathematical equations for sample input image. Edge detection is the technique with the group of mathematical functions which will identify the edge points in the digital images. The edge points of the image color, brightness changes sharply organized a set of curved line segments edges. This causes the sharp discontinuous in the image. The main aim of the edge detection is to remove useless data from image and filter the noise in the image. Many researches have been done on this but these not work out that extent. In this paper, to overcome this proposed ensemble edge detector is used to detect the images and 3d-images without discontinuous and reduces the noise data and filters the edges. With the comparison with existing edge detectors the proposed system performs the more. Results will show the performance of proposed system.

**KEYWORDS:** Edge detection, image processing.

## I. INTRODUCTION

Image processing defined as the processing of normal image into digital image by using various mathematical and arithmetic operations to extract the clear image without any noise and filters the image to reduce the data without the loss of resolution. Typically Image Processing framework incorporates regarding images as two dimensional signs while applying officially set sign preparing techniques to them. It is among quickly developing advancements today, with its applications in different parts of a business. Image Processing is one of the fast growing research area for computer engineering and other engineering also.

Digital image processing is implied for handling digital PC. It is the utilization of PC algorithm to perform image preparing on digital images. It is an innovation broadly utilized for advanced picture operations like feature extraction, pattern recognition, segmentation, image morphology etc. Edge detection is an all around created field all alone inside of image preparing. Edge recognition is essentially image division strategy, isolates spatial area, on which the picture is characterized, into important parts or areas. Edges describe limits and are in this manner an issue of basic significance in image handling. Edges ordinarily happen on the limit between two distinct areas in a images. Edge discovery permits client to watch those elements of a image where there is a pretty much unexpected change in dim level or composition demonstrating the end of one district in the image and the start of another. It finds down to earth applications in therapeutic imaging, PC guided surgery analysis, find protest in satellite pictures, face acknowledgment, and unique finger impression acknowledgment, programmed movement controlling frameworks, investigation of anatomical structure and so on. Numerous edge recognition methods have been produced for removing edges from advanced pictures .Gradient based traditional administrators like Robert, Prewitt, Sobel were at first utilized for edge location however they didn't give sharp edges and were profoundly delicate to commotion picture Laplacian based Marr Hildrith administrators likewise experiences two impediments : high likelihood of recognizing false edges and the limitation slip may be extreme at bended edges yet calculation proposed by John F. Vigilant in 1986 is considered as the perfect edge identification calculation for pictures that are ruined with commotion. Wary's point was to find the ideal edge location calculation which lessens the likelihood of distinguishing false edge, and gives sharp edges. [1][2][3][4][5].

# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 4, April 2016

## II. RELATED WORK

Different number of operators is available for edge detection. But these operators are classified into two categories. In First order derivative [6] the input image is convolved by an adapted mask to generate a gradient image in which edges are detected by thresholding. Most classical operators like sobel, prewitt, robert [7] are the first order derivative operators. These operators are also said as gradient operators. These gradient operators detect edges by looking for maximum and minimum intensity values. These operators examine the distribution of intensity values in the neighbourhood of a given pixel and determine if the pixel is to be classified as an edge. These operators have more computational time and can't be used in real-time application. In second order derivative [6], these are based on the extraction of zero crossing points which indicates the presence of maxima in the image. In this, image is first smoothed by an adaptive filters [8]. Since the second order derivative is very sensible to noise, and the filtering function is very important. These operators are derived from the Laplacian of a Gaussian (LOG), and proposed by Marr and Hildreth [8], in this, the image is smoothed by a Gaussian filter. For this operator we have to fix some parameters such as the variance of the Gaussian filter and thresholds. Some methods are available for their automatic computation [9], but in most cases their values have to be fixed by the user. A significant problem of LoG is that the localization of edges with an asymmetric profile by zero-crossing points introduces a bias which increases with the smoothing effect of filtering [10]. An interesting solution to this problem was proposed by Canny [11], which says in an optimal operator for step edge detection includes three criteria: good detection, good localization, and only one response to a single edge. After that other operators have been proposed [12][13][14][15]. These operators provides good efficiency against noisy images, but they offers some limit about localization when detecting edge types other than those for which they are optimal [16]. In last we conclude that none of the actual edge detectors based on the first or the second derivative of an image meets our criteria because the blurring effect of pre-processing, and the operator linearity causes a restriction to correctly detect any edge form. So we required a new operator called declivity operator [17] which solves our problem. This nonlinear differential operator does not require any preprocessing.

