Image segmentation

[1]Snehal Mohan Veer, [2]Vaishali Bhimte, [3]Vikram Ghiye

[1]Assistant Professor, [2]Assistant Professor, [3]Assistant Professor
[1]Electronics and telecommunication Engineering department
[1]APCOER, Pune, India

Abstract: Image segmentation is the most used technique that emerged in early 1960. Cancer is group of diseases characterized by an abnormal and unregulated growth of cell. Lung cancer is the most common cause of death due to cancer in both men and women. Early diagnosis of lung cancer can improve the effectiveness of the treatment. The stage of a cancer means how big (size) it is and whether it has spread. Knowing the stage is important because treatment is often decided according to the size of a cancer. Our aim is to efficiently detect the size of lung tumor from CT images.

I. INTRODUCTION

I. Image segmentation is the most widely used image processing technique that emerged in early 1960. In 2007, R. Adams developed a seeded region algorithm which is used for segmentation of intensity of an image. In 2008,D. Y . Kim used seeded region growing algorithm for kidney tumor detection. In 2008, N. A. Mat-Isa proposed a feature extraction algorithm. This algorithm was used to extract features of cervical cell. In 2010, Nisar Ahmed Memon proposed a method to segmentation of lung which contain tumor. In 2010 Aparna kanakatte and in 2011 cherry d. developed an algorithm for lung tumor detection using SUV thresholding. In 2015, S. K. Vijay Anand proposed an algorithm for lung tumor detection using thresholding. In 2016, Different Edge detection techniques were used to detect a tumor. Poonam bhayan used morphological approach and watershed segmentation to detect a lung tumor. They had used median filtering technique to remove noise. They required many parameters as an input. They had used global thresholding but it is not giving proper segmentation result for all images. In some method they had selected seed point manually. In Nisar Ahmed paper, they had only segment the lung region.

II. WORKING PRINCIPAL

CT images are found to have random noise. The total variation based on partially differential equation algorithm is chosen because it effectively removes random noise present in an image. The input to the denoising module is a lung CT image of size 512 x 512.

$Uo(x, y) = u(x, y) + n(x, y)$ ……….. (1)

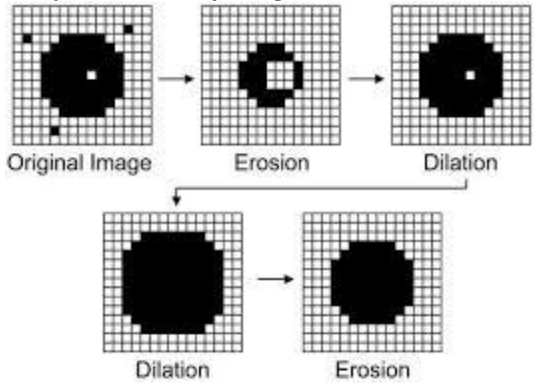
Thresholding is simple but useful technique. Otsu's method is an attractive alternative. The basic idea is that well-threshold classes should be distinct with respect to the intensity values of their pixels. Threshold giving the best separation between classes in terms of intensity values would be the best (optimum) threshold. In addition to its optimality, Otsu's method has the important property that is based entirely on computation performed on the histogram of an image.

III. EROSION

The lung image after segmentation with Otsu's threshold value contains non-body pixels such as the air surrounding the lungs, body and other high intensity regions. Airways such as trachea or the bronchi may result in empty cavities which is not relevant to study is removed through erosion. Erosion function is a reduction operator. It removes noise and other small objects, breaks thin connections between objects, and removes an outside layer from larger objects.

IV. DILATION

The dilation function is an enlargement operator, the reverse of erosion. For a binary data set, any 0 pixel that has a 1 neighbor, where the neighborhood is defined by the structuring element, is set to 1. The dilation fills small holes and cracks and adds layers to objects in a binary image.



