International Journal of Engineering and Advanced Technology (IJEAT)
ISSN: 2249 – 8958 (Online), Volume-9 Issue-4, April 2020

Skin Cancer Diagnosis using Ostu Thresholding with and Without Bat Algorithm

Gurinder Kaur Sodhi , S .Chatterji , Kamal Kant Sharma

Abstract :Nowadays , Cancer diseases is becoming a house hold name but science has exponentially manifold to fight against the deadly disease. Even though ;many cancer diseases are still untouched or not followed properly clinically detected at early stages and lead to incurable disease ,one of the cancer disease termed as Skin Cancer . The main concern is early detection so that it should not be spread to other parts of the body and patient fails to recover . This is not detectable if it's not known to patient and not informed to concerned doctor at a right time . This manuscript discusses and explains in detail the thresholding technique used for segmentation of the image with and without optimized BAT algorithm.The results have been compared with various already known parameters i.e . Peak Signal to Noise Ratio (PSNR) , Mean square error (MSE) and Rand Index (RI) and validated with prior art . Evaluation of Ostu thresholding and Ostu thresholding with BAT algorithm have been compared and analysis has been presented with optimum results have been obtained by applying Ostu thresholding with BAT algorithm as compared with Ostu thresholding algorithm considering various essential parameters

Keywords :Ostu thresholding technique , BAT algorithm , Skin Cancer , PSNR , RI

I. INTRODUCTION

Skin cancer is a broad category of cancer which splits into various tributaries and spread through every part of body and converted into incurable disease. In this kind of condition , it has been observed that mortality rate increases and even this type of cancer is not age specific and occurrence rate is very high due to exposure towards UV and other harmful appliances which are a common source of heavy radiation like mobile phones . Due to changing lifestyle and uneven stress , these type of cancer are more frequent and exponentially increasing . The only prevention against these kind of deadly disease is cure and its early detection. This type of cancer involves various different types of skin layers as a medium . Cancer is nothing but collection of unnatural cells which decay faster or don't decay as per their stipulated time . It has been noticed that 1 st cancer patient cell are still active after its discovery in year of 1980. There are different layers possibly available and different types of skin cancer found : Melanoma, Basal and Squamous cell Carcinoma .

Revised Manuscript Received on April 18, 2020.
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Every type of cancer is dangerous but Melanoma is more dangerous on a scale of 5 due to its unpredictable behavior and not detected in a similar position as other cancerous cells. Automatic Diagnosis of cancer totally dependent upon Medical Image Diagnosis system which deals with reverse transcription . Evaluation of squares errors and mathematical tools in bringing different cells to light after crisp implementation of available systems . In order to identify different types of cancerous cells in their early stage ; it is mandatory to pursue research with advanced mathematical tools and advanced imaging system with pre available statistics and medical information of patients .

II. SEGMENTATION

The segmentation process is used to extract the affected area from an image . This method reduces a color image into a bright intensity and segregated on basis of Rayleigh scattering , therefore breaking an image into different sections , keeping segmentation opens . The main objective to keep edges active with more scattering so that images resolution should not be compromised and images are clear thresholding technique . This kind of method is an advancement of image processing , although segmentation should be proper with different known intensities. Intensities can be increased by zooming or focusing on an image so that edges can be seen clear and crisp . This technique of thresholding is used to counter the blur of image due to non uniform intensity and some cells are left out , but this technique is used to find lesion boundary and zoom it for more contraction among cells . It can be seen from their light intensity emitted by cells in a certain condition and can be identified as uniform and non uniform cells define by a term 'Uniformity' . Uniformity decides the presence of cancerous cells along the edges and intensified . Boundary is magnified and critically analyzed with closed elastic technique . In this technique a closed elastic modulus is used to expand or contract among neighboring edges at point of focus considering lesion boundaries . By using this technique it reduces the error in detection . the segmentation process is done to extract image edges. thresholding is used to focus on an image area where a lesion boundary exists. Image edges are then used to focus on the boundary area of the image . A closed elastic curve is fitted into the initial boundary and is locally shrunk or expanded to approximate edges in its neighborhood in the area of focus. By using this technique it reduces the error in detection.

