DETERMINATION OF BREAST CANCER AREA FROM MAMMOGRAPHY IMAGES USING THRESHOLDING METHOD

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Abstract—*Calculation of breast cancer areaby an image analysis on mammography using thresholding method has been done.The mammography images ware taken from three sides of projection which include oblique (mlo), lateral (ml) and cranial caudal (cc).The results achieved were expected to facilitate in calculating the area of breast cancer for the next stage examination.The thresholding method used was based on the pixel separation in different classes, depending on each grey levels of pixel.The area calculation has been performed by summing the number of pixels that build up the object in the image.The calculation results of the object's wide obtained from three sides, i.e. mlo, ml, and cc, are 4.49 cm², 3.03 cm², and2.58 cm², respectively.These values indicate that the image processing techniques developed can be implemented to calculate the area of breast cancer.*

Keywords — *breast cancer,mammography, thresholding, area, image processing.*

I. INTRODUCTION

Breast cancer becomes a deadly disease when too late handled due to it is a malignant tumors derived from the breast gland. it includes milk glands and other supporting tissues that grow infiltratif, destructive, and be metastases. For now, the most effective way to reduce the number of breast cancer patients is through early detection; conduct an appropriate identification of breast cancer risk for women, and proper application of breast cancer prevention [1]. Breast cancer starts from glandular tissue for milk production, called lobules, and the channels that connect lobules to the nipples. The rest of the other breast tissues consist of fat, lymphatic and connective tissue [2].Breast cancer screening is done using a mammogram by utilizing a low-dose X-ray, which can detect early-stage breast cancer symptoms [3].Mammography has proved capable to detect the breast cancer at an early stage [4].

The mammographic images obtained by mammogram screening are subjective and sometimes appears a collection of micro calcified considered as interference. In addition in the field of radiology, the medical staffs still rely on their visual ability in analyzing mammography images.In fact; the mammography image obtained from the screening results is still influenced by high brightness values, solid tissue, noise, and contrast levels. Based on the shape of the object, it is necessary to do image segmentation to analyze the verified areas as breast cancer [5].

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Therefore, it's necessary a technology in image processing that can be used to assist in image processing process. Image processing itself becomes one of the technologies used to solve the problem of image processing in order to facilitate analysis of the image being processed [6].The role of image segmentation in visually analyzing is to make better the image quality. Image segmentation is performed by separating the object and the background by thresholding technique, it will make easier to detect the abnormal parts of the breast [7].

In analyzing the image of mammography is very important to distinguish the region of the object and the background area so that the object can be more easily analyzed using image segmentation process. Image segmentation is the most important part in image processing [8]. Image thresholding is the simplest method of segmenting.Thresholding is used to adjust the number of gray degrees in an image. The thresholding process is basically a composing process of quantization on image. In order to obtainedsome good segmentation results, some image quality improvement operations need to be done first to sharpen the boundary between the object and the background. Thresholding is a process used to generate a binary image, an image that has two gray level values, Black and white depending on whether the original pixel value is greater or less than the value of T. The pixel will be changed to white when it's gray level value is greater than T, and will be changed to black when its gray level value is less than or equal to T [9].

II. MATERIAL AND METHODS

2.1 Material

The image used in this research is mammography image in dicom format on three projection sides, i.e., oblique (mlo), lateral (ml) and craniocaudal (cc), each of them using a projection of 24 kV and 110 mAs. The segmented image is only a detectable image of having breast cancer that has a mass. The following is the example of normal and abnormal breast mammography images.
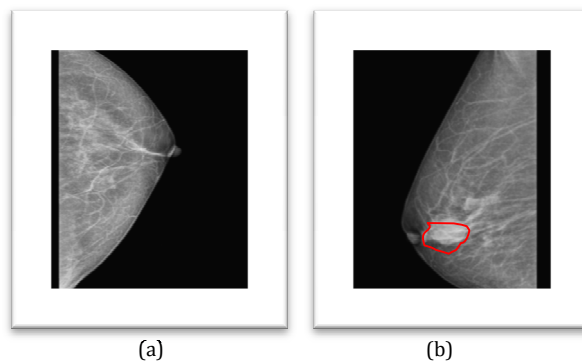

(a)   (b)
Figure1. Breast image (a) normal (b) abnormal

Mammography images in this study were obtained from breast cancer patients exposed by X-ray radiation from an X-ray tube passing through the breast tissue and then producing an image.The resulting image was then captured by the CR film on the plane. The reading result of CR film is then copied into the storage media.

2.2 Method

The initial process of this research begins from reading the mammography image that has mass with Dicom format in Matlab program. The result of the image reading was then segmented using thresholding method to separate the object and the background.After the image of the segmentation results in the form of binary images obtained,the morphological operation to improve the segmentation result and eliminate noise then conducted.The next stage is to determine the location (coordinates) of the midpoint of the mass.The area of mass of the morphological process results was then calculated using the following equation:

$$Area = \frac{\sum_{i=1}^{N}\sum_{j=1}^{M} f(i,j)}{r^2} \qquad (2.1)$$

The calculation results of each image then divided by image spatial resolution.

