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Comparison of Median and Mean Filer for Investigating of Colour Images using MATLAB

Dr. A. Mary Odilya Teena*

Assistant Professor, Department of Computer Application, St. Joseph's College of Arts & Science (Autonomous), Cuddalore, TN, IND.

A. Karunamurthy

Assistant Professor, Department of Computer Application, BWDA Arts and Science College, Villupuram, TN, IND.

D. Suresh Kumar

Assistant Professor, Department of Computer Science, BWDA Arts and Science College, Villupuram, TN, IND.

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ABSTRACT

Recent advancements in digital technology have enabled the use of multidimensional signals in systems ranging from basic digital circuits to sophisticated parallel computers. Images captured with modern sensors can be manipulated by a number of different sound sources. Although current technologies make noise reduction much easier, the levels associated with various electro-optical devices are about trivial levels. In this paper we have explained some of the basic technical aspects of the field of sound detection technology. We focus on medium & medium filtering and standard deviation technology to reduce image noise.

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1.0 INTRODUCTION

Images are the most basic and simple way to communicate or convey information. It is said that an image is worth a thousand words. It conveys pathetic information of any object's position, size, and relationship. They describe the spatial information that we can identify as objects. Because of our local images and psychological abilities, we humans are good at drawing information from pictures (Gonzalez and Woods, 2008). Our discussion therefore focuses on the analysis of noise-reducing images. These images are represented in digital format. By pointing out the numbers we can

* *Corresponding author's e-mail:* teena16121979@gmail.com (Dr. A. Mary Odilya Teena)

conveniently increase, reduce, multiply and split the brightness by the image (Gonzalez and Woods, 2004).

A digital image can be described as a 2D image, where f (a, b) represents the coordinates a and b, and the magnitude of (a, b) f at the two coordinates is called the Gray scale intensity of the image. A digital image is one in which the positions and intensities of 'f' are classified into different dimensions. Ascertain that the digital image is comprised of a limited number of components, each of which has a specific position and meaning. Hence these components are called image elements, pulses and pixels (Manikandan and Chinnadurai, 2017; Manikandan and Chinnadurai, 2019).

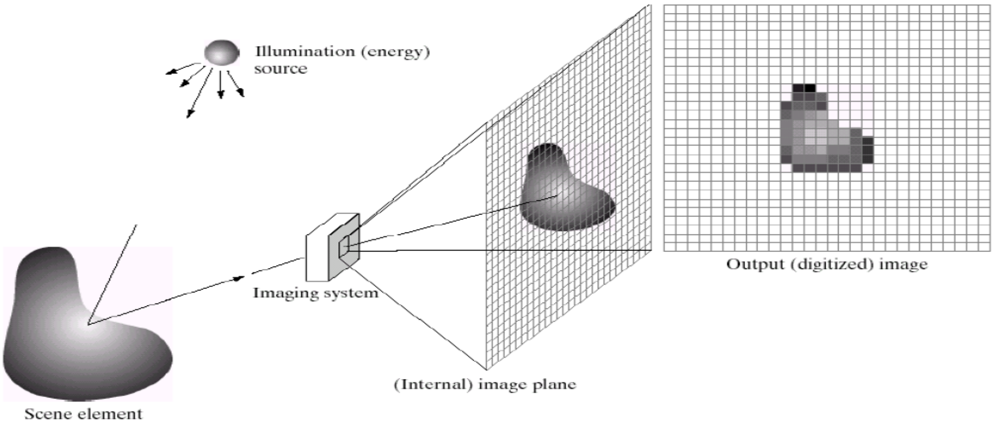


Figure 1 – Digital Image Processing

1.1 Gray Level Image

Each and every pixel is signified by 8 bits, therefore totally there are 256 levels in a grey level image. Greyscale images are distinct from one bit bi-tonal images in black and white, which have only black and white backgrounds and are called as bilevel or binary images. This image is commonly produced when the strength of light in a single band electromagnetic spectrum is measured.

Figure 2 – Gray Level Image

2.0 POSITIVE AND NEGATIVE IMAGE (GREY)

In this positive and negative image, the value of zero becomes one and one becomes zero, i.e., black will be turned to white and vice versa. The intensity value of the RGB image is subtracted from the utmost pixel value of the positive and negative image and used to create a difference in the pixel value of the output. The darkest field in the output gets brighter and lighter field gets darker. We can see from fig that the transformation is carried out in (50,205) coordinates, which produce the image in both positive and negative (grey).