III. PROPOSED WORK

The proposed work is to analyze the Ostu thresholding segmentation technique with and without BAT algorithm for extraction of border of skin cancer region. There are various steps involved in evaluation of image and detection of cancerous cell in stepwise arrangement as shown in figure 1 :

(a) Preprocessing
(b) Segmentation
(c) Feature extraction
(d) Classification

Fig.1 shows the basic steps of skin cancer diagnosis

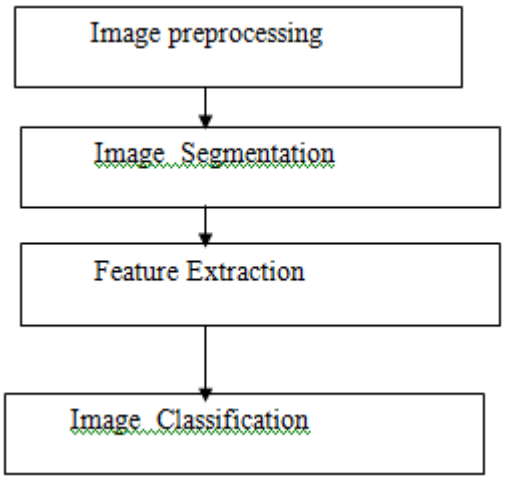

Fig. 1 Basic Steps of Skin Cancer Diagnosis

IV. OSTU BAT THRESHOLDING TECHNIQUE

Thresholding is two level thesholding in which image is separated into two types of classes of image i.e gray and binary image. Gray image is an image which actually creates different colors and also termed as physical image but on the other hand , Binary image is an encrypted image in an array of 0 and 1 contains bit of numbers and can be subjected to evaluation in digital or discrete medium . The main advantage of this technique lies in a fact that this can be applied pre and post image processing .In other words , this technique can be used on gray image or binary image , self sufficient to produce optimum results .

This technique is nature inspired algorithms and can be used for multiple problems for their optimization also termed as Metaheuristic techniques . they evolved around the operation of BATs , as they used wings and use echolocation techniques . In fact they can see their prey in dark and produce a signal that strike back to them after hitting certain objects . In this way , they identified and used in sonar.This technique clubbed with thresholding so that images can be filtered out and subject to prey or cells which are not subjected for evaluation . Similar to BATs hunting strategies : signal can be of short frequency , pulse modulated dependent upon type of ceels , species or prey that belong to optimum or local optimization . Their signal bandwidth keep on changing , depending upon type of images and congestion level and increased in loudness can also be controlled with suppression of harmonics with limited attenuation . Their pulse rate subjected to global optimization of multi variables in such a way that globally fitness function can be evaluated with one or more set of variables connected . This kind of technique is very successful in basic algorithms and used in image processing of coagulated or non –coagulated so that objective function can be summarized in form of PSNR , mean square error , error clustering and local minimization . These Metaheuristic algorithms also are variable specific , deals with bandwidth and attenuation , also control color exchanging with different combination keeping in mind the clarity and steepness of images in relation with fixed process for evaluation with feature extraction in step wise process .

V. RESULTS

Fig.2 (a) , (b) , (c) , (d) shows the different images and the Simulated Results of PSNR, MSE ,RI for Ostu and Ostu – BAT algorithm for the first Image Count

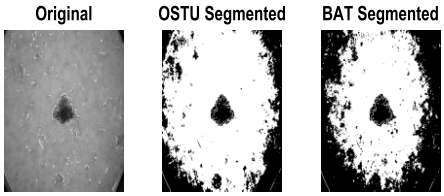

Fig 2. (a) Original image , Ostu –segmented , BAT segmented of 1 st image count

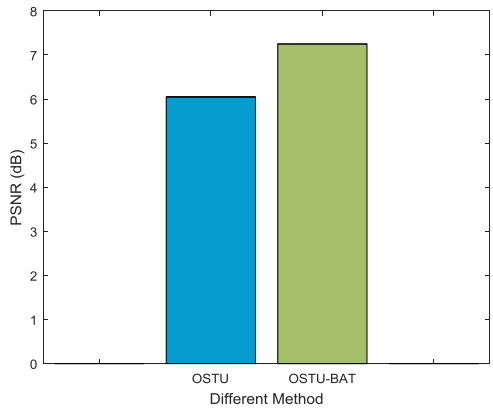

Fig 2 (b) Simulated results of PSNR (peak signal to noise ratio) for Ostu and Ostu –BAT Algorithm for 1 st image count

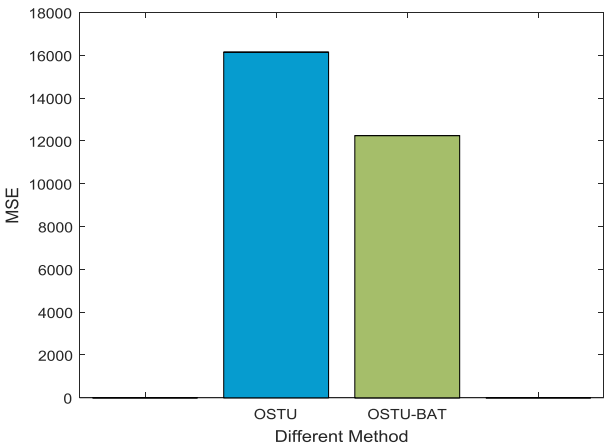

Fig 2. (c) Simulated results of MSE (Mean Square error) for Ostu and Ostu –BAT Algorithm for 1 st image count

