IJSREAT-0000829

by FDRP Journal's

Submission date: 06-Oct-2024 09:34AM (UTC+0700)
Submission ID: 2476505228
File name: IJSREAT-0000829.docx (631.66K)
Word count: 1406
Character count: 8855

A COMPARATIVE STUDY OF MEAN SQUARE ERROR, SIGNAL TO NOISE RATIOS OF GREY SCALE THRESHOLDED AND COMPRESSED IMAGES BEFORE PERFORMING EDGE DETECTION METHOD

[ABIR CHAKRABORTY, UNIVERSITY OF COIMBRA, PORTUGAL]

[ABSTRACT: Author has already published a paper where he has used colored and grey scale images to find out the mean square error, peak signal to noise ratio's in clustering based segmented and compressed version. Here in this article author has done the same comparison of image thresolding, image compression and then edge detection techniques respectively. So there will be a sharp comparison between these two different articles where the aim of the author is same for both the cases. In this articles author has used two different types of thresholding techniques: global and adaptive thresholding.]

[KEYWORDS:RGB, GREY, PREWITT, CANNY, SOBEL, ADAPTIVE AND GLOBAL THRESHOLDING, COMPRESSED IMAGE.]

1.INTRODUCTION:

In Simple Thresholding, a global value of threshold was used which remained constant throughout. So, a constant threshold value won't help in the case of variable lighting conditions in different areas. Adaptive thresholding is the method where the threshold value is calculated for smaller regions. Here, the algorithm determines the threshold for a pixel based on a small region around it. So we get different thresholds for different regions of the same image which gives better results for images with varying illumination. Adaptive thresholding is a form of image thresholding technique in which rather than specifying the threshold value manually or using any restrictions, the threshold value is adjusted and selected automatically according to the image pixels and layout for converting the image pixels to grayscale or a binary image.

A global thresholding technique is one which makes use of a single threshold value for the whole image, whereas local thresholding technique makes use of unique threshold values for the partitioned subimages obtained from the whole image.Global Thresholding is a widely used technique where a single threshold value is applied to an entire image. However, this technique may not be suitable for images with varying lighting conditions or complex backgrounds. To overcome this limitation, adaptive thresholding techniques may be employed, which adjust the threshold value locally based on the characteristics of each pixel's neighborhood. These techniques are

particularly useful in scenarios where there is significant variation in illumination across different regions of the image.

The objective of compression

.

Now lets talk about edge detection techniques which author has used in this paper

Edge Detection Operators are of two types:

- Gradient – based operator which computes first-order derivations in a digital image like, Sobel operator, Prewitt operator, Robert operator
- Gaussian – based operator which computes second-order derivations in a digital image like, Canny edge detector, Laplacian of Gaussian

an image. It uses the kernels or masks –

.

2. STEPS OF PROGRAMMING:

1. Upload the image in mat-lab command window ;
2. Perform global or adaptive thresholding on grey-scale image accordingly;

3. **Compressed the image by using mat-lab command after image thresholding**
4. **Perform edge detection of the thresholded and compressed image by 'prewitt' or 'sobel' or 'canny' detection method**

3. PROGRAMMING CODES:

3.1 IMAGE THRESHOLDING AND EDGE DETECTION:

```
x=imread('NEW PHOTO.jpg');

subplot(2,2,1)

y=rgb2gray(x);

GT_value=graythresh(y);

binary_img=imbinarize(y,GT_value);

[U1,S1,V1] = svdsketch(double(binary_img),1e-2);

Anew1 = uint8(U1*S1*V1');

BW1=edge(Anew1,'prewitt');

imshow(BW1);

title('prewitt filtering of compressed global thresholding');

subplot(2,2,2)

AT_value=adaptthresh(y,0.5);

adaptive_img=imbinarize(y,AT_value);

[U1,S1,V1] = svdsketch(double(adaptive_img),1e-2);

Anew1 = uint8(U1*S1*V1');

BW1=edge(Anew1,'sobel');

imshow(BW1);

title('sobel filtering of compressed adaptive thresholding');
```

```
subplot(2,2,3)

GT_value=graythresh(y);

binary_img=imbinarize(y,GT_value);

[U1,S1,V1] = svdsketch(double(binary_img),1e-2);

Anew1 = uint8(U1*S1*V1');

BW1=edge(Anew1,'canny');

imshow(BW1);

title('canny filtering of compressed global thresholding');

subplot(2,2,4)

AT_value=adaptthresh(y,0.5);

adaptive_img=imbinarize(y,AT_value);

[U1,S1,V1] = svdsketch(double(adaptive_img),1e-2);

Anew1 = uint8(U1*S1*V1');

BW1=edge(Anew1,'canny');

imshow(BW1);

title('canny filtering of compressed adaptive thresholding');
```

