



An Improved Median Filter Using Decision Based Switching Filter

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Abstract— Images plays vital role in our daily life. Noise is one of the important limitation in digital image processing. Noise is basically the type of unwanted disturbance in the image. A lot study is made so outlying to diminish or confiscate noise from digital images. Most of the filter fails when the noise density is very high. This paper proposes improved modified decision based median filter which is capable of removing noise of very high density. The simulated results preserve edges than available method. The filter works when the pixels are having value 0 or 255 represents pepper noise and 255 represents salt noise. The proposed algorithm implemented over the MATLAB shows that 77.56% noise removals can be done which is higher as compared to the exiting algorithm or filter used so far.

Keywords— Digital images, Salt and pepper noise, Median filter, Global median filter

I. INTRODUCTION

In image processing reduction and reinstatement of picture is likely to improve the qualitative examination of a representation and the presentation criterion of quantitative picture examination technique Digital picture is tending to a diversity of sound which affects the class of icon. The major reason of de-noising the representation is toward return the feature of unique figure as a great deal as potential. The criterion of the sound taking away crisis depends on the sound kind by which the picture is undignified. In the ground of reducing the figure clatter quite a few type of linear and nonlinear filter technique have been planned dissimilar move toward decrease of sound and icon improvement [1] have been measured, every of which has their own restriction and compensation.

Picture de-noising is a essential icon giving out job i. e. as a procedure itself as fine as a module in extra process There are a lot of conduct to de-noise an picture or a locate of facts and process exist. The significant belonging of a good figure denoising representation is that it should entirely take away sound as distant as probable as well as defend limits. Usually, there are two types of model i. e. linear model and non-linear model. Normally, linear model are use. The remuneration of linear icon remove model is the rate and the boundaries of the linear model is, the model are not clever to defend limits of the descriptions in a well-organized approach i. e. the ends, which are known as discontinuities in the picture, are muddy away. On the other hand, Non-linear model [2] can grip limits in a great deal improved method than linear model.

II. RELATED WORK

Modified Decision Based Unsymmetrical Trimmed Median Filter (MDBUTMF) algorithm defines which give well again presentation in contrast with accessible sound taking away algorithms in conditions of PSNR and IEF. The routine of the algorithm has been experienced at dissimilar sound density on together gray-scale and shade descriptions. Still at elevated sound thickness level the MDBUTMF give improved fallout in contrast with extra offered algorithms. Equally diagram and quantitative consequences are established. The algorithm is successful for salty and interrupt sound exclusion in descriptions at elevated sound density. Development of a loud picture is required duty in digital image processing [2]. Filter technique are separated into two part linear and non-linear technique. After study linear and non-linear filter each of have borders and reward. Projected a filter which is more useful in restore the similes dishonoured with fixed-value wish sound [3]. As the planned clean is computationally easy, the return time is earlier. This sieve find application in eliminating noise from various scanning images, used in the study of surface morphology, because these images are invariably degraded by fixed value impulse noise. Just now devise sound sieve namely, Adaptive Two-Stage Median Filter (ATSM) to denoise the imagery dishonoured by fixed-value desire racket. The act of the projected strain is prove to be enhanced in terms of Peak Signal-to-Noise relation and being image awareness [4]. This strain is capable in denoising the extremely corrupted picture. A new decision-based algorithm for re-establishment of descriptions that are very dishonoured by wish racket. The new algorithm shows considerably enhanced icon class than a typical medium pass through a filter and a range of nonlinear filter. The future process, dissimilar other nonlinear filter, remove only dishonoured pixel by the medium value or by its adjacent pixel value [5]. The fresh process which introduce the idea of exchange of earsplittingly pixels by linear forecast previous to opinion. A story simplify linear analyst is residential for this reason. The aim of the method and algorithm is the exclusion of high-density salt and pepper sound in picture [6]. A new algorithm to take away high-density salt and pepper noise using adapted pure organization technique. The new

algorithm has inferior addition occasion when compare to extra average algorithms. Consequences of the algorithm are compare with various existing algorithms and it is prove that the new scheme has improved illustration exterior and quantitative events at senior sound density[7].A mixture of filter technique for taking away of Gaussian sound from medicinal similes. The presentation of Gaussian blast remove mixture filter technique is calculated using quantitative routine procedures such as RMSE and PSNR. The new fallout indicate that the Hybrid Max Filter performs extensively improved than many other accessible technique and it gives the best fallout after succeeding iterations [8]. The way is easy and effortless to realize as witch medium filter incorporate with a controlling desire racket discovery process for successfully denoising really corrupted picture [9]. To decide whether the existing pixel is corrupted, the algorithm first classify the pixels of a contained transom, centring on the existing pixel, into three groups-lower strength inclination racket, pure pixels, and senior strength desire racket. A scheme to take away brackish & sprinkle, Gaussian and spoil clatter from mix descriptions using medium sieve, comfortable medium strain, wiener, and centre weighted median and averaging filter [10]. The routine of the diverse filter with the functional noise using mix similes are compare and analyse according to PSNR value.