Retrieval Number: B3651129219/2020©BEIESP
DOI: 10.35940/ijeat.B3651.049420
Journal Website: www.ijeat.org

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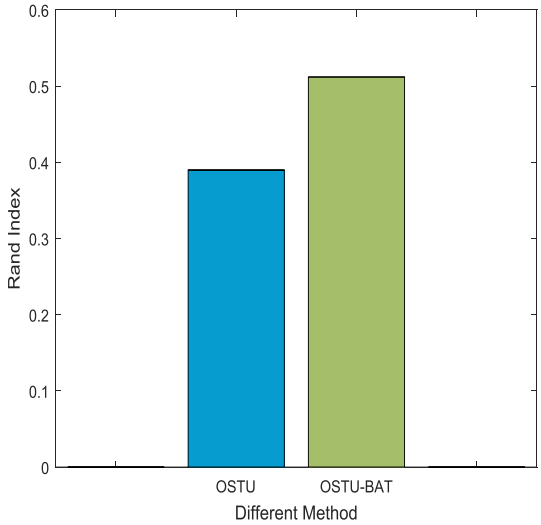

Fig 2. (d) Simulated results of Rand Index for Ostu and Ostu –BAT Algorithm for 1 st image count

Fig. 2 First image Results of original image , ostu , ostu- bat segmented image for Various parameters PSNR , MSE ,Rand Index

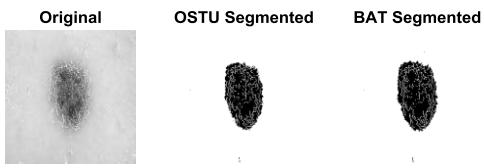

Fig 3. (a) Original image , Ostu –segmented, BAT segmented of 2 nd image count

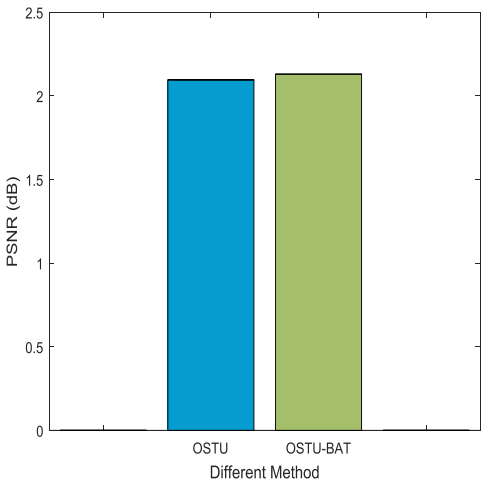

Fig 3. (b) Simulated results of PSNR (peak signal to noise ratio) for Ostu and Ostu –BAT Algorithm for 2nd image count

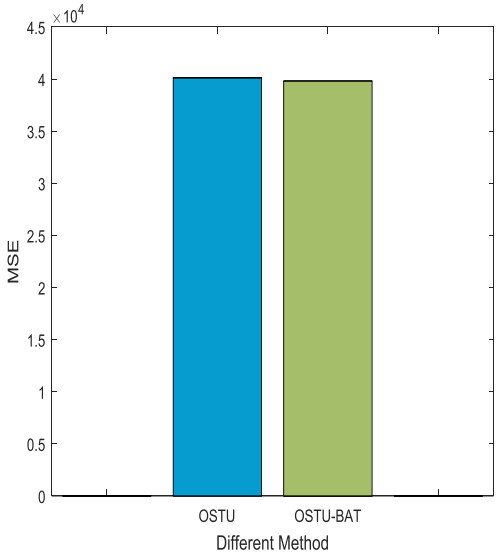

Fig 3. (c) Simulated results of MSE (Mean Square error) for Ostu and Ostu –BAT Algorithm for 2 nd image count

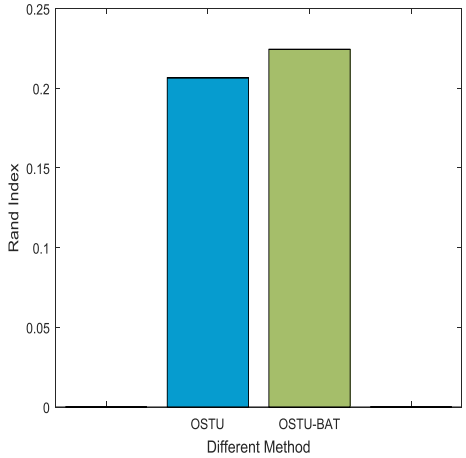

Fig 3. (d) Simulated results of Rand Index for Ostu and Ostu –BAT Algorithm for 2 nd image count

Fig 3 Second image Results of original image , ostu , ostu- bat segmented image for Various parameters PSNR , MSE ,Rand Index