### Edge detection

Edge detection is important software utilized as a part of image processing, fundamentally for feature detection and extraction, which mean to distinguish focuses in a digital image where quality of image changes pointedly and discover discontinuities. The motivation behind edge detection is significantly decreasing the measure of information in a picture and preserves the basic properties for further picture preparing. In a grey level picture the edge is a nearby element that, with in an area isolates areas in each of which the dim level is pretty much uniform with in distinctive values on the two sides of the edge. For a noisy picture it is hard to identify edges as both edge and noise contains high recurrence substance which brings about obscured and distorted result.

### Proposed System:

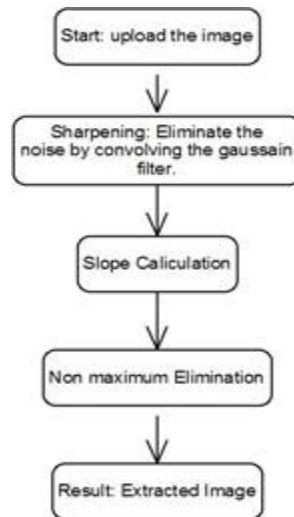
In this paper, a new methodology has been proposed that is based on existing algorithms. The proposed system concentrates on some of the issues like noise elimination, finding slopes,

# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 4, April 2016

## III. FLOW CHART FOR PROPOSED ENSEMBLE APPROACH



### Algorithm:

- Step 1: Start
- Step 2: Declare variables x and y as pixel coordinates.
- Step 3: Read pixels x and y.
- Step 4: Declare each pixel with 8 neighbors
- Step 5: For (x=0; x<8; x++)
- Step 6: For (y=0; y<8; y++)
- Step 7: Check all the combinations between 8 neighbors.
- Step 5: Stop



Fig: 1 Image for Edge detection



Fig: 2 Image after Advanced Filters

## IV. IMPLEMENTATION

Edge detection is done by many authors among those sobel and prewitt edge detection implemented a 3x3 matrix multiplication to all the pixels on the picture and their complexity is width \* height \*3 \*3. In this paper, the hybrid approach edge detection find out the difference among the nearest pixels and if any difference is greater or equal than the threshold value, then consider them as an edge and complication is width \* height. If we increase the threshold value, then edge will decrease, and if threshold value decreases, then the edge will increase. So, there is an inverse relation among the edge and the threshold value. But in sobel & prewitt, we cannot increase or decrease the edges. For different image, sometime, we need to increase or decrease the edges.

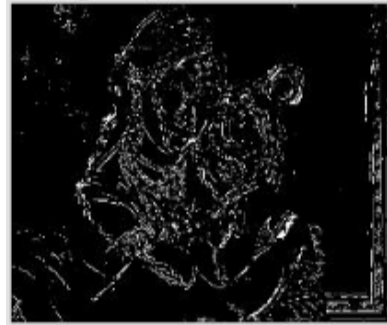
# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 4, April 2016



Fig: 3 Sobel Edge Detector



Figs: 4 Prewitt Edge Detectors

The color difference of two neighboring pixels in opposite direction of an edge is large. Without edge, color difference of neighbor pixels is small.

Each pixel has 8 neighbors. If pixel co-ordinate is  $x$  &  $y$ . Then its neighboring pixels are  $(x+1,y+1)$ ,  $(x,y+1)$ ,  $(x+1,y)$ ,  $(x-1,y-1)$ ,  $(x,y-1)$ ,  $(x-1,y)$ ,  $(x-1,y+1)$  &  $(x+1,y-1)$ . The color difference of two pixels means RGB difference among the two pixels. If two pixels are  $(x,y)$  &  $(a,b)$ , then the color difference will be.

In hybrid edge detection, firstly take a bitmap whose height & width is similar to the original image and the color of all its pixels is white.

The comparison of proposed edge detection with of edge detection to sobel or prewitt edge detection. Black pixel indicates that this pixel is common for proposed and sobel/prewitt. Red pixel indicates that this pixel is only for sobel/prewitt. And blue pixel indicates that this pixel is only for proposed.



Fig: 2 Proposed Edge Detection

## Advantages of Proposed edge detection algorithm

On analyzing all these edge detection techniques, it is found that proposed gives optimum edge detection .Following are the some points throwing light on the advantages of proposed edge detector as compared to other detectors discussed in this paper:

1. **Less Sensitive to noise:** As compared to classical operators like Prewitt, Robert and Sobel proposed edge detector is less sensitive to noise. Its uses better filter which removes noise at a great extent as compared to above filters. LoG operator is also highly sensitive to noise as differentiate twice in comparison to proposed operator.

