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OTSU METHOD BASED LARYNGEAL TUMOR DETECTION AND CLASSIFICATION

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ABSTRAC:- Vocal disorders are mostly due to the abnormal action of vocal cards in phonation process .this abnormal actions of vocal cards are caused by malign or benign tumor and should result in different values other than predetermined values. The vocal disorder person's voice is different for different vocal diseases. In this paper we have chosen laryngeal cancer, and we have developed a tool called Otsu's thresholding to detect the voice which is affected by the laryngeal cancer. Otsu thresholding facilitates better detection of affected area whether it is healthy or not compared with narrow band imaging technology. The MATLAB/simulation is to implement the Otsu thresholding

KEYWORDS: Tumour detection, Otsu thresholding, watershed segmentation.

I. INTRODUCTION

Narrow-Band Imaging (NBI) facilitates practitioners to distinguish and detect the lesions more accurately. NBI utilize filtered spectrum illumination frame work for well depiction of tissues. In NBI, wavelengths in the visible spectrum are shifted from the illumination source, except for narrow bands in the blue and green spectrum focused separately at 415m and 540m.These wavelengths harmonize with peak in the assimilation spectrum of oxyhemoglobin, so veins are articulated when seen in NBI mode. For noise evacuation in pre-processing stage since it conserves and enhances includes that are valuable in back to back pre-processing stages.

ROI segmentation is done for further processing of pre-processed image and then blood vessel segmentation analysis is taken for classification of tumour and non tumor part. It is applicable to physicians for detecting tumor parts in NBI images and radiologist to detect and classify lesion regions.

II. RELATED WORK

E. Bullit, et.al [1], have proposed murine models of human pathology which are imperative to the examination of numerous sicknesses, there are couple of productions that address quantitative estimations of murine vascular morphology. This report likewise portrays strategies for PC helped measurement of vessel number and shape from these pictures.

Laitakari, et.al [2] have proposed an approach of morphometric techniques that has given new conceivable outcomes in such tumour investigations.it is a Automated quantitative image analysis allows the precise investigation of huge quantities of examples, with a affectability. This strategy permits a correct estimation of cell and tissue size, shape.

Sylvain Paris, et.al [3] have proposed of bilateral filter, The Bilateral filtering is a system to smooth pictures while saving edges. And It is a non-direct method that can darken a photo while with respect to strong edges. Its ability to fall apart a photo into different scales without causing haloes after change has made it widespread in computational photography applications, for instance, tone mapping, style trade, relighting, and denoising.

Sebastian Gross, et.al [4], have proposed an approach of Endoscopic screening. Endoscopic screening of the colon (colonoscopy) is executed to avoid disease as well as for helping treatment. Our method incorporates multi scale filtering for noise decrease, destruction of little blood vessel, improvement of significant edges**.**

Compared to above methods how effective existing method which is laryngeal tumour detection and narrow band imaging, if we see morphological operations lesion regions are not detected accurately could not detect lesion regions, What's more, in the event that we see in Bilateral filtering, it is a system to smooth pictures while safeguarding edges. The strategy produces divisions by grouping each picture pixel as vessel or non-vessel, in view of the pixel's component

vector, and if we see in endoscopic screening it is used to suppression of little blood vessel and improvement of significant edges only, and if we see in whit light endoscopy is where ever white lightening part there only it will extract the blood vessels so it will provide limited information about laryngeal tissue, Finally by comparing all the techniques advantage in Narrow Band Imaging (NBI) is it will remove noise and enhance the image and detecting abnormality part and selecting region of interest where ever we interest and extracting blood vessel based on the probability we will decide which type of tumour it is and that too here no need anaesthesia.

In propose method (Otsu), region of interest taking automatically and here doing color thresholding, by taking different type of data base we have absorved various parameters like peak signal noise ratio, accuracy, bit error rate, mean square error and we got good result compared to existing method which is laryngeal tumor detection and classification .about that information we have mention in methodology and how effective this proposed method shown in comparison table.

