AN ANALYSIS OF IMAGE SEGMENTATION METHODS USING OTSU 2D ALGORITHM

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ABSTRACT

To enhance the low resolution image, an analysis of OTSU 2D algorithm based image segmentation is proposed. Generally different threshold based image segmentation methods extract foreground from background. Here we apply the iterative based Otsu algorithm is implemented. but here we faced the difficulties like image corrupted with noise, suitable for bimodal histograms and object cannot perfectly extracted from background .to overcome all these difficulties ,we can go for Thresholding based image segmentation using improved 2D OTSU algorithm .Here convert image in to gray. cubic calculation distance is used to compare all the pixels along with the channels. Then applying IDWT,DWT techniques to extract foreground and background. and estimate PSNR for each method. Now the image as classified into LL, LH, HL, HH Because if we enhance the better quality picture, there is no impact. so if enhance low resolution image we get better quality output. Applying DWT, interpolation, IDWT for low resolution image. Then finally output is bet ter when compared to input.

INTRODUCTION :

Image segmentation is a process of partitioning an image into distinct regions with the goal of extracting object of interest from the background. In image analysis, it is one of the most fundamental and difficult problems since it influences the performance of the entire process. Even though technology advancement on image segmentation has experienced tremendous growth in theory and application, still it is not an easy task because of the complex background and changeable illumination on the images. Image segmentation is based on two algorithms. they are Discontinuity, Similarity. Discontinuity is the approach in which an image is segmented into regions based on discontinuity. The edge detection based segmentation falls in this category in which edges formed due to intensity discontinuity are detected and linked to form boundaries of regions. Similarity detection is the approach in which an image is segmented into regions based on similarity. The techniques that falls under this approach are Thresholding.

Thresholding is used to extract object from background. Thresholding is used to convert gray level to binary level. Thresholding is divided into two types.

They are two types local Thresholding and global Thresholding.Local Thresholding is defined as each and every pixel have different threshold values. global Thresholding is defined as each and every pixel have same threshold values. The work is orgainsed as follows. In Section II we can discuss about Otsu,Otsu 2d algorithams and DWT,IDWT and Interpolation Techniques. In section III, the Results and Discussions are given. The Conclusion and extension of this work is given in section IV.

II: PROPOSED SYSTEM

2.1 Otsu : Otsu is one of the method from global thresholding. Otsu is used to reduction the gray level to binary image. if the image contain both object and background. it does not exhibit good performance when the histogram will be bimodal. if object is small when compared to background the histogram will not be bimodal.

As no of iterations increases the image is corrupted with noise.

2.2 Otsu 2D

An image *f*(x, y) and local average image *g*(x, y) with L gray levels of size N, suppose nij is the total number of occurrence of the pair (i, j) in which i indicates the gray value and j represents the local average gray value .An arbitrary threshold vector (s, t) it divides the 2Dhistogram into four regions as shown in Fig. 1. The region Are presents the object, D represents the background, B represents edges and C represents the noise.Here we extract the background by using floor and Cubiccalulation distance. Similarly then extract the foreground by using IDWT. then Image as classified to LL, LH, HL, HH .Then interpolation the low resolution image. Finally we get output is better when compared to input.

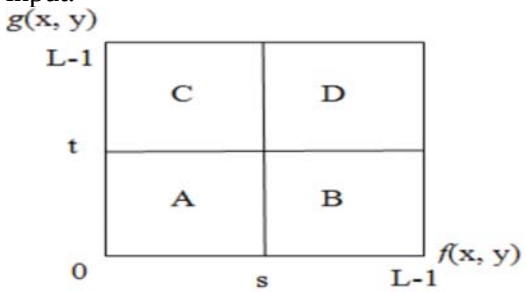


Fig 1 : 2D histogram

2.3 DISCRETE WAVELET TRANSFORM (**DWT**): It is a wavelet transform for which the wavelets are discretely sampled. As with other wavelet transforms, a key advantage it has over Fourier transforms is temporal resolution: it captures both frequency *and* location information (location in time).

The DWT decomposes a digital signal into different subbands so that the lower frequency subbands have finer frequency resolution and coarser time resolution compared to the higher frequency subbands. DWT is the basis of the new JPEG2000 image compression standard .Time and frequency information A lot of flexibility - there are many different types of DWT bases, whereas the DFT is just based on cos and sin of different frequencies (or equivalently, complex exponential different frequencies).Because data are shattered into more components, it becomes much easier to filter in or filter out a given non stationary waveform. A lot of signals are found to be *sparse* in an appropriate DWT basis. This makes it easy to, for instance, filter noise out of a phoneme by using a simple binary mask in the DWT domain. Wavelets are often used to denoise two dimensional signals, such as images. IDWT is used for reconstructing the signal.