III. RESULTS AND DISCUSSION

The type of mammography image used in this study was ones identified has mass. The apparent mass was further segmented using the thresholding method. The purpose of this method is to distinguish the object area and the background area so that objects can be more easily analyzed.
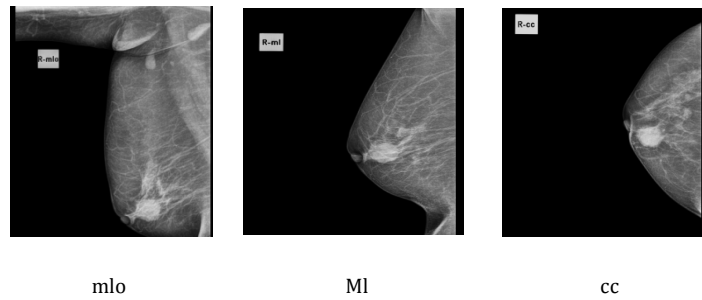
| mlo | Ml | cc |

Figure2 . Mammography images that have mass

Image segmentation was conducted using thresholding method with the aim of separating the object and the background, i.e. between the breast and the mass. The results obtained using thresholding methods were in the form of binary imagery. Further step is a morphological operation to improve the segmentation results to eliminate noise and unwanted areas. The output of the morphological operation was used to determine the location of the mass based on the centroid and calculate the mass area. The image obtained from each segmentation result with three sides of the projection can be seen in Fig. 3.
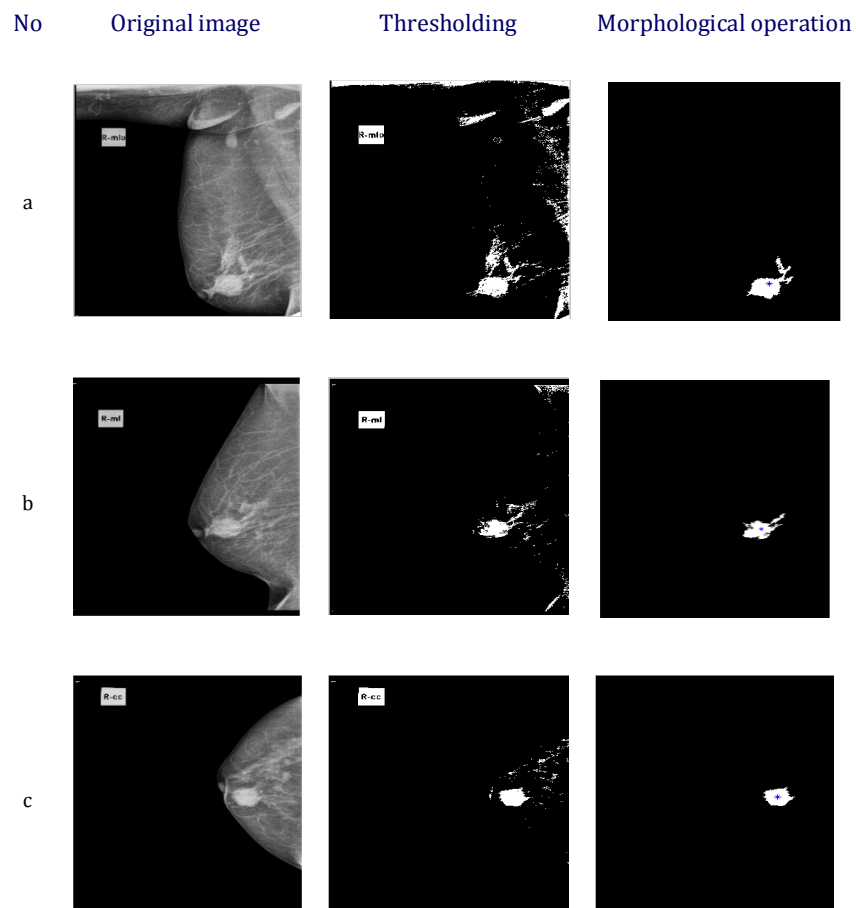
| No | Original image | Thresholding | Morphological operation |

Figure 3. Ssegmentation images with exposure position of (a) oblique (b) lateral dan (c) cranio caudal

The area obtained at the area that has mass from three side projection, i.e. oblique (mlo), lateral (ml) dancranio caudal (cc), respectively are 4.49cm², 3.03cm²,dan2.58 cm².While the location of the mass was obtained based on the midpoint coordinates (*x,y*) on each side of the exposure.The exposure conducted on the side of oblique was on coordinate x =119.41 cmand y=196.43 cm, while on the side of lateral was on ccoordinatee x=119.84 cmand y=143.94 cm, andon the side of cranio caudal was on ccoordinatee x=129.58 cmand y=118.19 cm.

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IV. CONCLUSION

Based on this research, it can be concluded that thresholding method can perform automatic image segmentation as a substitute for the manual calculation method commonly performed by doctors and other medical officers in calculating the area of mammography images that has mass. From the results of every side of imaging, it can be concluded that the use of thresholding method works well. The segmentation result obtained can be used in calculating the area of mass object which will be used by doctors or other medical personnel for further medical treatment.

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