III. METHODOLOGY

Analysis for the proposed method (Otsu), and its block diagram shown below figure1

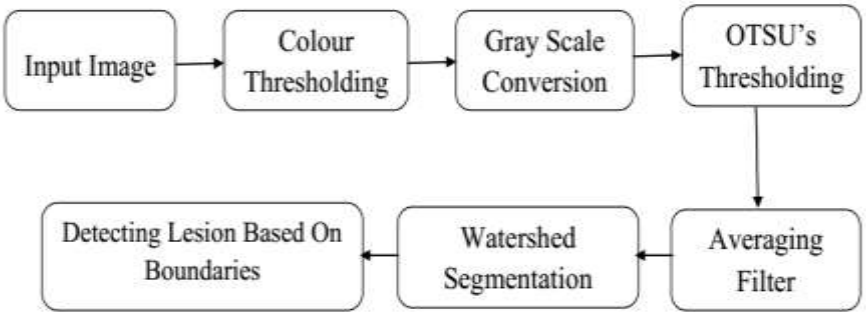

Fig.1 Block Diagram of Proposed Method

Colour Thresholding

Thresholding is the most straightforward strategy for image segmentation from a black and white, and thresholding can be utilized to make matched pictures. Thresholding done so far has involve setting boundaries based on gray values or intensity of image pixel From a grayscale picture, thresholding is to be done based on colour values and manipulating colour component of these image and is converted to gray scale image for further processing.

Otsu Thresholding

Otsu is a multi-thresholding; it is used to automatically perform clustering based image thresholding and reduction of a gray image into binary image. In this method region of interest will take automatically perrform color segmentation and that too compared to fast.

Otsu is utilized to regularly perform pressing based picture thresholding; the decrease of a gray level picture to binary picture average filter, the average filter is a basic sliding window spatial filter that replaces the centre value in the frame with the average of all the pixel esteems in the frame.

The algorithm for this method is given below:

1. Evaluate graph and likelihood of every intensity level.
2. Put up initial discard and $\omega_i(0)$ mean $\mu_i(0)$.
3. Get through all possible starting point t=1,... highest intensity
   (i). Refurbish ωi and μ_i.
   (ii). Calculate $\sigma_b^2(t)$
4. Needed starting point have a close similarity to the highest value of $\sigma_b^2(t)$

Average Filtering

In this average filtering, each pixel values are replaced by avg values of its beside pixel. in addition, it has the impact of removing unreprentative of their surroundings. The window, or piece, is generally square yet can be any shape. A case of mean separating of a solitary 3x3 window of attributes.

Watershed Segmentation

Watershed segmentation is a inclination-based segmentation technique. It considers the inclination guide of the picture as an alleviation outline. It fragments the picture as a dam. The portioned areas are called structure vessels.

Watershed segmentation tackles an assortment of picture segmentation issue. It is reasonable for the pictures that have higher force esteem.

Detecting Lesion Based On Boundaries

Here the lesion is detected based on boundaries, based on threshold values.

IV. RESULTS

The simulation result of proposed method entire program performed in MATLAB and analysed with different data base images .The input image applied to colour thresholding shown figure2, Thresholding done so far has involve setting boundaries based on gray values or intensity of image pixel From a grayscale picture, thresholding is to be done based on colour values and manipulating colour component of these image which is shown figure3. Figure4 shown below RGB masked image is converted to gray scale which is black and white image for further processing shown in figure5.RGB mask image highlighting the abnormal area then RGB image convert into gray mask image after that enhancing that image, and highlighting abnormal area of tumor shown fig. 6.

