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ENHANCED HYBRID MEDIAN FILTRATION TECHNIQUE FOR MEDICAL IMAGES

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Abstract:- *Offered research work suggested a scheme to exclude the noise from ultrasound medical image. Such sorts of pictures are tremendously affected by noise from various sorts of medicinal equipment like CT scan, MRI or ultrasound systems. Some techniques of Denoising like mean, median, and spatial mask filtrating are frequently used procedures to abolish the noise. Here hybrid median filter is introduced to eliminate high density impulse noise. Hybrid median filter is a mixture of two filters. Suggested research work likewise gives the comparison outcomes of some formerly adapted filtration techniques for denoising of impulsive noise in medical images. With enhancement in PSNR and lesser MSE value to significant level also suggested work offers a unique scheme in hybrid median filtration. For better preserving the edge and texture areas, an improved median filtering scheme has been advised in this work. The proposed filter is effective in removing noises.*

Keywords: *MRI and USI images, Noise, Denoise, Mean filter; Median filter; Adaptive median; Spatial adaptive mask; Adaptive spatial mask filter etc.*

I. INTRODUCTION

In research and technological arena, digital images exhibit a vibrant role. There are numerous information structures in arena of medical science where digital images have utmost vibrant share like MRI, X-ray imagery, ultrasound imagery and Computer tomography. Due to numerous varieties of incidents the features of imageries is ruined by various varieties of noises during its creation and transmission. For this persistence countless filters are castoff in the direction of lessening or completely remove these noises. In suggested study we use numerous categories of filters like mean, median, Adaptive median, Adaptive spatial mask filter, and spatial filter in mean filter, Hybrid median filter. In literature review part it shows some previous studies in ground of our interest. In proposed methodology part, it offers a brief sketch about the projected method, that how our proposed system convert RGB picture into grey scale picture and after that apply a number of filters and also a novel filter is applied which is the progressive variety of median filter and useful to lessen the noise from images. And finally in the conclusion part it illustrates that, suggested system is efficient compared to traditional one and delivers better PSNR and MSE value.

II. LITERATURE SURVEY

K B Shiva Kumar, et al. (2011) Proposed an algorithim named as HDLS. In projected scheme it yield 2 images, preceding one is cover picture and former one is payload image and both the pictures allocated disjointedly into 2 cells each. In given scheme RGB element of previous cell 1 are transformed after split-up independently from one domain to another by means of DWT/ DCT/FFT named as spatial to transform domain. Cell 2's components on further side are reserved in spatial domain itself. From the aspects of security it provided enhanced outcomes than existing techniques and also has the enhanced PSNR [1].

RenuNagpal, et al. (2010) Suggested an innovative methodology using cascading named as MBFO and AFO. This introduced filter works in extreme noisy environment (salt and paper noise) and also recognizes four sorts of facial expression named as anger, fear, happiness and neutral at very high rate. Suggested scheme may work on training and furthermore on dataset that is defined via users. In this, process neural network is casted off too intended for classifying the emotions. The forthcoming work of offered learning comprises a kind of system which may work with other several sorts of noise like speckle noise with support of adaptive median filter or wiener filter. Also additional neural network may castoff for further advancement. And by replacement of current BFO to another tool which requires less computation will improve its computational time. Also by adding other numerous varieties of emotions and constructing it graphical base system, offered scheme may considered as universal algorithm [2].

Jeny Rajan, et al. (2008) projected an enhanced variety of a technique given by Jian Ling and Alan C. Bovik named as improved hybrid method. The proposed upgraded account has two stages, the prior one has the 4th order PDE and former one has the relaxed median filter which has outcome of prior stage. The suggested scheme has the benefits of both the nonlinear 4th order PDE and relaxed median filter. The research is done on molecular imageries and ordinary test images. Outcome illustrates the improvement of suggested scheme at higher rate of noise above current routine [3].

G. Jagadeeswar Reddy, et al. (2008) anticipated a scheme of denoising for fingerprint imageries which includes two transform named as curvelet and wavelet. The outcomes show perceptiveness of mutually two transforms based reconstructions above wavelet reconstructions. The Curvelet transform system is easier, little redundant and furthermore quicker equated to present technique. The outcome picture of curvelet transform are seems nearer to novel image than denoised picture of wavelet transform. Curvelet transform gives the increased PSNR aimed at Speckle, Gaussian and Random noise. For low standard deviation enactments of both the transforms are nearly same but for Salt and Pepper aimed at greater standard deviation Curvelet transform beats Wavelet transform. [4].

