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LOW COMPLEXITY EDGE DETECTION AND IMPULSE NOISE REMOVAL IN VARIOUS IMAGES

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Abstract

In this project the trilateral Subjective Sparse Coding [SSC] is proposed as a powerful image de-noising method. The intimation of our project is to remove noise and preserve edges of the image by using edge preservation technique. Our project is about de-noising in image processing. When the image is given as an input and the size of the image modifies to 512 x 512. After the input is given, the image is preprocessed by using preprocessing system. This preprocessing system is to determine the occurrence of the impulse noise in the input image. If the impulse noise appeared in the image then Edge preservation filter is used to preserve the edge and remove the impulse noise in images. Here there is a comparison between two types of filter which includes median filter and edge preservation filter. When an input is applied to a particular image there is a huge transformation from color image to the gray scale image. The input image attached is related to medical field and the general image. Further, patch by patch process was included to remove noise in the images. It shows that the proposed system is superior over the state of art filter for determining the parameters and getting a quality image.

Index Terms: De-noising, Edge preservation filter, Subjective Sparse Coding

I INTRODUCTION

Image processing is a process of getting a new image that can perform operations which gives useful information. It is a type of image processing in which an input image and an output image which includes some characteristics .In other words it is called as signal processing. The two types are Analog image processing and Digital image processing.

Analog image processing: Continuous range of amplitude values in analog wave format. During the transmission of the analog waves the signals and accuracy of the image gets affected.

Digital image processing: Discrete type of signals and during the transmission of the signals and accuracy the image was not affected by the noise. In image processing, there are various methods like encryption, decryption, segmetography and de-noising.

DE-NOISEING: It is a process to reconstruct an image from the noisy signal and to remove unwanted noises to restore the original image [4]. There are different methods in image de-noising are frequency domain and spatial domain.

Different types of image de-noising are Gaussian noise, Poisson noise, Speckle noise and Impulse noise.

Impulse Noise: It is the removal of unwanted noises in the images and it occurs due to the defect of pixels in the camera and memory elements are missing in the image hardware systems. Impulse noise is classified into two types. There are fixed valued impulse noise and random valued impulse noise.

Fixed Valued Impulse Noise: Normally affected by the errors due to transmission and has 8 bit images occur for two possible values, the fixed values for salt and pepper noise is 0 and 255. By using the salt and pepper noise, the pixels are corrupted with the minimum and maximum values.

Random Valued Impulse Noise: It is unequal height impulses and has the values between 0and 255 hence its removal is very difficult.

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II EXISTING SYSTEM

Various algorithms are used to remove noises in images. The existing method that they used was Annihilating filter based Low rank Hankel matrix [1]. By using this filter smoothness or textures within an image patch can be identified with the help of sparse spectral components in the frequency domain. The missing pixels in the image can be identified by using Annihilating filter. The impulse noise removal algorithm in the image was Sparse and low rank decomposition of a Hankel structured matrix. To overcome these problems, the other method used was Multiplier approach. The patch by patch process is used to adopt the images that have spectral components and the robust ALOHA is to adopt the particular pixel in an image. Both the single channel and the multi-channel noise was removed by using the ALOHA algorithm. Single channel is used to capture a single image and measured through the Gray scale detectors, whereas the multi- channel is used to capture the multiple images and which is measured through R (red), G (green), B (blue) detectors. Henkel structured matrix is identified by the patch size and annihilating filter size. In existing system the different parameters like Peak Signal to Noise Ratio, Signal to Noise Ratio and Mean Square Error can be determined.