Fig. 2 Input Image

Fig. 3 Colour Threshold Image

Fig. 4 RGB mask image

Fig. 5 Gray Mask Image

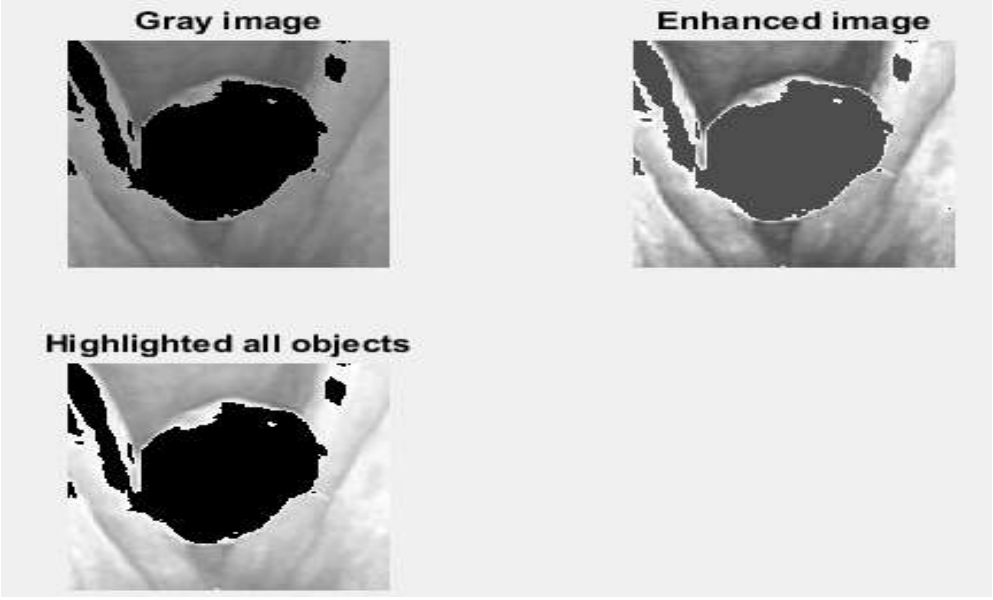

Fig. 6 Enhanced Image

The histogram of a picture is the pixel intensity esteems. This is a chart demonstrating quantity of pixels in a picture at every unique intensity esteems as appeared in figure 7.

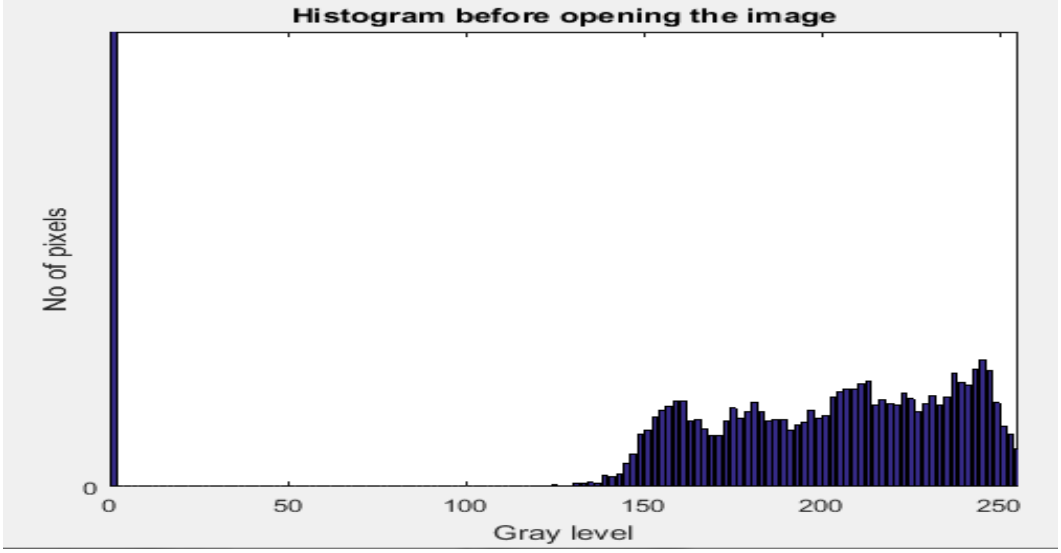

Fig. 7 Histogram before Opening the Image

The OTSU method is a multi thresholding technique and it implements an image thresholding which is based on automatic clustering and transforms a gray image into binary image. In this method region of interest will take automatically perrform color segmentation and that too compared to fast.

Otsu is utilized to regularly perform pressing based picture thresholding; the decrease of a gray level picture to binary picture average filter which is a basic sliding window spatial filter. In which Centre values are replaced by avg of all pixel esteems in the window.The Otsu binary image is shown figure 8. the average filtering to replace every pixel esteem in a picture with the average estimation of its adjacents, it makes the impact of position of pixel esteems which are misleading of their environs which is shown average filtering image figure 9.