Richa Singh, et al. (2007) projected a biometric structure that comprise two stages, the earlier one is enhancement and further one is deformation technique. From the different globally enhanced images, this framework receipts a decent quality portion and pooled them to yield a single great feature image. This offered scheme is authenticated by casting the two elements as the case study, named as iris and face biometrics. Experiment illustrates the advancement in present iris and face recognition schemes by processing through suggested improvement and deformation algorithms [5].

Abhijit M. Vispute, et al. (2016) projected a study which gives the comparative outcome of previously surviving approaches like mean, median, spatial adaptive mask filter etc. it also proposed its individual novel filter that is upgraded practice of spatial adaptive mask filter with increase of 2% in PSNR and reduction of 5% in MSE in range of 0.1 to 1 [6].

Jyotsna singh, et al. (2018) advised a work which mainly focuses on denoising of biometric images like MRI and USI images. The lessening of noise is very essential and demanding task. Hence this study offers knowledge of various types of noises and also briefly defines the general denoising techniques for medical images [7].

III. PROPOSED METHODOLOGY

The above learning illustrates that there is no filter which is more superior to the existing one, so to aimed at this persistence we projected a scheme for color and grey scale biometric imageries which is more proficient compare to existing one also we give a comparison outcome of previously derived methods to offered scheme from [6] which is the base paper of our study. Also from our above study and research work, we learn about various types of noises and its filtration techniques [7]. Our offered scheme named as hybrid median filter is a mixture of two filters. In offered scheme we firstly input the novel biometric (MRI & USI) images and formerly resize our window to apply our proposed method. After the feedback processing is done then we check the picture whether it is grey scale picture or not, if not then convert it into grey scale for more processing. After the conversions into the grey scale we increase size of picture thus hybrid median filter can be applied. After this we check whether entire pixels are filtered or not, if yes then we find diagonal value nearby the pixel which is going to be filtered and with this we also find the value of right, left, lower and upper part of the pixel which is going to be filtered until entire pixels are filtered. Lastly we estimate median of the formerly estimated values. The testing of offered scheme illustrates enhanced values than existing techniques.

PROPOSED ALGORITHM STEP

Step 1: Start

Step 2: Input the novel picture and afterward resize the window size to apply the filters.

Step 3: It is checked that the delivered picture is grey scale picture or not. If yes at that point switch to step 4; if not then transform it into grey scale and afterward switch to step 4.

Step 4: Increase the size of formed picture through step 3 hence recommended hybrid median filter can be applied and formerly switch to next.

Step 5: From the formed picture through preceding step we checked; entire pixels are filtered or not. If yes then directly switch to step 9 and exit; if not then switch to step 6, step 7 and step 8 respectively then finally to step 9 then exit.

Step 6: From the pixel to be filtered, find values to the right, left, lower and upper of the pixel.

Step 7: Find the diagonal values nearby the pixel which is to be filtered.

Step 8: Calculate the median of values of step 6 and step 7.

Step 9: Find the diagonal values nearby the pixel which is to be filtered.
Exit.

IV. RESULT ANALYSIS

First run the program.

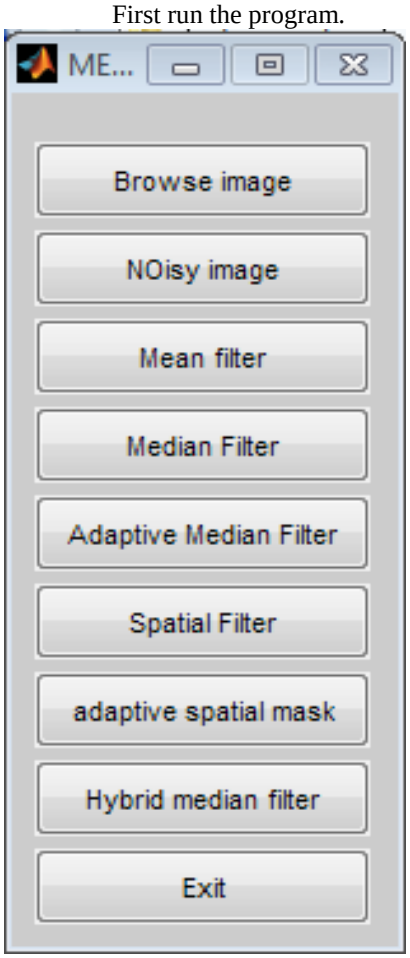

Fig. 1

Fig :1 screenshot of running the program

Take MRI original image.