V. SEEDED REGION GROWING ALGORITHM

Select initial seed pixel. Set the initial value for Total of pixels in the region with 1 and Total of gray level for all pixels in the region with original gray level value of the initial seed pixel. Choose 8 neighborhoods such that initial seed point must be located at the centre of all its neighbors. Compare the gray level of the seed pixel with its neighbor's pixel. Include the neighbor pixel into the region if intensity difference is less than threshold. If the neighbor pixel is included into the region add one (1) to Total of pixels in the region value.
b. Add original gray level of the neighbor pixel to Total of gray level for all pixels in the region value. Set the neighbor pixel, which is added to the region as a new seed pixel. Repeat Step (3) to (6) until all pixels have been considered to be grown or the pixel cannot be grown anymore.

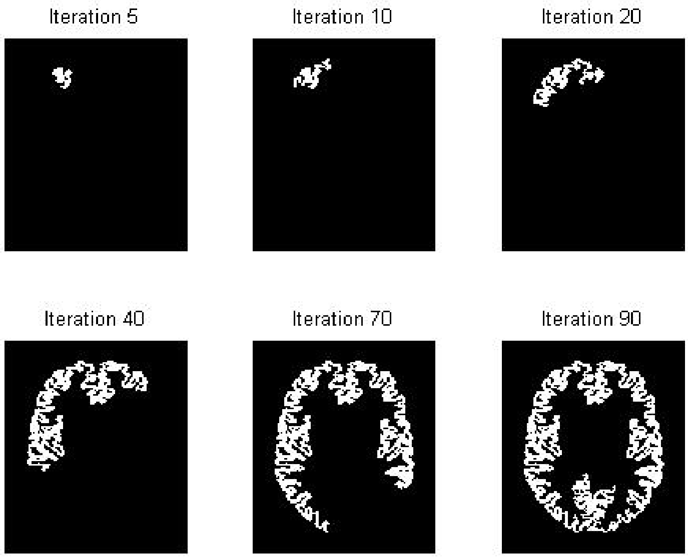
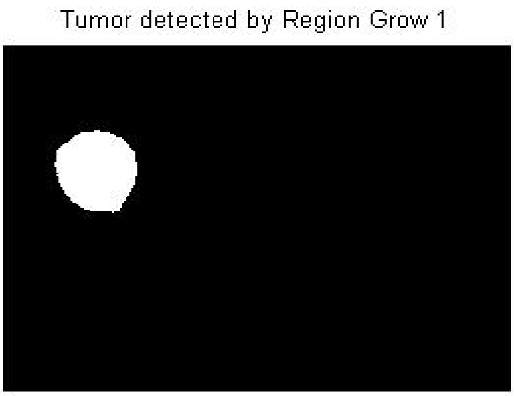


IMAGE SEGMENTATION RESULT



RESULT

TP=Lung nodules classified by the system as cancerous and classified as positive by the expert.
FP= Nodules classified by the system as cancerous and classified as negative by the expert.
FN=Nodules missed by the system and classified as positive by the expert .
TN= Nodules classified by the system as negative and classified as negative by the expert are true negative

CONCLUSION

The algorithm is also very stable with respect to noise. Our result will never contain too much of the background, so long as the tumor detected correctly. The performance of the proposed system was evaluated in terms of specificity, accuracy, precision and recall. That has yielded promising results within minimum time that would supplement in the diagnosis of lung tumor.

REFERENCE

1. R. C. Gonzalez and R. E.Woods, Digital Image Processing.
2. N. A. Mat-Isa, M. Y. Mashor, and N. H. Othman, ”Seeded Region Growing Features Extraction Algorithm; Its potential use in improving screening for cervical cancer” International journal of the computer, Vol. 13 , pp 61-70, January April
3. Nisar Ahmed Memon, Anwar Majid Mirza, and S.A.M. Gilani, ”Segmentation of lungs from CT scan images for early diagnosis of lung cancer”, World Academy of Science, Engineering and Technology
4. Poonam Bhayan, Gagandeep Jindal, ”A Segmented morphological approach to detect tumor in lung images”, IJCST Vol. 2, Issue 3, September
5.Leonid I. Rud in, Stanley Osher, Emad Fatemi, ”Nonlinear total variation based noise removal algorithms ”, Physica D, vol. 60 no. l-4 , pp. 259 -26 8, June