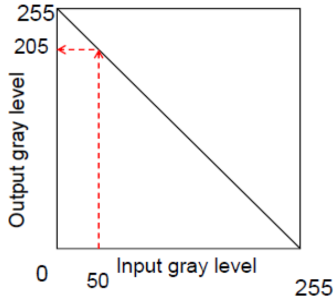


Figure 3 – Transformation Function for Negative Image

Matlab Coding for Reading, Displaying negative of grey image

```
%Reading Grey Image
gi=imread('image.pgm');
%Displaying Gray Image
figure;imshow(gi);
%Negative of Gray Image
ni= 255-gi;
figure;imshow(ni);
%Writing Gray Image
imwrite (ni,'negativeimage.pgm');
```

Figure 4 – MATLAB Output for Positive (Gray)

Figure 5 – MATLAB Output for Negative Image (Gray)

3.0 COLOUR IMAGE PROCESSING

The colour image is characterized by the usage of colour model or colour space. In cameras and display monitors the RGB colour space is frequently used. Each pixel is denoted in terms of 24 bits, therefore the total number of colour values are 1,67,77,216 (224)

MATLAB Coding for Reading, RGB Components negative of colour image

```
%Reading Colour Image
ci=imread('image.pgm');
%Red, Green and Blue Components of Colour Image
rc=ci(:,:,1);
gc=ci(:,:,2);
bc=ci(:,:,3);
%Writing Red,  Green and Blue Components of Colour Image
imwrite(rc,'red.bmp');
imwrite(rc,'green.bmp');
imwrite(rc,'blue.bmp');
%Negative of Colour Image
ni= 255-ci;
imwrite(ni,'negativeimage.bmp');
%RGB to Gray Level Image
gl=rgb2gray(ci);
imwrite (gl,'Grayimage.pgm');
```

Figure 6 – MATLAB Output for RGB Components Negative of Colour Image

4.0 IMAGE FILTERING

Image filtering techniques is used to eradicate the unwanted noise from the image. Images are affected by noise, which is caused by haphazard fluctuations in intensity values caused by poor camera capture or environmental conditions.

4.1 Types of Noise

1) **Salt and pepper noise:** The haphazard incidence values of 0 and 1 (i.e., black and white) are seen in this kind of noise. Median filter technology is an effective noise deduction for this kind of noise.
2) **Gaussian white noise:** Gaussian white noise contains a disparity intensity such as noise qwed to camera electronics or sensor noise.
3) **Poisson or shot noise:** In this type, the noise is a type of electronic noise which id decreased based on augmenting the photons per pixel.

"MATLAB coding for adding noise to image

I = imread('coin.tif');

n1= imnoise(I,'salt&pepper',0.02);

n2= imnoise(I,'gaussain',0,0.01);

n3= imnoise(I,'poisson');

subplot(2,2,1); imshow(I); xlabel('Input Image');

subplot(2,2,2); imshow(n1); xlabel('salt&pepper noise');

subplot(2,2,3); imshow(n2); xlabel('gaussian noise');

subplot(2,2,4); imshow(n3); xlabel('poisson noise');"