3.2 PEAK SNR AND MEAN SQUARE ERROR DETECTION:

```
ref=imread('image11.jpg');
A=imnoise(ref,'salt & pepper',0.02);
[peaksnr,snr]=psnr(A,ref);
fprintf('\n the peak-snr value is%0.4f',peaksnr);

 the peak-snr value is19.9457>> fprintf('\n the peak-snr
value is%0.4f',snr);
 the peak-snr value is17.3769>>
ref = imread('image11.jpg');
```

```
A = imnoise(ref,'salt & pepper', 0.02);
err = immse(A, ref);
fprintf('\n The mean-squared error is %0.4f\n', err);
```

```
 The mean-squared error is 645.671
```

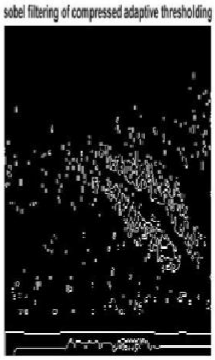
4.MOST DESIRED RESULT:

4.1 ORIGINAL IMAGE 1

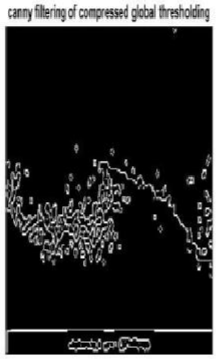
4.2 ORIGINAL IMAGE 2

prewitt filtering of compressed global thresholding

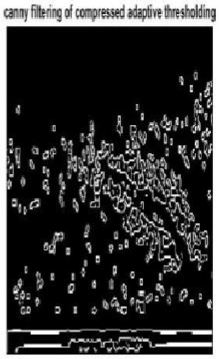
sobel filtering of compressed adaptive thresholding



canny filtering of compressed global thresholding



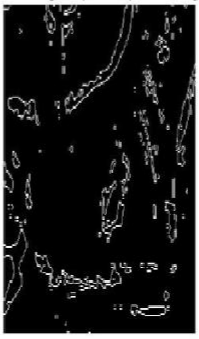
canny filtering of compressed adaptive thresholding



4.3 ORIGINAL IMAGE 3

prewitt filtering of compressed global thresholding

sobel filtering of compressed adaptive thresholding

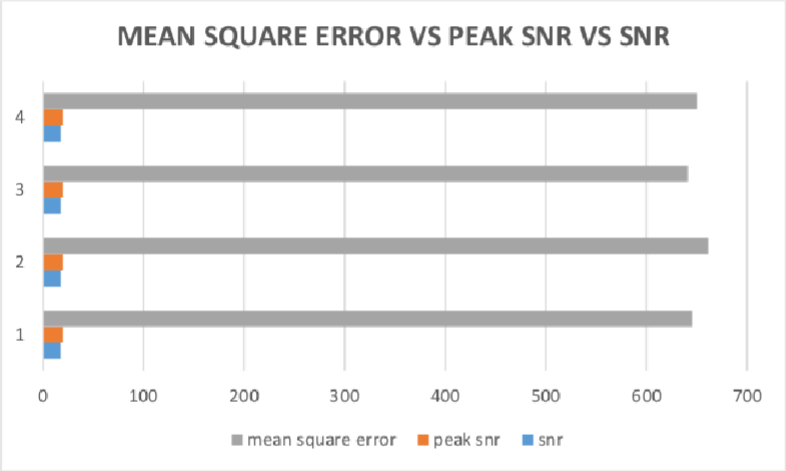


canny filtering of compressed global thresholding

canny filtering of compressed adaptive thresholding

5.TABLE OF CALCULATIONS:

TYPES OF THRESHOLDING	SNR	PEAK SNR	MEAN SQUARE ERROR
PREWITT GLOBAL THRSHOLDING	17.3769	19.9457	645.6710
SOBEL ADAPTIVE THRESHOLDING	17.4950	19.9592	661.4120
CANNY GLOBAL THRESHOLDING	17.4660	19.9716	640.9656
SOBEL GLOBAL THRESHOLDING	17.5619	19.9556	650.3410



5. DISCUSSIONS OF RESULTS:

As we have seen the in the table of data's the values are deviating largely in case of mean square error and in case of adaptive thresholding based on sobel detection the deviation of mean square error is high. In the first and third case of global thresholding the edge detection gives sharp results compare to adaptive thrsholding but in second case adaptive thresholding has given better result in terms of edge detection.

