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Removal of Salt and Pepper Noise Using 2D Median Filtering

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ABSTRACT:

Noise is a redundant signal that may occur in the image. Salt and Pepper noise is also recognized as impulse noise, independent noise or random noise, random occurrence of black and white pixels .The random occurrence of black and white pixels is Salt and Paper noise. Image de-noising is the first step in analysing, restore quality of the image. In this paper we use 2D median filter for salt and pepper noise without the use of medfilt2 FUNCTION. Median filter is a type of non-linear filter used to condense the amount of intensity variant between one pixel and the other pixel**.**

Keywords: Random, medfilt2, median filter.

1. INTRODUCION

In the field of technology, digital images usage is growing day by day. Digital imaging is used in face recognition, signature recognition as well as intelligent bureaus. These images may be tainted due to some noise issues.De.noising means to removing noise from the signal. It is known as noise reduction. Noise is an unwanted signal that may occur in the image. The reason behind the noise in image is imperfect instruments, problems with the data acquisition, process; interfering natural phenomena can all degrade the data of interest. Furthermore, noise can be introduced by transmission errors and compression.

Image de-noising is the first step in analyzing the data to restore the quality of the image. Noise reduction is the challenging issue for the researchers as it may distorts the actual image and blurring effect of the image. Different methodologies are used in noise modeling. Mathematical formulas are used to show the distortion of the image, where Zero mean does not lose generality, as the non-Zero mean can be subtracted to get to a zero mean model.

In image processing, noise produces an image that may consist of uneven lines, blurred object, distortion of pixels, corners, background scenes etc. should involve the relation between the automaton and image processing. A digital image with size mn□□ is a bi-dimensional array with that each element called a and with a grey level or colour value. There are two types of impulse noise, salt and pepper noise and random valued noise. For images corrupted by salt and pepper noise, the noisy pixels can take only the maximum and the minimum values in the dynamic range. Salt and pepper noise can significantly deteriorate the quality of an image.

Image processing applies filters with convolution operations on the images. Filters are designed as specific blocks and are used as masks for convolution operations. Basically two methods are used to remove the noise named as linear and non-linear, and we use a non –linear method for removing the noise in this paper. . The median filter was once the most popular nonlinear filter for removing impulse noise because of its good demising power and computational efficiency.

2. REVIEW OF LITERATURE

Monika Raghav et al [1] in this paper, the main focus is on the denoising of the images. Nowadays, the use of image becomes an emerging technology in the field of medical as well as education. But the problem is that it may consist of noise in image which can distort the quality of the image. Image de - noising happens after the image transmission.

Kanika Gupta et al [2] author have been focus on the removal of the noise from the the original signals. Thus, this paper consists of different techniques that are used to remove the noise. Noise is an unwanted signal that must remove to obtain the quality of the image

Rohit verma,et al[3] image has been using for various purposes and in various fields. While capturing or transmission of image, noise occurs in the process, thus, before use of the image noise must be removed. Ample algorithms can be used but having merits and demerits. Techniques can be used depending on the behavior of the noise.