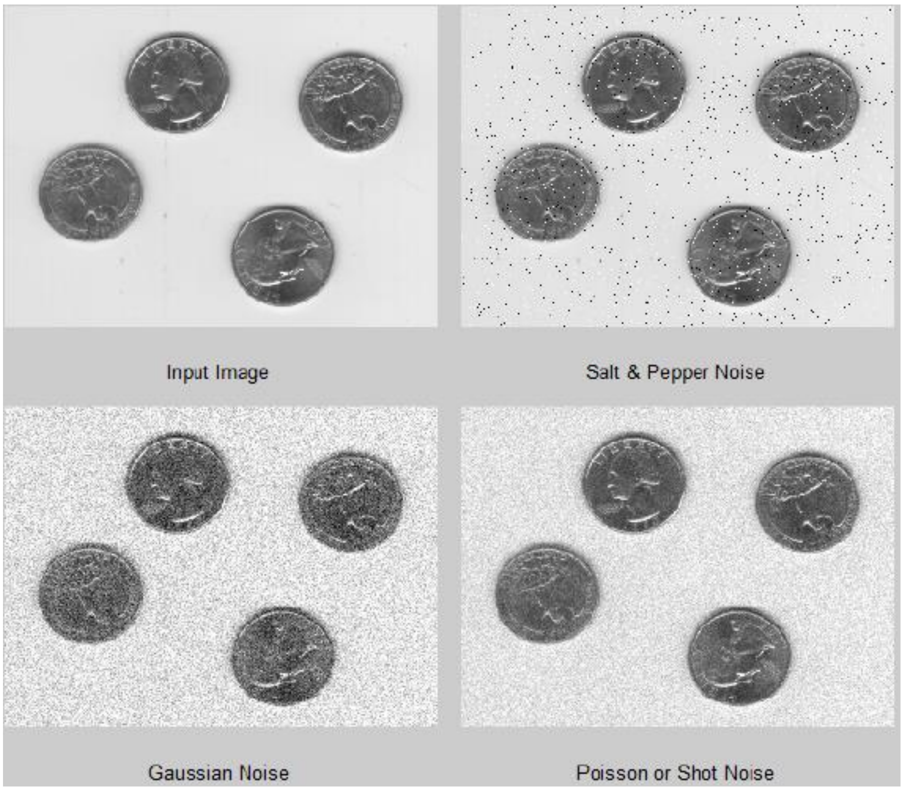


Figure 7 – Adding Noises to Image

4.2 2D Median Filter

The output pixel is restored by the median pixel value of the local vicinity in this median filter (3X3 pixels). This filtering technique is used to decrease "salt & pepper" noise.

MATLAB code for 2D Median Filter

I = imread('coin.tif');

J = imnoise(I,'salt&pepper',0.02);

K = medfilt2(J);

imshow (J); xlabel ('noisy image');

figurei, imshowi(K);

xlabel('Image without noise');

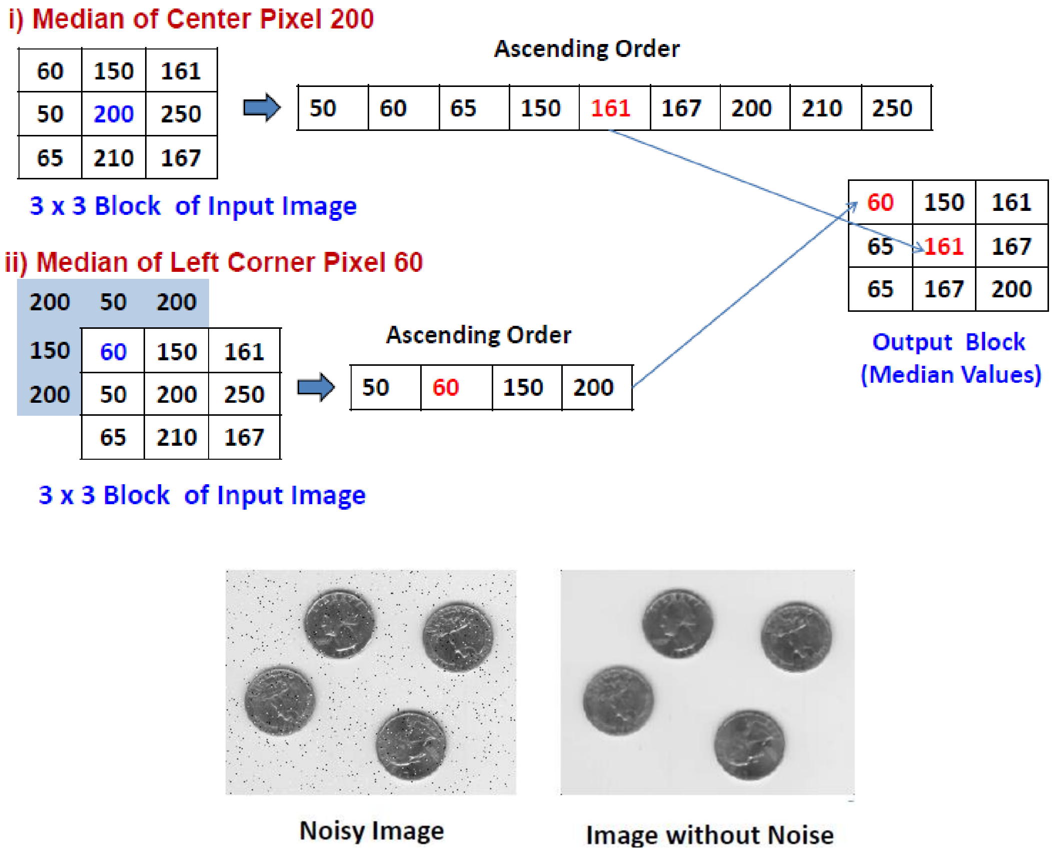
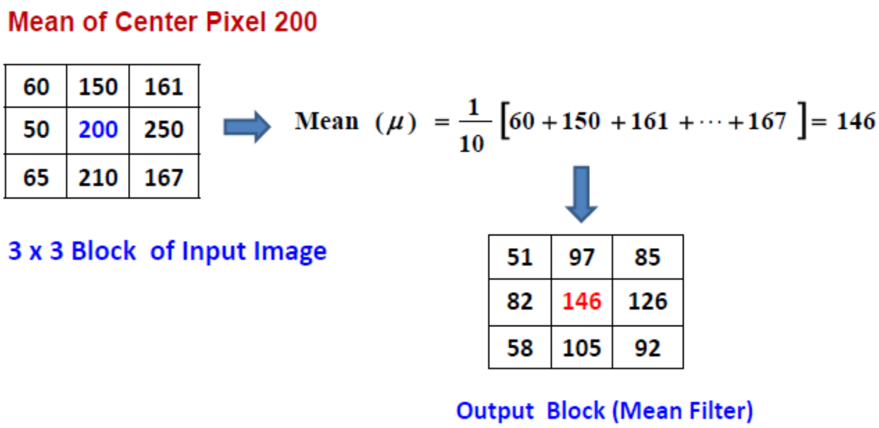