7.FUTURE SCOPE OF WORK:

Here author has discussed only two types of thresholding along-with three edge detection methods for comparison purpose. But one can easily perform more such comparison with different other edge detection methods and different image thresholding techniques along-with other more parameters.

9. CONCLUSIONS:

Author has already mentioned that this paper is a continuation of his previous articles where has displayed applications of image segmentation and edge detection through image clustering for coloured , grey , and compressed images but here author has used edge detection techniques for compressed grey scale images with the help of image thresholding. So according to author people will get better idea if they study both the

REFERENCES:

1. "COMPARISON OF SIGNAL TO NOISE RATIO OF COLORED AND GRAY SCALE IMAGE IN CLUSTERED CONDITION FROM THE CONTOUR OF THE IMAGES WITH THE HELP OF DIFFERENT IMAGE FILTERING METHOD"- Abir Chakraborty, Volume 9, Issue 5 May 2024| ISSN: 2456-4184

2. Detection and Comparison of Signal To Noise Ratio's and Other Dimensions Related Specifications From Contours of Several Images - A Matlab Syntax Based Applications of Biomedical and General Jpeg Images- Abir Chakraborty, Dr. Somshekhar Bhat, Dr. Kumar Shama [Volume 10, Issue 9, September-2022, Impact Factor: 7.429, ISSN: 2455-6211]

3.DETECTIONOFSIGNAL TONOISE RATIO FROM IMAGE CONTOUR -A MATLAB APPLICATION [Volume: 06 Issue: 09 I September – 2022, ISSN: 2582-3930]

4.APPLICATION OF IMAGE PROCESSING USING MATLAB- A PRACTICAL HANDBOOK FOR IMAGE PROCESSING LABORATORTY]-ABIR CHAKRABORTY

5.Detection and Comparison of Signal To Noise Ratio's and Other

Dimensions Related Specifications From Contours of Several Images - A Matlab Syntax Based Applications of Biomedical and General Jpeg Images-[Abir Chakraborty1, Dr. Somshekhar Bhat2, Dr. Kumar Shama3, 1,2,3Manipal Institute of Technology, Mahe , Karanataka, India, Volume 10, Issue 9, September-2022, Impact Factor: 7.429, ISSN: 2455-6211]

6. Ahmed, S. & Alone, M. R. (2014). Image Compression using Neural Network. International Journal of Innovative Science and Modern Engineering, 2(5), 24-28.

7. Balasubramani, P., & Murugan, P. R. (2015). Efficient image compression techniques for compressing multimodal medical images using neural network radial basis function approach. International Journal of Imaging Systems and Technology, 25(2), 115-122. https://doi.org/10.1002/ima.22127

8. Fukushima, K. (1980). Neocognitron: A self-organizing neural network model for a mechanism of pattern recognition unaffected by shift in position. Biological Cybernetics, 36(4), 193-202. https://doi.org/10.1007/ Bf00344251

9.Grgic, S., Grgic, M., & Zovko-Cihlar, B. (2001). Performance analysis of image compression using wavelets. IEEE Transactions on Industrial Electronics, 48(3), 682-695. https://doi.org/10.1109/41.925596

10.Hussain, A. J., Al-Jumeily, D., Radi, N., & Lisboa, P. (2015). Hybrid neural network predictive-wavelet image compression system. Neurocomputing, 151, 975-984. https://doi.org/10.1016/j.neucom.2014.02.078.

11.Joe, A. R., & Rama, N. (2015). Neural network based image compression for memory consumption in cloud environment. Indian Journal of Science and Technology, 8(15), 1-6. https://doi.org/10.17485/i jst/2015/ v8i15/73855,

IJSREAT-0000829

ORIGINALITY REPORT

28%	26%	14%	22%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.geeksforgeeks.org Internet Source	8%
2	listens.online Internet Source	5%
3	Submitted to Southern New Hampshire University - Continuing Education Student Paper	3%
4	Submitted to University College London Student Paper	3%
5	www.kluniversity.in Internet Source	3%
6	Submitted to Fiji National University Student Paper	2%
7	heritagesciencejournal.springeropen.com Internet Source	2%
8	Submitted to University of Salford Student Paper	2%
9	www.ijera.com Internet Source	1%

10	api-uilspace.unilorin.edu.ng Internet Source	1%

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		