Fig. 8 Otsu Binary Image

Fig. 9 Average Filtered Image

Figure10 demonstrates the inclination of the image is one of the key building obstructs in image processing. For instance the canny edge detector utilizes picture inclination for edge recognition. Each pixel of a inclination pictures measures the adjustment in intensity of that same point in the first image, in a provided guidance. To get the full scope of bearing, gradient images in the x and y headings are figured. Figure11 watershed magnitude segmentation, Watershed segmentation is a inclination-based segmentation method. It considers the gradient guide of the image as alleviation delineate. It is reasonable for the pictures that have higher intensity esteem. Watershed segmentation is caused over segmentation.

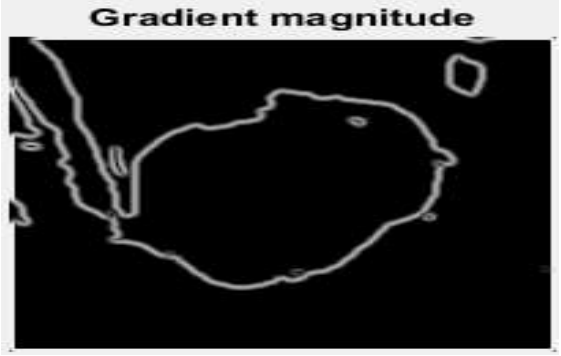

Fig. 10 Gradient Magnitude

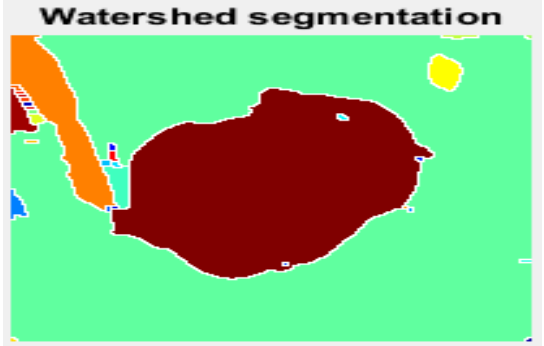

Fig. 11 Watershed segmentation

Figure13 shown below opening by reconstruction have some noise, the typical morphological opening is erosion followed by dilation. the erosion contracts an image based on the structuring element shape and it is eliminating morphological noise in opening closing shown below figure14 ,opening closing by reconstruction used to eliminating some inconvenience of morphological opening and the closing reconstruction and output of abnormality area of tumour shown in figure16 after that we are taking region of interest where we want extract blood vessels that area one we are taking as Region of interest(ROI). Finally extracting blood vessel probability extraction based on that we are deciding whether cancer effecting or not. In particular area shown below figure19, and finally which type of tumor it is because we have two types' benign tumor and malignant tumor.

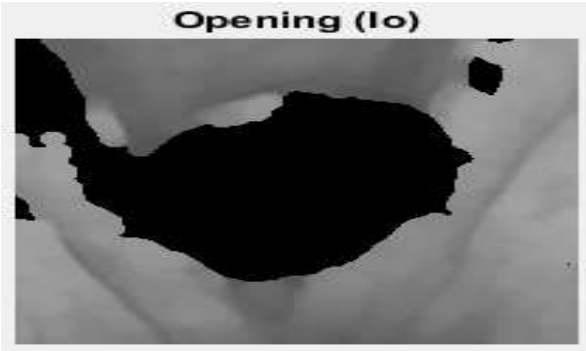

Fig. 12 Opening (lo) (lobr)

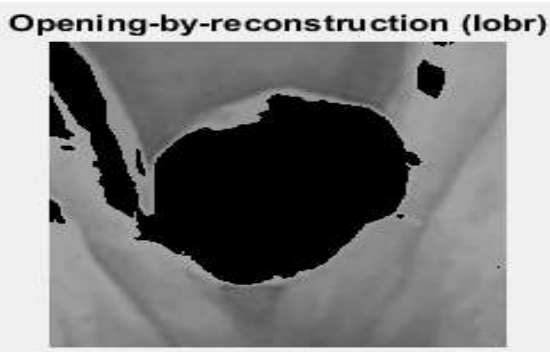

Fig. 13 Opening-by Reconstruction

Fig. 14 Opening-closing (loc)