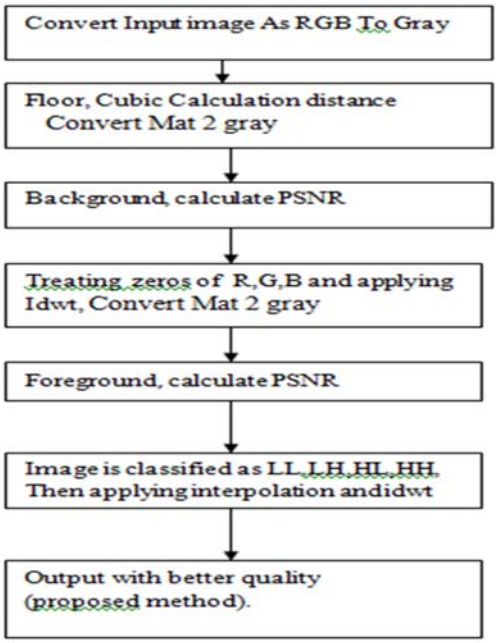
2.4 SWT

The stationary wavelet transform is an extension of the standard discrete wavelet transform. Stationary wavelet transform uses high and low pass filters. SWT apply high and low pass filters to the data at each level and at next stage produces two sequences. The two new sequences are having same length as that of the original sequence. In SWT, instead of decimation we modify the filters at each level by padding them with zeroes. Stationary wavelet transform is computationally more complex.

2.5 INTERPOLATION

"Up sampling" is the process of inserting zero-valued samples between original samples to increase the sampling rate. (This is called "zero-stuffing".) Up sampling adds to the original signal undesired spectral images which are centered on multiples of the original sampling rate.Interpolation, in the DSP sense, is the process of up sampling followed by filtering. (The filtering removes the undesired spectral images.) As a linear process, the DSP sense of interpolation is somewhat different from the "math" sense of interpolation, but the result is conceptually similar: to create "in-between" samples from the original samples. The result is as if you had just originally sampled your signal at the higher rate.

2.6 FLOW CHART OF OTSU 2D



Here convert image as RGB to gray,because every image have R,G,B channels. Floor is used for point to point communication for every pixel.cubic calculation is used to compare all the pixels with 3D and extract background.treating R,G,B . As zeros.to display foreground by using IDWT.TO estimate PSNR for Foreground and background. Now the image as classified into LL, LH,HL,HH by using DWT. if we enhance the better quality picture, there is no impact on image. so if enhance noisy image we get better quality output .Applying interpolation for increasing the sampling factor with 2.IDWT is used for display segmentation image. Then finally output is better quality when compared input.

3. RESULTS AND DISCUSSIONS:

In order to evaluate the performances of the proposed method with the conventional Otsu2D for that baboon image and rice image' is taken as input image which is of size 256 x 256.