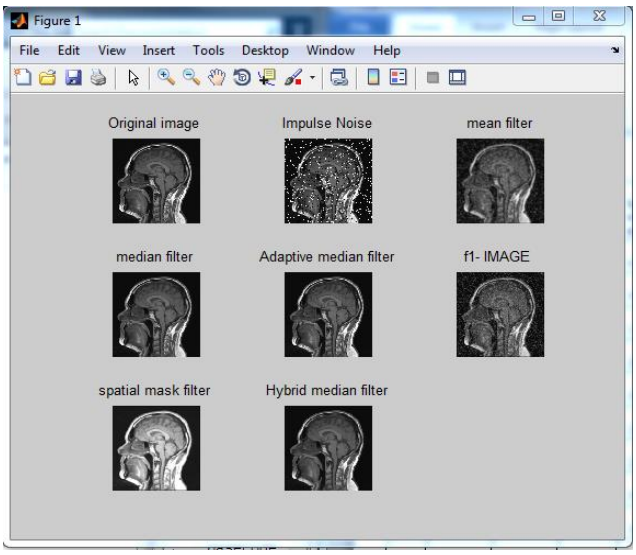

Fig.2 COMPARISION RESULT OF MRI IMAGE AT 0.1

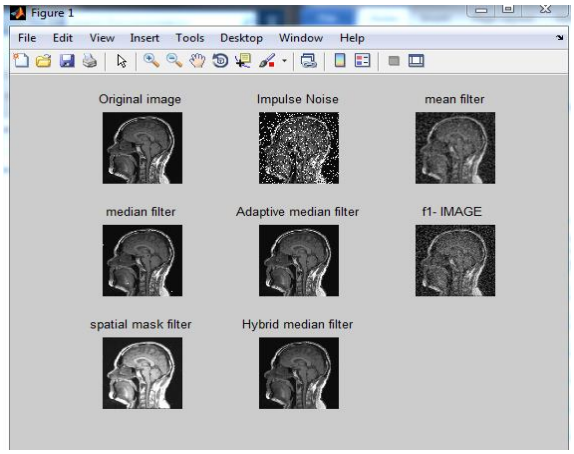

FIG.3 COMPARISION RESULT OF MRI IMAGE AT 0.2

COMPARISION TABLE. 1

Noise	Mean filter	Median filter	Adaptive median	Spatial adaptive mask	Adaptive spatial mask filter	Propose
0.1	21.7403	29.7022	34.2831	41.2056	43.9463	159.9603
0.2	19.5289	26.4303	31.5211	37.0863	44.0361	153.3607
0.3	17.2918	21.3619	28.8098	33.0476	43.6895	143.6377
0.4	15.7339	17.9444	27.0177	30.2061	43.4145	130.3557
0.5	14.2666	14.0942	24.8973	27.5491	42.1100	109.6368
0.6	12.9775	11.2397	23.4311	25.2411	39.4001	85.4521
0.7	11.8031	8.8843	21.8371	23.0274	35.7524	63.5842
0.8	10.9121	7.1867	19.8252	21.2861	32.2709	48.1913
0.9	10.0341	5.6644	17.1020	19.6386	28.4232	34.8216
1	9.1324	4.4196	24.5371	17.9083	24.5371	24.7553

Comparison between PSNR values for MRI

COMPARISION TABLE. 2

Noise	Mean filter	Median filter	Adaptive median	Spatial adaptive mask	Adaptive spatial mask filter	Propose
0.1	435.5613	69.6404	24.2533	0.0023	0.0027	1.5259e-04
0.2	724.7475	147.9280	45.8108	0.0023	0.0027	1.5259e-04
0.3	1.2131e+03	475.2128	85.5255	0.0023	0.0027	1.5259e-04
0.4	1.7366e+03	1.0439e+03	129.2153	0.0027	0.0027	0.0027
0.5	2.4345e+03	2.5331e+03	210.5497	1.5023e-04	0.0027	0.8938
0.6	3.2759e+03	4.8877e+03	295.0990	1.5023e-04	0.0027	0.8938

0.7	4.2931e+03	8.4071e+03	425.9621	0.0027	0.0027	0.0027
0.8	5.2707e+03	1.2428e+04	676.9525	0.0027	0.0027	0.0027
0.9	6.4516e+03	1.7646e+04	1.2673e+03	0.0027	0.0027	0.0027
1	7.9404e+03	2.3503e+04	6.2697e+03	1.5023e-04	0.0027	0.8938