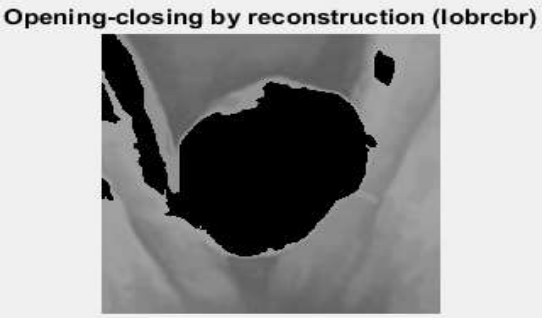

Fig. 15 Opening-closing by Reconstruction (lobrcbr)

Fig. 16 Output Image

Fig. 17 Selected ROI

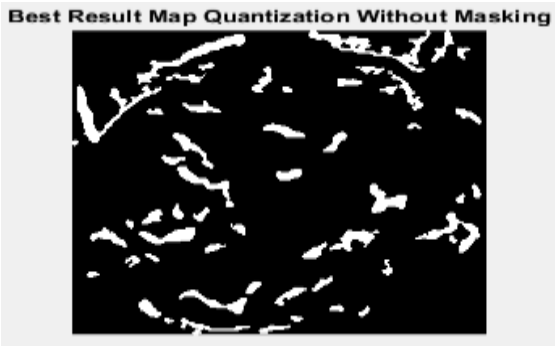

Fig. 18 Best result map

Fig. 19 Blood vessel extraction

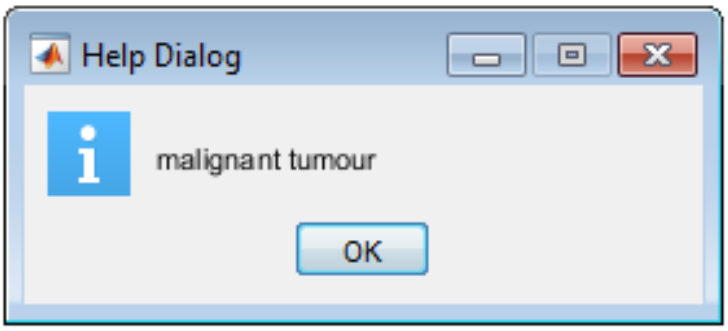

Fig. 20 classification result

TABLE1

Comparison table

Parameters	Existing Method	Proposed Method
PSNR	17.9036	32.5263
MSE	0.1620	0.0559
Accuracy	0.4838	44.1055
BER	2.2522	0.6928

V. CONCLUSIONS

The OTSU method is a multi thresholding technique and it implements an image thresholding which is based on automatic clustering and reduction of a black and white image into binary image were carefully evaluated with algorithm and developed in multiple ways for various parameter like peak signal noise ratio, mean square error ,accuracy ,bit error rate then simulated that code in MATLAB programming comparing with existing method and finally we are getting good performance.

REFERENCES

[1]. E. Bullitt, S. R. Aylward, T. Van Dyke, and W. Lin, “Computer assisted measurement of vessel shape from 3T magnetic resonance angiography of mouse brain,” Methods (San Diego,Calif.), vol. 43, pp. 29–34, Sept. 2007.

[2]. J. Laitakari, V. Nayha, and F. Stenback, “Size, shape, structure,and direction of angiogenesis in laryngeal tumor development,”Journal of Clinical Pathology, vol. 57, pp. 394–401,2004.

[3]. S.Paris, p.kornprobst,and j.tumblin,"bilateral filtering: theory and applications,"vol.4 hanover, MA, USA: Now publisher inc.,2009

[4]. S. Gross, M. Kennel, T. Stehle, J. Wulff, J. Tischendorf,C. Trautwein, and T. Aach, “Polyp segmentation in NBI colonoscopy,” in Bildverarbeitungf¨ur die Medizin 2009, Informatikaktuell, pp. 252–256, Springer Berlin Heidelberg, 2009.