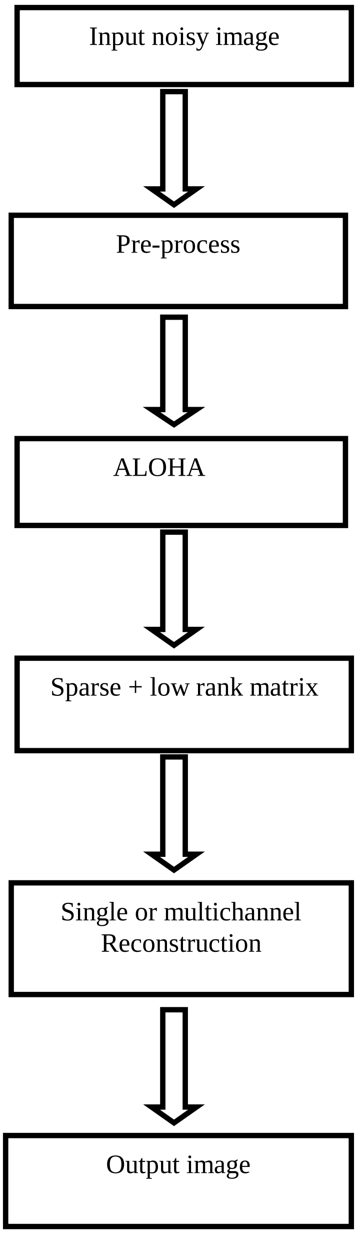

Fig 1: Block diagram for existing system

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A one particular image is given as the input image, in that image; the pre-processing method has to be done to identify weather the impulse noise gets occurred in an image.

On the other hand to remove the impulse noise, the removal algorithm was ALOHA and the other efficient removal algorithm was Sparse and low rank Hankel matrix [2]. These two algorithms is to find the both the single channel or multiple images. Single channel is used to capture a single image and measured through the Gray scale detectors, whereas the multi-channel is used to capture the multiple images and which is measured through R (red), G (green), B (blue) detectors. These processes were done step by step to remove the impulse noise and get effective and less noisy images.

III PROPOSED SYSTEM

In existing system, only the particular pixel noise was eliminated by using patch by patch method and this algorithm needs highly correlated spectral dataset.

To match the maximum dynamic range of a pixel values in salt and pepper noise which can be easily founded by the adaptive median filter (AMF). To occur accidentally within the dynamic range of pixels in the random valued impulse noise which is difficult to found by adaptive median filter (AMF) instead adaptive center weighted median filter (ACWMF) is used. When the density of the noise increases in AMF and ACWMF the de-noising algorithms are severely degraded. To overcome these problem, the another method was decision based filter [3]. The problem of decision based filter is preserving the edges of the image and removing those noises are difficult. To overcome these problems the edge preservation filter is used.

In the proposed system, edge preservation filter is used to preserve the edges in various images. The Smoothing technique is effective for removing noises in patches or region but also it affects the edges of images.

Edge preservation filter: The edge preserving filter are conveniently be formulated in a graph based signal processing, where the graph is first determined by using differential structure of an image and are formulated. Filtering is a technique which is widely adopted in CG and CP [10]. It gets transform from the certain image characteristics to the pixel intensity values. Some of the applications are applied in image filtering such as edge preservation, texture editing and image reduction. Powerful noise reduction method provides many natural images are described as a collection of gray value and oriented texture domains.

Edges are the critical importance to the visual images. These filters are widely used de-noising for the medical images [6]. For impulse noise detection, the filtering technique is an important step to identify the noise. Here the nature of the edge and noise in an image appears to be similar, due to the sudden transmission of the gray level values. Here it is difficult to differentiate between noisy image and edge pixels [5]. Extracting the edges from the corrupted image is a difficult task without any prior knowledge about the edge information. The problem of identifying noise pixels and edge pixels has the direct implication on preserving details in an image during the filtering. In these filter technique to isolate the pixels belonging to edges and noisy images.

Normally when an image is given as input, some noise gets added in those images. Our project is to remove impulse noise from that image [9]. At first an image is given as input for different sizes and the original image was resized in the form of fixed size and then the pre-processing is done to check the occurrence of the noise in the image, then the filter used is called edge preservation filter. This is designed to preserve the edges and sharpness of an image. This edge preservation can be done in satellite and in medical images.

The output image is obtained as a result of resized image and also the impulse noise was removed from a noisy image. Some parameters are measured from an output like Peak Signal to Noise Ratio, Mean Square Error and Signal to Noise Ratio. Salt and pepper noise is also called as impulse noise removed as a result by using this Edge Preservation Filter. The main function of a pre-processing method is to identify the noise in a given original input image [8]. Meanwhile the edge preservation filter is to preserve the image in which the noise gets added in the original input function.

