Relative Study for Mammographic Images using Edge Detection Algorithm

Apoorva Jain

Dept. of Computer Science Engineering, JEMTEC

Abstract

Image processing refers to manoeuvring of the grey point information contained within the pixel of a digital image. Image edge detection is one of the significant inside of image processing. In this paper, I will show various edge detection operators, and their comparative result images for mammographic images. A mammogram is an X- Ray representation of breast. These images are used as a screening means to detect early breast cancer in women experiencing no symptoms or in women experiencing symptoms such as ache and nipple absolve. There is resemblance between normal and cancerous breast tissues; early detection of breast cancer is tricky. Cancer analysis with the support of image processing includes the subsequent things-Image acquirement, enhancement, post-processing and diagnosis. I used MATLAB software to implement edge detection algorithms for early detection of breast cancer in women.

Keywords

Mammographic Images, Breast Tissues, Nipple Absolve

I. Introduction

Edge detection is used for finding the sharp edges of objects within images. It is the widely used tool in the area of image processing to extract important features present in image which are otherwise not visible. This is typically used for taking out and uncovering of edges. Edge detection in mammographic image is a bit tough process. Image Segmentation-Image segmentation is a process of partitioning a digital image into several segments. It helps in making the image more clear and useful for others to read. It helps in removing noise and thus helps in interpreting of images in a better and productive way. Mammographic images are tough to read and interpret, that is why, firstly edge detection is done by using certain operators then further processing takes place.

A. Edge Detection Techniques

Following are the different edge detection techniques used in this papera)

- Robert
- Sobel
- Prewitt
- Canny

The major property of the edge detection method is its ability to extract the exact edge line with good orientation [1].

1. Robert Edge Detection

It performs a straightforward, rapid to calculate, 2-D spatial incline dimension on an image. This process underline section of elevated spatial rate of recurrence which frequently correspond to edges. The contribution to the operator is a greyscale image the same as to the output is the most common practice for this system.

2. Sobel Edge Detection

The Sobel method of edge discovery for image segmentation find boundaries using the Sobel estimate to the derivative[1]. It precede the ends at those points where the incline is maximum. The Sobel operator perform a 2-D spatial incline measure on an image and so highlights region of elevated spatial regularity that match up to edges.

3. Prewitt Edge Detection

To approximate the amount and direction of an edge Prewitt is a accurate way. Even though unlike incline edge discovery wants a rather fairly amount of time uncontrollable computation to approximate the way from the magnitudes in the x and y-directions, the scope of edge recognition obtain the track directly from the seed with the utmost reaction.

4. Canny Edge Detection

The Canny edge detection method is one of the touchstone edge recognition technique. It was first created by John Canny for his Master's thesis at MIT in 1983, and still outperforms many of he newer algorithms that have been developed [1]. To locate edges by untying clatter from the figure before finding edges of figure the Canny is a very significant process. It is a enhanced mode exclusive of upsetting the characteristics of the edges in the figure subsequently it apply the affinity to locate the boundaries and the significant value for threshold.

II. Experimental Results & Conclusion

This section includes the comparative presentation of various edge detection method wiz Robert, Sobel, Prewitt, Canny. It was implemented using MATLAB R2016a. I have used a mammographic image for testing.
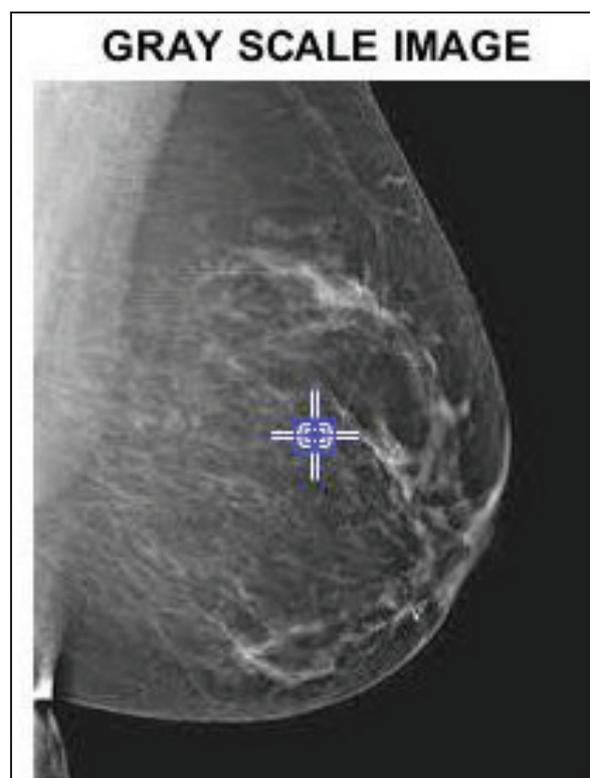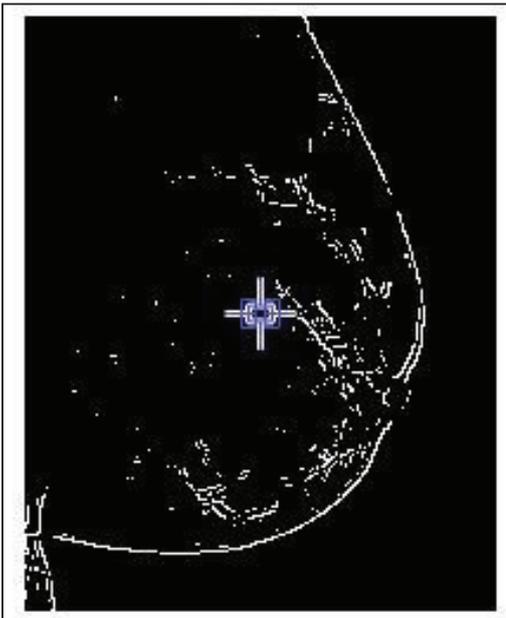