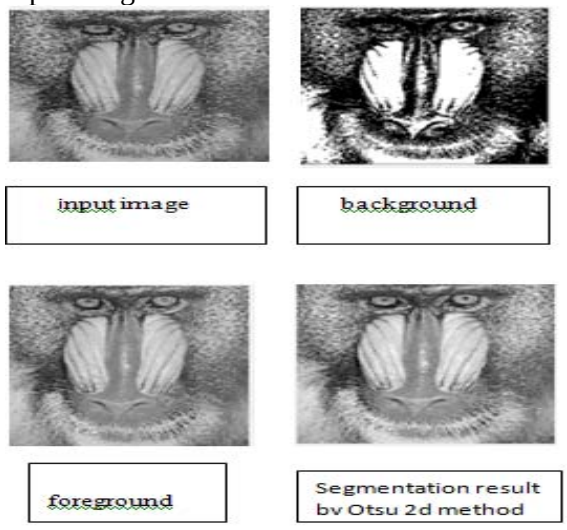


Fig: 3.1 Baboon image

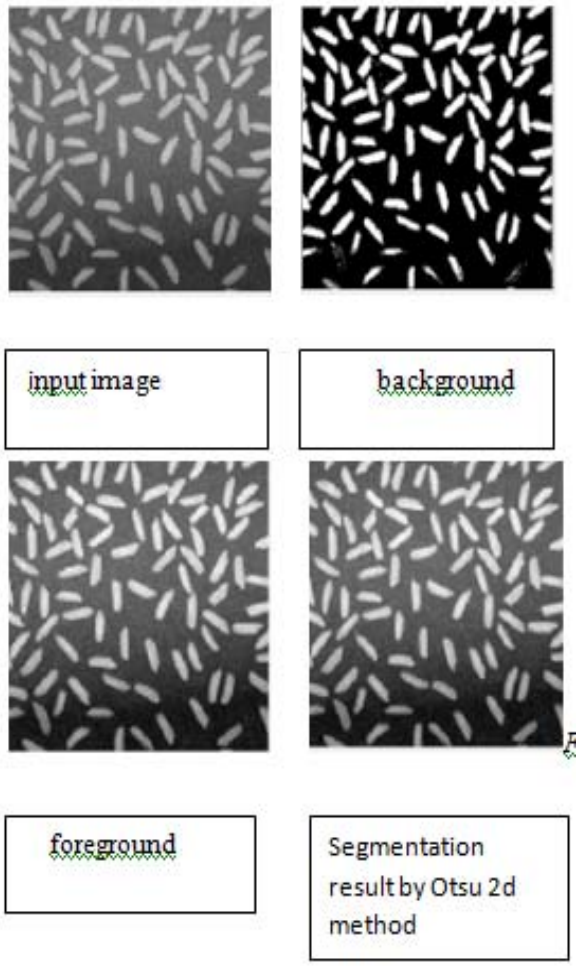


Fig 3.2 rice image

As input is converted from gray to binary. then we extract background by using floor and cubic calculation distance. to extract the foreground by using idwt. Then image is classified as LL,HL,HH,LL by using dwt then we applying interpolation and idwt for to store true values.

INPUT	PSNR FOR BACKGROUND	PSNR FOR FORGROUND	PSNR FOR PROPOSED (segmentation Result by Otsu 2D)
1.Baboon	29.68	34.86	35.04
2.Rice	30.57	35.66	36.01
3.coins	30.89	36.50	36.75
4.vegetables	29.74	35.12	35.42

Fig 3.3 table: PSNR COMPARISON

Here different output images have different PSNR Values Based On Input Picture Quality. if we compare baboon and rice psnr values baboon background is 29.68,foreground is 34.68 and segmentation image psnr result is 35.04,similarly rice image background is 30.57 and foreground is 35.66 and segmentation image psnr is 36.01.

CONCLUSION

Here An Analysis Of Otsu 2D Algorithm Based Image Segmentation implemented which is a computationally efficient method designed for segmenting the images with varied complexities. This method performs better than the other Thresholding methods for segmenting the weak objects and also the fine details in an image to produce binary images with a much good accuracy, which can be used in further analysis and processing. The quality of results obtained by the proposed parameter-less method shows that the algorithm is robust to various image scenarios and be used in many applications.

REFERENCES

[1] M. P. Akila Devi, T. Latha, C. Helen Sulochana, "Iterative Thresholding Based image segmentation by using 2D improved Otsu Algorithm",2015.

[2] Y. Zhang and L. Wu, ''Fast document image binarization based on an improved adaptive Otsu's method and destination word accumulation,'' J. Comput. Inf. Syst., vol. 7, no. 6, pp. 1886--1892, 2011.

[3] Q. Ge, L. Xiao, J. Zhang, and Z. H. Wei, "An improved region-based model with local statistical features for image segmentation," Pattern Recognition., vol.45, pp.1578–1590, 201

[4] X. Xu, Z. Yang, and Y. Wang, ''A method based on rank-ordered filter to detect edges in cellular image,'' Pattern Recognition. Lett., vol. 30, no. 6 pp. 634-- 640, Jun. 2009.

[5] Z. Xie, S. Wang, and F. L. Chung, "An enhanced possibilistic C-means clustering algorithm," Soft Computing, vol.12,pp. 593–611, 2008.

[6] Z. M. Wang, Y. C. Soh, Q. Song and K.Sim, "Adaptive spatial information segmentation," Pattern Recognition., vol.42, pp. 2029 – 2044, 2009.

[7] Z. Yu, C. A. Oscar, R. Zou, W. Yu, and J. Tian, "An adaptive unsupervised approach toward pixel clustering and color imag segmentation,"Pattern Recognition., vol. 43, no. 5, pp. 1889– 1906, 2010.[9] A. Dirami, K. Hammouche, M. Diaf, and M. Siarry, "Fast multilevel thresholding for image segmentation through a multiphase level set method," *Signal Process.*, vol. 93, pp. 139–153, 2013.

[10] L. Dong, G. Yu, P. Ogunbona, and W. Li, ''An efficient iterative algorithm for image thresholding,'' *Pattern Recognit. Lett.*, vol. 29,no. 9, pp. 1311--1316, Jul. 2008.

[11] D. Liu and J. Yu, ''Otsu method and K-means,'' in *Proc. 9th Int. Conf HIS*, vol. 1, pp. 344--349, Aug.2009