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Hybrid technique to enhance image for better image segmentation

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ABSTRACT

Segmentation is a technique to break the image into parts. But to get better segmentation there is a condition that image must be free from noise. To get image free from noise denoising model is used which remove the noise by producing the required pixel and also correct the incorrect pixel. Here image taken is an X-ray image, in this paper, the 3x3 matrix window is taken. In this window average of the pixel value is calculated. This algorithm rechecks the best fitness value of each pixel and makes appropriate changes. But due to Recovery, it needs some enhancement. So to get enhanced image enhancement technique is applied to enhance the image as the original image. Then the segmentation is applied to get a segmented image. The performance of the proposed model has been estimated under various experiments. The results are found improved for all of the dataset images on the basis of PSNR (peak signal to noise ratio) and SSIM (structural similarity) based parameters.

Keywords— *Image de-noising, Pixel recovery, Segmentation, Image enhancement*

1. INTRODUCTION

The visibility of images can be affected because of the presence of noise. So, in order to get back its original form the process called denoising is done So, Denoising is very essential in Image processing. Depending upon the different Kind of noises these are various techniques for denoising. So we must know which technique to use for which kind of noise. For example, image visibility can be affected by Salt and Peppers Noise. And various techniques are present for denoising of salt and peppers noise. But at the same point, these are a difficulty for some techniques in removing high-density noise. But in removing high-density noise the quality of images gets damaged.

We have to preserve the feature in Images during denoising process So that Important Information on Image cannot get damaged. So we have used a bilateral filter in the research work to remove Salt and peppers noise so that the information on the image is protected from being damaged. And to remove the impulse noise of higher density, computer Image processing Method is used. It is of two types: The space domain processing and Image spatial domain.

2. EXPERIMENTAL DESIGN

Image de-noising models are used in many image models, in which Image have some type of noise. Different types of noises can be present in Image. The noise in the image may be produced due to many causes, which contain the dust particles, electromagnetic disturbance, etc. Image de-noising is used to remove the noise in the image by using pixel value of each pixel of image, by taking average of the pixel value in a matrix of 3x3 blocks. This proposed model of the de-noising gives better result by using reference value and rechecking of value by using three value that is variance, weighted average and fitness rate. The following algorithm explains the stepwise execution of the proposed image de-noising model:

Algorithm 1: Advanced Image De-noising Model (HIDM)

1. Take input of image in matrix form
2. From that matrix take the number of components→ y
3. Analysis of the smoothness and weights parameter
    a. Assign limit of smoothness intensity
    b. Assign the value of smoothness weight
    c. Give the maximum of iterations
    d. Give the tolerance value on the smooth output
    e. On each pixel start the guessing parameter to guess the noise in each pixel
4. Set the windows size
5. Read the number of blocks

6. Run iteration for each of the block
    a. Run the noise assessment method and make the decision(N)
    b. The Value of decision==1 indicates the presence of noise then do the following steps
        i. Calculate the average weight from the surrounding pixel
        ii. To get better value take the variance and covariance of the calculated average weight
        iii. Make an appropriate decision by Check the calculated value with the value of surrounding pixels
        iv. If OK then give the value to the center pixel with a maximum fitness value
    c. Return the block
7. Join all blocks to construct the final image matrix
8. Return the final image matrix

Algorithm 2: enhancement technique

1. Convert image to gray.
2. Take value for sharpening.
3. Compute the pixel value from a neighbor.
4. Replace the value with computed value.
5. Apply filter to each pixel a preferred value.
6. Apply filter to sharpen the image.

After recovery and enhancement, the image segmentation is done.

3. RESULT ANALYSIS

The results of the proposed model have been obtained in the form of SSIM and PSNR parameters, The SSIM parameter is used to determine the similarity between the original and de-noised image, and the distance is measured in the form of pixel correlation, which is converted in percentage to prepare the representing value.