Comparison between MSE values for MRI

Take USI original images

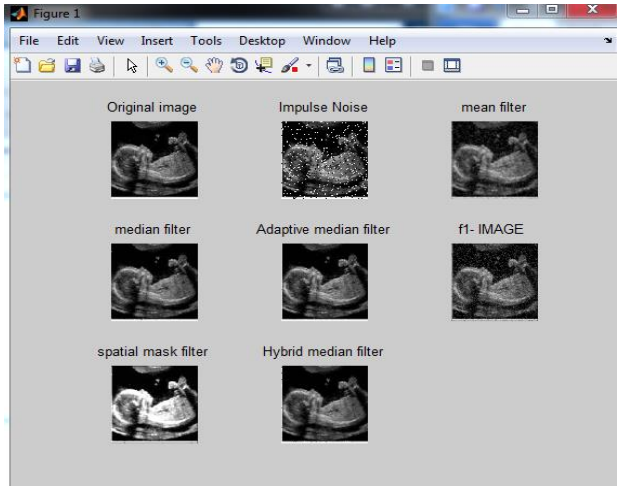

Fig 4COMPARISION RESULT OF USI IMAGE AT 0.1

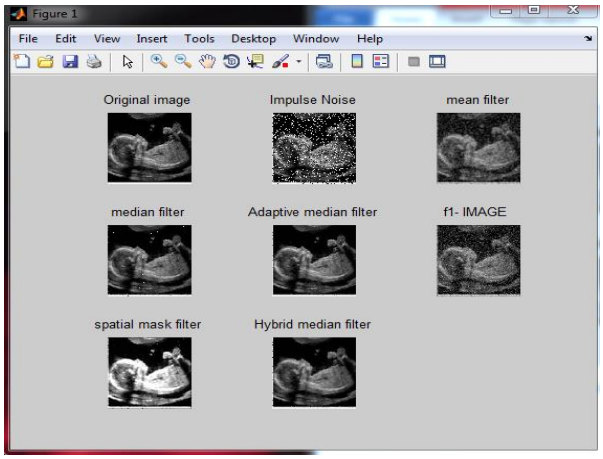

Fig 5 COMPARISION RESULT OF USI IMAGE AT 0.2

COMPARISION TABLE. 3

Noise	**Mean filter**	**Median filter**	**Adaptive median**	**Spatial adaptive mask**	**Adaptive spatial mask filter**	**Propose**
0.1	21.5445	31.4235	38.3316	41.1302	42.0660	185.4262
0.2	18.9297	25.8542	33.6663	36.2910	41.9471	173.4620
0.3	16.7513	21.2546	31.4291	32.3382	41.6541	161.0144

0.4	15.0454	17.1930	28.0620	29.1593	41.2436	142.8016
0.5	13.5422	13.8030	26.6280	26.4340	39.9707	113.2830
0.6	12.3319	10.9761	24.9414	24.1006	37.8952	86.0395
0.7	11.1869	8.7281	22.9934	21.9300	34.8048	64.9554
0.8	10.1374	6.7638	20.0853	19.9020	30.4590	46.1888
0.9	9.2395	5.3564	17.2028	18.1922	26.3987	33.4056
1	8.4151	4.1627	10.3199	16.5846	22.5862	23.6264

Comparison between PSNR values for USI

COMPARISION TABLE. 4

Noise	Mean filter	Median filter	Adaptive median	Spatial adaptive mask	Adaptive spatial mask filter	Propose
0.1	455.6478	46.8527	9.5481	0.0040	0.0040	1.5259e-04
0.2	831.9798	168.9111	27.9547	0.0040	0.0040	1.5259e-04
0.3	1.3739e+03	487.1017	46.7915	0.0040	0.0040	1.5259e-04
0.4	2.0349e+03	1.2410e+03	101.5969	0.0040	0.0040	1.5259e-04
0.5	2.8764e+03	2.7088e+03	141.3439	0.0040	0.0040	1.5259e-04
0.6	3.8009e+03	5.1936e+03	208.4220	0.0040	0.0040	0.9924
0.7	4.9476e+03	8.7151e+03	326.3922	0.0040	0.0040	0.9924
0.8	6.3000e+03	1.3699e+04	637.6089	0.0040	0.0040	0.9924
0.9	7.7469e+03	1.8943e+04	1.2382e+03	0.0040	0.0040	1.5259e-04
1	9.3663e+03	2.4935e+04	6.0408e+03	0.0040	0.0040	0.9924

Comparison between MSE values for USI

The above comparison results shows the advancement of the proposed work in terms of increased PSNR values and lessening in the MSE values

V. CONCLUSION

For better preserving the edge and texture areas, an improved median filtering scheme has been advised in this work. This learning offers novel proficient Hybrid median filtration procedure having improved PSNR & MSE noise variance ranging from 0.1 to 1.

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