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AWGN AND COLOR NOISE REMOVAL IN IMAGES BASED ON CURVE FITTING AND RECURSIVE MEDIAN FILTERING WITH FOM, PSNR AND SSIM ESTIMATION

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ABSTRACT

Noise corruption is the main role played in pulling back the image processing technology useless. So analysis and how to mitigate the noise in 2D images would be very worth in medical image processing, satellite image processing and various other domains. The main disadvantage in Switching median filters are known to outperform standard median filters in the removal of impulse noise due to their capability of filtering candidate noisy pixels and leaving other pixels intact. The boundary discriminative noise detection is one powerful example in this class of filters. Certain issues in such algorithms are evaluated and enhanced by increasing the window size of the filter. In this project, we propose modifications to the filtering step of the algorithm by increasing the window size one step higher to existing size to address these issues. Experimental evaluation shows the effectiveness of the proposed modifications in producing sharper images than the existing algorithm. The noise elimination with around 90% of noise has been proposed and implemented using MATLAB 7.12 using image processing tool box.

1. INTRODUCTION

Image noise is undesired variation in pixel intensity values in a captured or transmitted image. Images captured with digital cameras or conventional film cameras or any other image sensor will pick up noise from variety of sources. Imperfect instruments, problems with the data acquisition process, interfering natural phenomena, transmission errors and compression can all introduce image noise and degrade the image quality. Image noise is an unavoidable side-effect during image capture. It is a phenemenon that no photographer can ignore. Even if noise is not clearly visible in a picture, some kind of image noise is bound to exist. Image denoising is the process of removing noise from images. It has remained a fundamental problem in the field of image processing. Digital images play an important role in daily life applications like satellite television, magnetic resonance imaging, computer tomography, geographical information systems, astronomy and many other research fields. While we cannot completely avoid image noise, we can certainly reduce them. The image noise is removed usually by image smoothing operation.

1.1 Mean Filter

Mean filter is a simple and intuitive way to reduce the image noise. It is a sliding-window spatial filter that replaces the center value in the window with the average (mean) of all the pixel values in the window. The idea is to eliminate the pixel values which are unrepresentative of their surrounding pixels. The window size is usually 3x3. Larger window sizes or repeated (iterative) mean filters introduce blurring and other unwanted effects in the image data.

Fig.1. **Image Denoising**

2. IMAGE PROCESSING

When remote sensing data are available in digital format, digital processing and analysis may be performed using a computer. Digital processing may be used to enhance data as a prelude to visual interpretation. Digital processing and analysis may also be carried out to automatically identify targets and extract information completely without manual intervention by a human interpreter. Analog images remote sensing products such as aerial photos are the result of photographic imaging systems (i.e. Camera). Once the film is developed, then no more processing is required. In this case, the image data is refered to as being in an analog format. Digital Images:remote sensed images can also be represented in a computer as arrays of pixels(picture elements), with each pixel corresponding to adigital number, representing the brightness level of that pixel in the image. In this case, the data are in a digital format. These types of digital images are referred to as raster images in which the pixels are arranged in rows and columns.