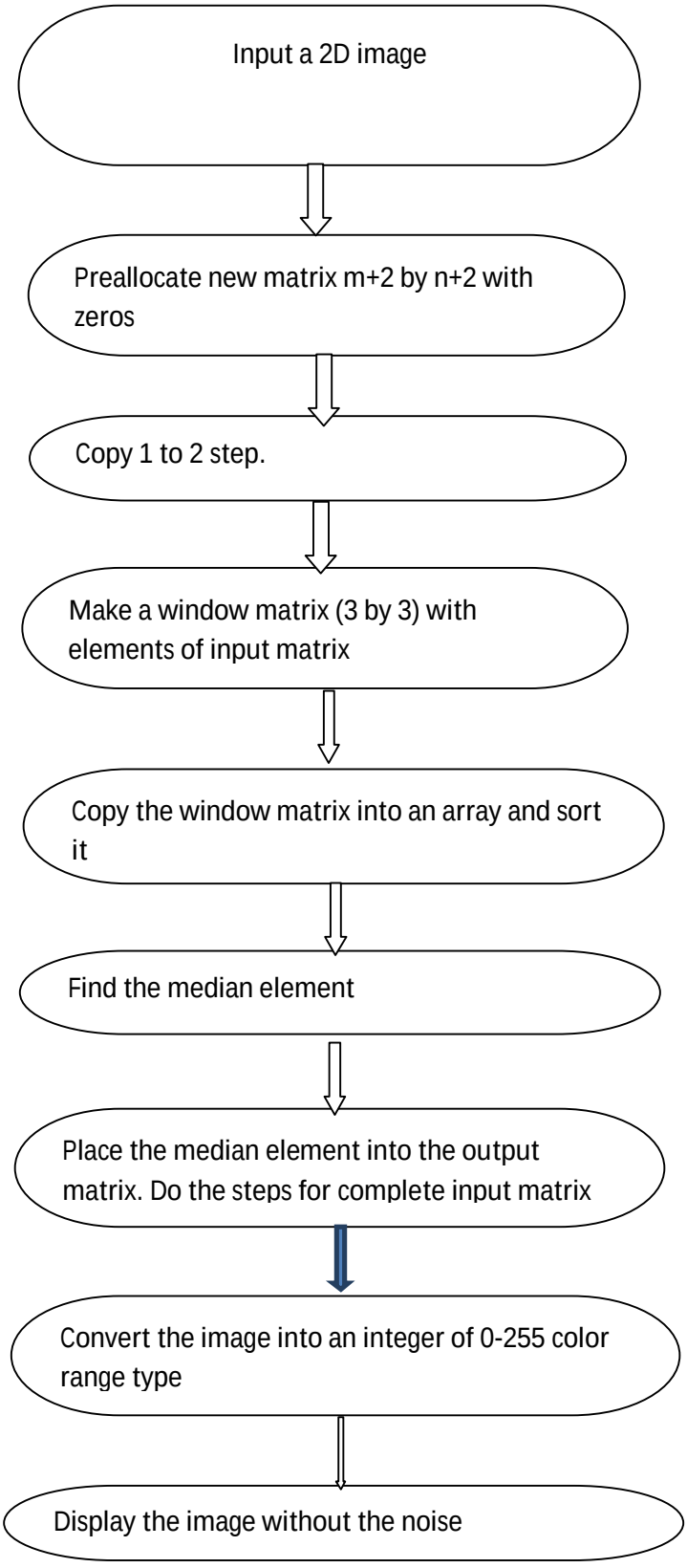
Impulse noise in an image is present due to bit errors in transmission or introduced during the signal acquisition stage. This noise is caused by malfunctioning pixels in camera sensors, faulty memory locations in hardware, transmission in a noisy channel and external disturbance such as atmospheric disturbance [4]. There are many studies on the restoration of images corrupted by impulse noise. It is well known that linear filtering techniques are not effective in removing impulse noise when the noise is non-additive [5]. The median filter was once the most popular nonlinear filter for removing impulse noise because of its good de-noising power and computational efficiency. However, the filter smears some of the details and the edges of the original image when the noise level is over 50 [6].

3. WORKING

In digital image processing, removing the noise is one of the preprocessing techniques, the image noise can be termed as the variation of brightness or color information In salt and pepper noise the image is corrupted due to black and white dots on it, having dark pixels in bright regions and bright pixels in dark regions. Black and white dot in the image have some noise value i.e. 0 and 1 respectively. Noise value for black is extreme low and for white is extreme high.

Filters are designed as specific blocks and are used as masks for convolution operations. Basically two methods are used to remove the noise named as linear and Non-linear, and we use a non –linear method for removing the noise in this paper. . The median filter was once the most popular nonlinear filter for removing impulse noise because of its good de - noising power and computational efficiency. Here we use 2D median filter for salt and pepper noise removal.

Figure 1: Shows the flow chart



a: consider a matrix A = $\begin{pmatrix} 4 & 7 & 9 \\ 3 & 5 & 3 \\ 6 & 1 & 2 \end{pmatrix}$

b: Now pad the matrix with zero on all the sides

A= $\begin{pmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 4 & 7 & 9 & 0 \\ 0 & 2 & 5 & 0 & 0 \\ 0 & 6 & 1 & 2 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$

c: Consider a window of size 3 x 3.The window can be of any size. Starting from matrix A (1,1), place the window

Window= $\begin{pmatrix} 0 & 0 & 0 \\ 0 & 4 & 7 \\ 0 & 2 & 5 \end{pmatrix}$

d: Window= $\begin{pmatrix} 0 & 0 & 0 \\ 0 & 4 & 7 \\ 0 & 6 & 1 \end{pmatrix}$

The value to be changed is the middle element [Value of 0 at(2,2)]

e: Sort the window matrix $\begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 3 \\ 4 & 4 & 7 \end{pmatrix}$

f: After sorting the output matrix is placed with a value of 0 at (2,2) pixel position. The value of the output pixel is found using the median of the neighborhood pixels.