Figure 8 – 2D Median Filter

4.3 2D Mean Filter or Average Filter

Average filter consists of a square matrix of add sized window in which the center pixel is the one that is being operated on. Reinstate the center pixel by means of average of the pixels in a matrix.



MATLAB code for 2D – Mean Filter

```
%Reading image
I=imread('coins.png');
%create filter
F=ones(3,3)/9;
%apply filter to image using imfilter
I2 = imfilter(I,F);
%display original and filtered images
imshow(I),  title('Original Image');
figure,  imshow(I2), title('Mean Filtered Image')
```

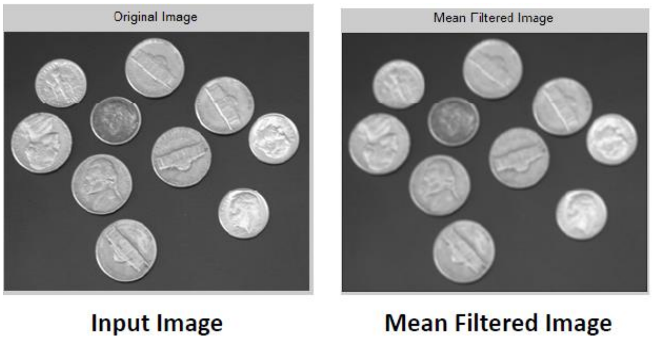


Figure 9 – Mean Filter

4.4 Local Standard Deviation Filter

On a scattered image, this filter tool is used to apply a standard deviation filter i.e., it computes the standard deviation within a nearest region about each grid cell. This filter can be used to highlight the limited variability in an image, which is used for edge detection.

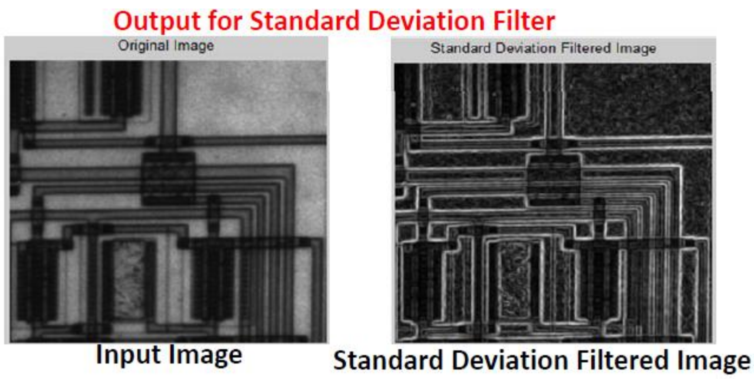


Figure 10 – Standard Deviation Filter

5.0 CONCLUSION

We can conclude that "A picture is worth a thousand words". By using the binary values, we can able to add, subtract, multiply, divide the values to the image. We have applied variety of filtering techniques to the image. The filtering techniques use the mathematical algorithms to alter the image. Some filtering techniques are easy to deal while some other needs great deal.

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