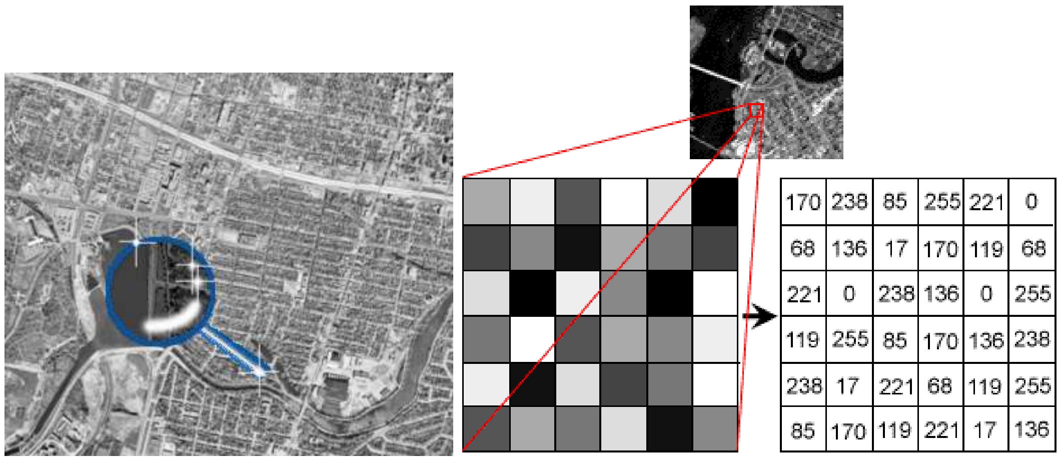


Fig.2. Digital image and pixel value

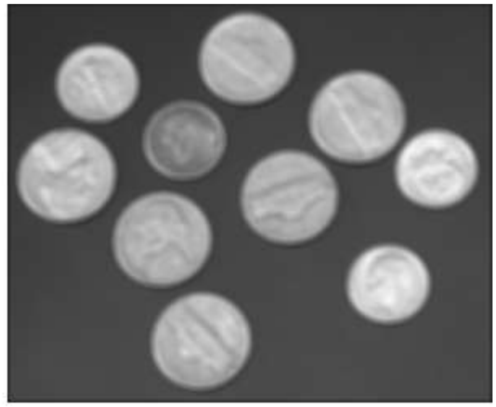
2.1 SPATIAL FILTERING

Another processing procedure falling into the enhancement category that often divulges valuable information of a different nature is *spatial filtering*. Although less commonly performed, this technique explores the distribution of pixels of varying brightness over an image and is especially sensitive to detecting and sharpening boundary discontinuities between adjacent pixel sets with notable differences in DN values. Patterns of sharp changes in scene illumination, which are typically abrupt rather than gradual, produce a relation that we express quantitatively as "spatial frequencies". The spatial frequency is defined as the number of cycles of change in image DN values per unit distance (e.g., 10 cycles/mm) applicable to repeating tonal discontinuities along a particular direction in the image. An image with only one spatial frequency consists of equally spaced stripes (in a TV monitor, raster lines).

2.2 Designing and Implementing Linear Filters in the Spatial Domain

Filtering is a technique for modifying or enhancing an image. For example, you can filter an image to emphasize certain features or remove other features. Image processing operations implemented with filtering include smoothing, sharpening, and edge enhancement. Filtering is a *neighborhood operation*, in which the value of any given pixel in the output image is determined by applying some algorithm to the values of the pixels in the neighborhood of the corresponding input pixel. A pixel's neighborhood is some set of pixels, defined by their locations relative to that pixel. *Linear filtering* is filtering in which the value of an output pixel is a linear combination of the values of the pixels in the input pixel's neighborhood.

Original Image

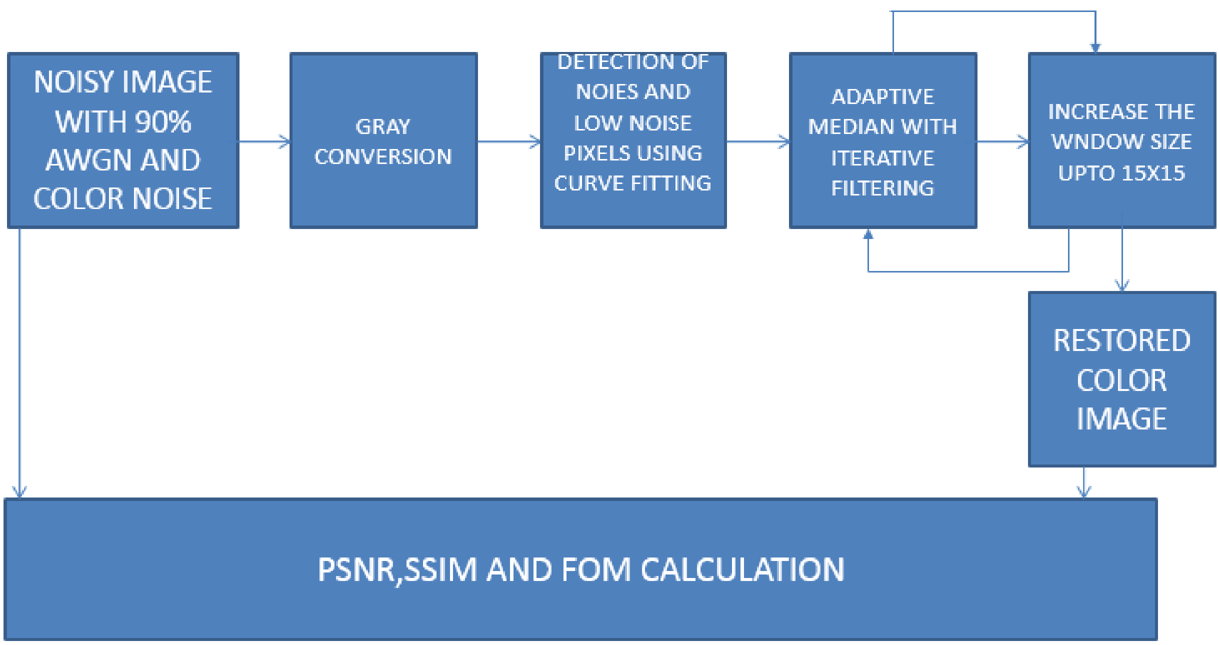


Filtered Image

The fspecial function produces several kinds of predefined filters, in the form of correlation kernels. After creating a filter with fspecial, you can apply it directly to your image data using imfilter. This example illustrates applying an *un-sharp masking* filter to a grayscale image.

3. RESULT ANALYSIS

An Enhanced algorithm is with 15x15 window size and An adaptive switched median filter is incorporated in the existing system, This may increase the denoising time. But this is efficient. Because, we add 90% of the noise and observe the performance of the proposed system.



In our proposed method the noise estimation is done with linear regression and the filter window is increased to 15x15. This method is likely to give a better PSNR value in our sequence of works as mentioned in the above block diagram.

Fig.4. Expected results

CONCLUSION

In this phase of work, a detailed study and implementation is carried out for gray level images. The expected value of PSNR is above 50 db, and we try to increase the noise level greater than 90% of salt and pepper noise, which is actually 80% in the existing work. Various reference papers had been analyzed to compare our novel proposed method. This noise elimination work could be very promising method in all applications like defense communications and bio medical image processing.

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