g: This procedure is repeated for all the values in the input matrix by sliding the window to next position i.e. A(1,2),and so on.

h: The output matrix is

$\begin{pmatrix} 0 & 3 & 0 \\ 2 & 4 & 2 \\ 0 & 2 & 0 \end{pmatrix}$

The Metlab code is:

```
% READ AN 2D IMAGE
A=imread(sky.jpg')
title('image with salt and pepper noise');
figure,imshow(A);
```

```
% PAD THE MATRIX WITH ZEROS ON ALL SIDES
modify A=zeros(size(A)+2);
B= zeros(size(A));
```

```
% COPY THE ORIGINAL IMAGE MATRIX TO THE PADDED
MATRIX
        for x=1:size(A,1)
              for y =1:size(A,2)
                    modify(x+1,y+1) =A(x,y);
              end
        end
```

```
%LET THE WINDOW BE AN ARRAY
%STORE THE  3-BY-3 NEIGHBOUR VALUES IN THE
ARRAY
% SORT AND FIND THE MIDDLE ELEMENT
```

```
for  i=1:size(modifyA,1) -2
      for j=1:size(modify,2) -2
            window=zeros(9,1);
             inc=1;
             for  x=1:3
                for   y=1;3
                       window(inc)=modify(i+x-1,j+y-1);
                        inc=inc+1
                 end
          end
          med=sort(window);
%PLACE THE MEDIAN ELEMENT IN THE OUTPUT
MATRIX
          B(I,j)=med(5);
 end
end
```

```
%CONVERT THE OUTPUT IMAGE TO THE 0-255 RANGE
IMAGE TYPE
B=uint8(B);
Title('IMAGE AFTER MEDIAN FILTERING');
Figure,imshow (B):
```

Figure 2: image with salt and pepper noise

Figure 3: image after median filtering

4. CONCLUSION

Different methodologies are used in noise modeling. Mathematical formulas are used to show the distortion of the image, where Zero mean does not lose genereality,as the non-Zero mean can be subtracted to get to a zero mean model. In image processing, noise produces an image that may consist of uneven lines, blurred object, distortion of pixels, corners, background scenes etc should involve the relation between the automaton and image processing. The median filter was once the most popular nonlinear filter for removing impulse noise because of its good denoising power and computational efficiency.

5 FUTURE SCOPE

Salt and pepper noise can significantly deteriorate the quality of an image. There are many studies on the restoration of images corrupted by impulse noise. It is well known that linear filtering techniques are not effective in removing impulse noise then filter smears some of the details and the edges of the original image when the noise level is over 50. How to efficiently remove this kind of impulse noise is an important research task.

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Facebook fan page is partially involved in it.

REFERENCES

[1]. Monika Raghav, and Sahil Raheja,"Image Denoising Techniques,"vol, 3, pp.5637-5641, issue5, May 2014.

[2] .Kanika Gupta et al," Image denoising Techniques- a review paper,"vol.02, issue4, pp6-9March 2013.

[3]. Rohit Varma,and Dr.Jahid Ali,"A Comparative study of various types of noises and efficient noise removal techniques,"vol.3,issue 10,pp.617-622 oct. 2013.

[4]. Srinivasan KS, Ebenezer D. A new fast and efficient decision-based algorithm for removal of high-density impulse noises. IEEE Signal Process Lett 2007; 14:189–92

.

[5]. Nodes TA, Gallagher NC. The output distribution of median type filters. IEEE Trans Commun 1984;32(5):532–41.

[6]. Luo W. Efficient removal of impulse noise from digital images. IEEE Trans Consum Electron 2006;52(2).

[7] HTTP://ANGELJOHNSY.BLOGSPOT.COM/2011/03/2d.html.

[8]. Eng HL, Ma KK. Noise adaptive soft-switching median filter. IEEE Trans Image Process 2001;10(2):242–51.

[9]. Akkoul S, Ledee R, Leconge R, Harba R. A new adaptive switching median filter. IEEE Signal Process Lett 2010;17(6):587–90.

[10]. Pok G, Liu JC, Nair AS. Selective removal of impulse noise based on homogeneity level information. IEEE Trans Image Process 2003;12(1):85–92.