Fig. 1: Original Image
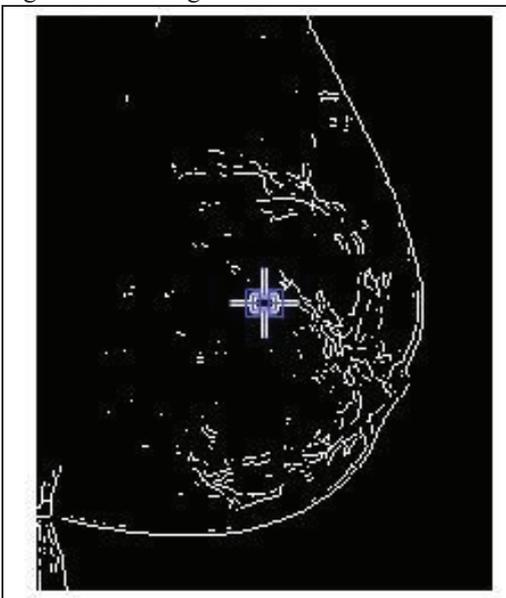
Fig. 2: Robert Edge Detection
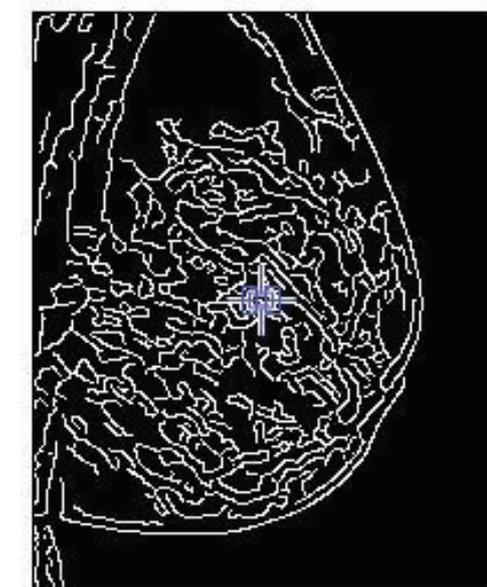

Fig. 3: Prewitt Edge Detection
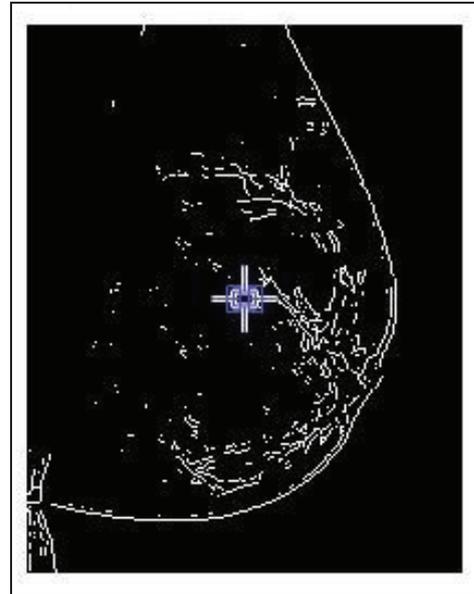

Fig. 4: Canny Edge Detection

Fig. 5: Sobel Edge Detection

Here , I have also calculated the standard deviation. In image processing it shows how much difference exist from the expected value. A low value specify that the data points are likely to be very close to the mean, whereas high standard deviation designate that the data points are extended out over a huge series of value.

For Robert the value is=0.1550
For Prewitt the value is= 0.1739
For Canny value is=0.3273
For Sobel the value is= 0.1749

Thus Canny could be effective for determining Breast cancer but only at the early stage, as it improves the precision of having a breast cancer to a greater extent.

III. Future Scope
We can detect the breast cancer tissues by using fuzzy logic as well. This algorithm will give us the clearer picture of breast cancer tissue.

References
[1] Muthukrishnan.R, M.Radha, EDGE Detection Techniques For Imagesegmentation, International Journal of Computer Science & Information Technology (IJCSIT) Vol. 3, No. 6, 2011.
[2] SpandanaParamkusham, Kunda.M.M.Rao, B.V.V.S.N. Prabhakar Rao,"Early Stage Detection of Breast Cancer Using Novel Image Processing Techniques, Matlab and Labview Implementation".
[3] Mukesh Kumar, V.M. Thakkar, UpendraBhatt, Neema Soliyal, Detection of Suspicious Lesions in Mammogram using Fuzzy CMeans Algorithm", 2016 Intl. Conference on Advances in Computing, Communications and Informatics (ICACCI), Sept. 21-24, 2016, Jaipur, India
[4] Dr. M. Karnan1, K. Rajiv Gandhi,"Diagnose Breast Cancer Through Mammograms", Using Image Processing Techniques And Optimization Techniques.
[5] Canny, J. F,"A computational approach to edge detection, IEEE Transaction on Pattern Analysis and Machine Intelligence", 8, pp. 679-714, 1986.

[6]   Lakshmi, S, V.Sankaranarayanan,"A Study of edge detection techniques for segmentation computing approaches, Computer Aided Soft Computing Techniques for Imaging and Biomedical Applications, pp. 35-41, 2010.

[7]   Melin P, Claudia IG, Juan RC, Mendoza O, Oscar,"Edge detection method for image processing based on generalized type-2 fuzzy logic", IEEE Transactions on Fuzzy Systems, 2013.