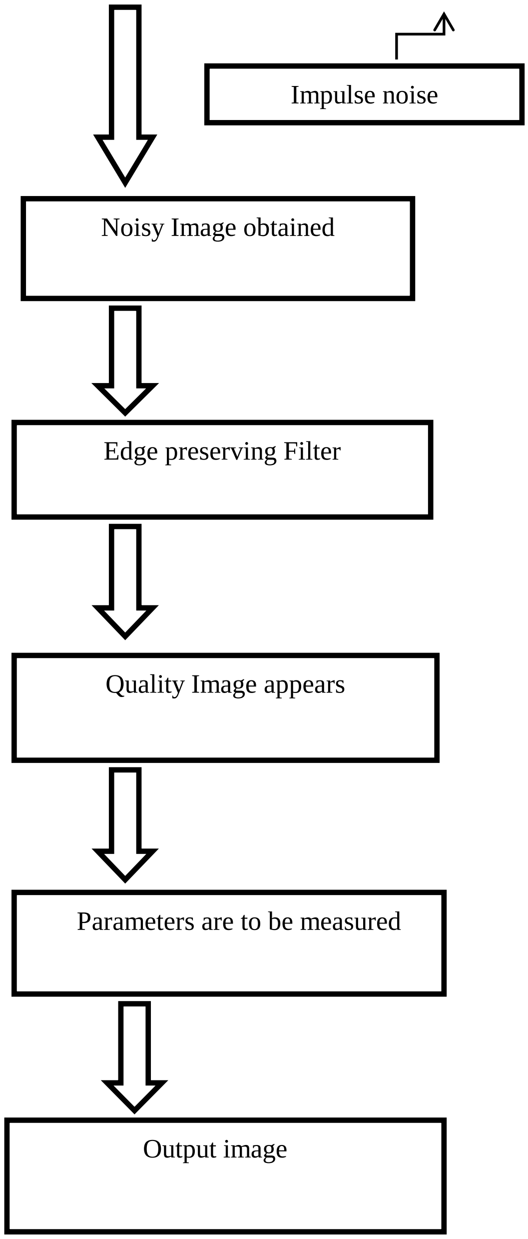


Fig 2: Block diagram for proposed system

When the input image is applied for determining an impulse noise, the noisy image gets obtained. Then input image gets resized into 512 x 512 formats. When the edge preservation filter was introduced, the quality image was appeared. Then the patch by patch process was used, to remove the noise in the entire function [7]. To determine these quality images some parameters are measure like Peak Signal to Noise Ratio, Mean Square Error, and Signal to Noise Ratio. As a result the effective and high quality output image was obtained.

IV RESULT

MEDIAN FILTER

Images	Noise range	PSNR	SNR	MSE

Rose	**0.5**	**56.70**	**27.24**	**0.13**
Chick	**0.5**	**76.42**	**34.215**	**0.0013**
Abdomen	**0.7**	**103.06**	**45.66**	**0.00003**
Liver	**0.5**	**192.787**	**91.52**	**0.00000**
Kidney	**0.7**	**103.06**	**46.139**	**0.00003**

Table 1: Median Filter


(a) Original image: 0.1


(b) Gray scale image


(c) Median image

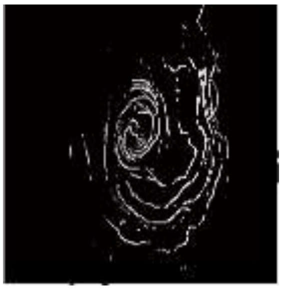

(d) Edge image

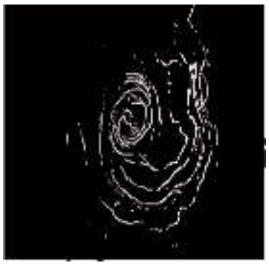
Fig 3.1

When an input noise of rose is 0.1, given to an image (a) it produces an output that are shown in fig(b),(c) and (d) respectively.


(a)Original image: 0.5


(b)Gray scale image

(c) Median image



(d) Edge image

Fig 3.2
When an input noise of rose is 0.5 , given to an image (a) it produces an output that are shown in fig(b),(c) and (d) respectively.

(a)Original image: 0.1

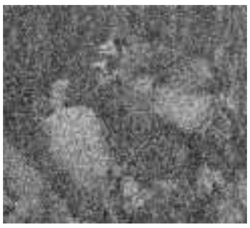
(b)Gray scale image

(c) Median image

(d) Edge image

Fig 3.3
When an input noise of Chick is 0.1 , given to an image (a) it produces an output that are shown in fig(b),(c) and (d) respectively.