2. **Remove cutoff problem:** The classical operators like Robert uses single thresholding technique but it results into cutoff. Cutoff means, if the edge gradient just above and just below the set threshold limit it removes the useful part of connected edge, and leave the disconnected final edge. To overcome from this drawback proposed detector uses we increase the threshold value, then edge will decrease, and if threshold value decreases, then the edge will increase. So, there is an inverse relation among the edge and the threshold value.

3. **Adaptive in nature:** Classical operator has fixed kernels so cannot be adapted to a given image. While the performance of proposed algorithm depends on variable or adjustable parameters like  $E$  which is the standard deviation

# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 4, April 2016

of given filter and threshold max are 90. So user can changes these parameters and can improve the result of proposed algorithm.

**4. Good localization:** LoG operators cannot find edge orientation while canny operator provides edge gradient orientation which results into good localization.

## V. CONCLUSION

Edge detection is a well developed field on its own within image processing. Edge detection is basically image segmentation technique, divides spatial domain, on which the image is defined, into meaningful parts or regions. Edges are significant local changes of intensity in an image. The main aim of the edge detection is to remove useless data from image and filter the noise in the image. Many research have been done on this but these not work out that extent. In this paper, to overcome this the proposed ensemble edge detector is used to detect the images and 3d-images without discontinuous and reduces the noise data and filters the edges.

## REFERENCES

- [1] DIGITAL IMAGE PROCESSING Mathematical and Computational Methods by James Clerk Maxwell,1868.
- [2] Digital Image Processing by R. Gonzalez and R. Woods, Addison Wesley, 1992, pp 414 - 428.
- [3] Oxford university publication by S. Sridhar , Digital Image Processing.
- [4] Shamik Tiwari , Danpat Rai & co.(P) LTD. "Digital Image processing"
- [5] J. F. Canny. "A computational approach to edge detection". IEEE Trans. Pattern Anal. Machine Intell., vol.PAMI-8, no. 6, pp. 679-697, 1986
- [6] Journal of Image Processing (IJIP), Volume (3) : Issue (1)
- [7] M. Juneja,P sandhu,"Performance evaluation of edge detection Techniques for images in spatial domain" International Journal of Computer theory and Engineering, Vol. 1, No. 5, December, 2009 1793- 8201.
- [8] S. Selvarajan and W. C. Tat," Extraction of man-made features from remote sensing imageries by data fusion techniques" 22nd Asian Conference on Remote Sensing, 5-9 Nov. 2001, Singapore
- [9] E. Argyle. "Techniques for edge detection," Proc. IEEE, vol. 59, pp. 285- 286, 1971.
- [10] William K pratt,Digital image processing,4th edition ,John WileyInc,2007
- [11] MARR,HILDRETH.Theory of edgedetection. Proc.R. Soc. Lond.(1980), B 207, pp. 187-217.
- [12] DELLEPIANE(S.),GIUSTO(D.D.),SERPICO(S.B.),VERNAZZA(G.).Automatic parameter computation for edge detection by the zero crossing method. 12 e Colloque GRETSI sur le traitement du signal et des images,Juan-les-Pins (12-16 juin 1989), pp. 617-612.
- [13] HARALICK (R. M.), LEE (J.). Context dependent edge detector.Proc.CVPR 88, Ann Arbor, Michigan (1988), pp.223-228.
- [14] J F CANNY," A computational approach to edge detection." IEEE Trans. PAMI (1986), 8, n ~ 6, pp. 679-698.
- [15] DERICHE (R.). Optimal edge detection using recursive filtering. Proc. First Int. Conf. Computer Vision, London (June 8-12, 1987).
- [16] DERICHE (R.). Fast algorithms for low-level vision. IEEE Trans. PAMI (1990), 12, n ~ 1, pp. 78-87.
- [17] SHEN (J.), CASTAN (S.). Edge detection by sign correspondence for zero-crossings. Actes du Premier Colloque Image' COrn, Bordeaux (19-21 nov. 1990), pp. 279-284.
- [18] SHEN (J.), CASTAN (S.). An optimal linear operator for step edge detection. CVGIP : Graphical Models and Image Processing (1992), 54, n ~ 2, pp. 112-133.