The following table 1 shows the results which are as follows:

Table 1: SSIM of X-ray images

Img 1	Img 2	Img 3
0.94	0.92	0.90

SSIM value of first images 93.95 dB.
SSIM value of the second image is 91.24
SSIM of the third image is 90.11

The PSNR parameter defines the frequency of the images and measured in the decibels. The following table 2 shows the results upon the images, which has undergone the tests in the different noise levels.

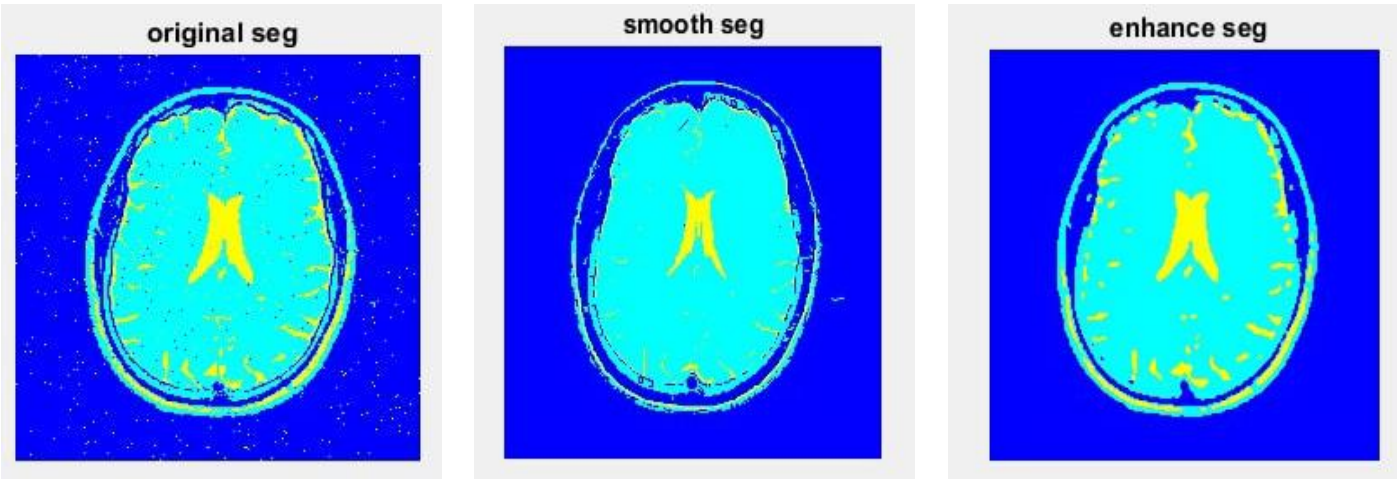
Table 2. PSNR of X-ray images

Img 1	Img 2	Img 3	Previous of img 3
65.75	60.55	52.06	31.87

PSNR value of first images 65.75 dB
PSNR value of the second image is 60.55 dB
PSNR value of the third image is 52.06 dB whereas it's previous value 31.87 dB

3.1 Segmentation

After removing the noise by using de-noising modal, detect segmentation of the image.



(a) **(b)** **(c)**

Fig. 1: Segmentation image (a) Original image, (b) After recovery, (c) After recovery and enhancement

4. CONCLUSION

Denoising modal has been designed to improve overall performance. The procedure used is blocking wise iterative to recover multifactor noise. It makes use slider window function to remove noise from the image. Its main advantage is that it only works on pixels that contain noise. It does not work on pixels which are noise free. The image1 has been recorded with the lowest SSIM value of 0.94 dB, whereas image 2 and images 3 produced the minimum SSIM values of 0.92dB and 0.90dB. The lowest value of PSNR has been recorded in image1 at 65.75, whereas the image 2 and image 3 are recorded with values of 60.55 and 52.06 respectively as minimum PSNR values. The proposed model results show the higher performance in order to de-noise the image matrices. Then Image enhancement is done and segmentation is done to detect image

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