(a) Original image: 0.7



(b) Gray scale image

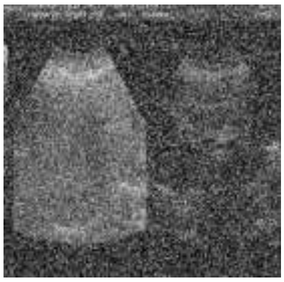
(c) median image

(d) edge image

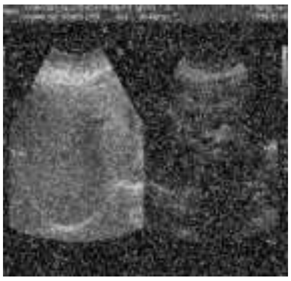
Fig 3.4

When an input noise of Chick is 0.7 , given to an image (a) it produces an output that are shown in fig(b),(c) and (d) respectively.

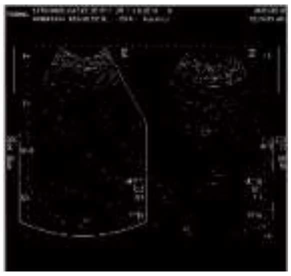
(a) Original image: 0.5



(b) Gray scale image



(c) median image

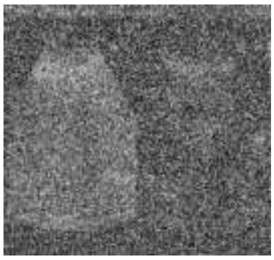


(d) edge image

Fig 3.5

When an input noise of Abdomen is 0.5 , given to an image (a) it produces an output that are shown in fig(b),(c) and (d) respectively.

(a) Original image: 0.7



(b) Gray scale image

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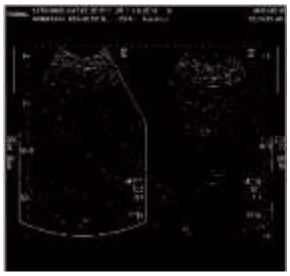
(c) median image



(d) edge image

Fig 3.6

When an input noise of Abdomen is 0.7 , given to an image (a) it produces an output that are shown in fig(b),(c) and (d) respectively.

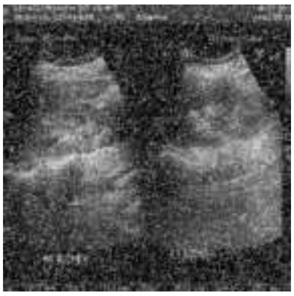
RESULT: EDGE PRESERVATION FILTER

Images	Noise range	PSNR	SNR	MSE
Rose	0.5	84.42	60.79	0.00023
Chick	0.5	142.90	70.90	0.0000
Abdomen	0.5	82.89	35.76	0.00034
Liver	0.5	82.89	36.66	0.00034
Kidney	0.5	165.01	72.29	0.0000

Table 2 : Edge preservation filter

(a) Original image: 0.5

(b) Gray scale image



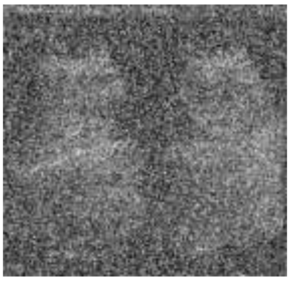
(c) median image

(d) edge image

Fig 3.7

When an input noise of kidney is 0.5 , given to an image (a) it produces an output that are shown in fig(b),(c) and (d) respectively.

(a) Original image: 0.7



(b) Gray scale image

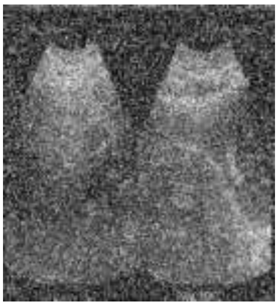
(c) median image

(d) edge image

Fig 3.8

When an input noise of kidney is 0.7 , given to an image (a) it produces an output that are shown in fig(b),(c) and (d) respectively.

(a) Original image: 0.5



(b) Gray scale image

(c) median image

(d) edge image

Fig 3.9

When an input noise of liver is 0.5 , given to an image (a) it produces an output that are shown in fig(b),(c) and (d) respectively.

(a) Original image: 0.7

(b) Gray scale image

(c) median image

(d) edge image

Fig 3.10

When an input noise of liver is 0.7 , given to an image (a) it produces an output that are shown in fig(b),(c) and (d) respectively.

V CONCLUSION

Hereby we conclude that the filter used is Edge preservation filter. There is an comparision of Median and edge preservation filter.The parameter terms that we undergone are Peak Signal to Noise Ratio, Signal to Noise Ratio, Mean Square Error and their values are measured.

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