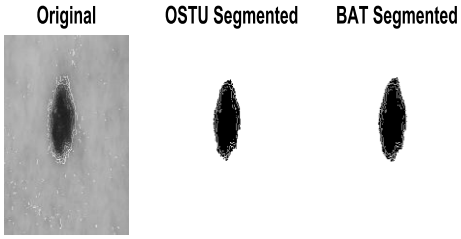

Fig 4. (a) Original image , Ostu –segmented , BAT segmented of 3 rd image count

Retrieval Number: B3651129219/2020©BEIESP
DOI: 10.35940/ijeat.B3651.049420
Journal Website: www.ijeat.org

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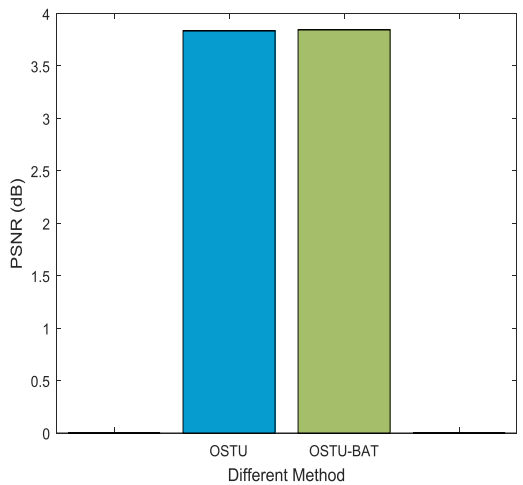

Fig 4. (b) Simulated results of PSNR (peak signal to noise ratio) for Ostu and Ostu –BAT Algorithm for 3 rd image count

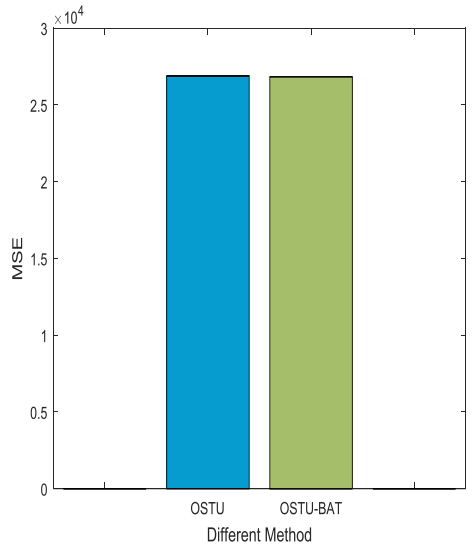

Fig 4. (c) Simulated results of MSE (Mean Square error) for Ostu and Ostu –BAT Algorithm for 3 rd image count

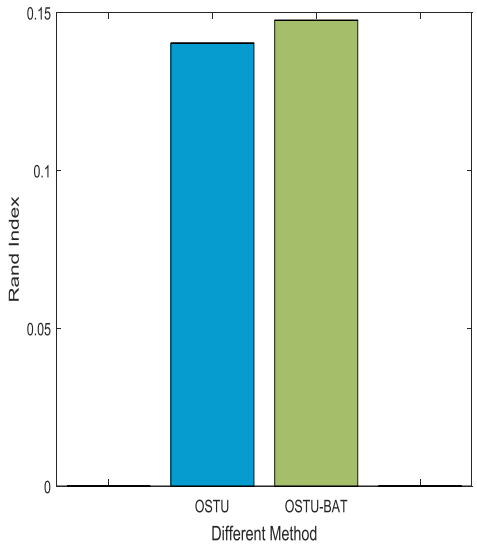

Fig 4. (d) Simulated results of Rand Index for Ostu and Ostu –BAT Algorithm for 3 rd image count

Fig 4 Third image Results of original image , ostu , ostu- bat segmented image for Various parameters PSNR , MSE ,Rand Index

Table 1 Evaluated Results regarding of Ostu and Ostu – BAT Thresholding With various parameters

	Image 1		Image 2		Image 3	
Parameter	Ostu	Ostu-BAT	Ostu	Ostu-BAT	Ostu	Ostu-BAT
PSNR	6.049	7.25	2.096	2.13	3.836	3.845
MSE	88.176	66.882	219.102	217.409	146.759	146.486
Rand Index	0.3898	0.5119	0.2066	0.2244	0.1403	0.1475

VI. CONCLUSION

By evaluating the results with OSTU and OSTU - BAT thresholding algorithm using various parameters it is concluded that PSNR(peak signal to noise ratio) should be high , MSE (mean square error) should be less , Rand – Index should be high which are the main requirement for diagnosis process . From the evaluated results it is concluded that Ostu –BAT performs better than Ostu thresholding algorithm in terms of all parameters as OSTU – BAT fulfill all requirements of diagnosis process .

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