III. PROBLEM FORMULATION

A. Problems in existing Work

Filtering is basically done in order to remove noise from an image noise effects the quality of an image noise may be define as the unwanted signal in an image. Several nonlinear filter has been projected for the renovation of images containing salt and pepper. Most of the existing research has been focus on removing an image having low density. but the filters fails when the noise density is high The improved Modified Decision Based Median Filter algorithm removes impulse noise at high noise density and gives better Peak Signal-to-Noise Ratio (PSNR) and root mean square(RMS).

B. Problem Definition

Elimination of noise in an image is a very vital assignment. Denoising finds wide applications in several fields of image processing. Image Denoising is one of the most important tasks which is to be performed before segmentation, texture analysis. The basic idea behind denoising is to remove the noise from an image and also preserve the visual quality of image. The purpose of filtering is also preserve the edge details. In the present work effort are made to remove impulse noise (salt and pepper noise).impulse noise occurs in an image during image acquisition and transmission. The proposed method will effectively remove noise using decision based median technique and produce better quality image.

IV. EXPERIMENTAL SETUP AND PROPOSED ALGORITHM

A. Proposed Algorithm

This section consists proposed algorithm's steps. It has given the different steps which are required to implement the proposed algorithm. The main difference here is to use improved modified Median Filter to reduce the effect of the salt and pepper noise in efficient manner.

Step 1: Select image from computer memory into current program.

Step 2: Select the dimension size of an image.

Step 3: Repeat the following steps until end of file is not obtained.

Step 4: Collect all the pixels from mask.

Step 5: Check whether pixel values 0 or 255 are present or not.

Step 6: Eliminate all pixel values 0 or 255 and collect the remaining pixels.

Step 7: Sort all the remaining pixels and find the median.

Step 8: Obtain the current value of median and apply on centre pixel.

Step 9: Move filter on each pixels of an image.

Step 10: When all the corrupted pixels are removed we will obtain the filtered image.

V. EXPERIMENTAL SET-UP

In order to implement the proposed algorithm; design and implementation is done in MATLAB using image processing toolbox. In order to do cross validation the proposed algorithm is compared with the existing standard median filter and relaxed median filter. Table 1 is showing the various images which are used in this research work. Images are given along with their format and size. All the images are of different kind and also the filtering evaluation is different for each image.

Table I:Images Table

IMAGE NAME	FORMAT
Image 1	.jpg
Image 2	.jpg
Image 3	.jpg
Image 4	.jpg
Image 5	.jpg

VI. RESULTS

Figure 1 has shown the input image which is passed to the model.



Fig.1 Input image

Figure 2 has shown the noisy image with density = 8. It is clearly shown that the noise has degraded the visibility of the image.



Fig.2 Noisy image

Figure 3 has shown the filtered image using the traditional median filtered image. It is clearly shown that the image is somehow filtered but has not shown the accurate results.



Fig.3 Median filtered image

Figure 4 has shown that the noise has been reduced using the sorted switching median filter but results are not much effective.



Fig.4 sorted switching median filtered image

Figure 5 has shown that the results are quite effective and has much more better results than the available methods. Thus the proposed algorithm has shown quite significant improvement over the available methods.



Fig.5 Proposed algorithm's filtered image

VII. PERFORMANCE EVALUATION

Table 2 and Figure 6 are showing the comparative analysis of the Mean square error (MSE). As MSE need to minimize; so our goal is to reduce them MSE as much as possible. Table 2 and Figure 4 are clearly shown that MSE is less in our case therefore proposed algorithm is providing better results.

Table II: MSE Evaluation Table

IMAGE	NOISY IMAGE	MEDIAN FILTER	SSMF	GMF
Image1	15523	10480	695	521
Image2	17543	11867	445	324
Image3	17702	11844	479	339
Image4	16088	10587	779	665
Image5	15753	10479	1277	1093

Table 2 MSE evaluation table

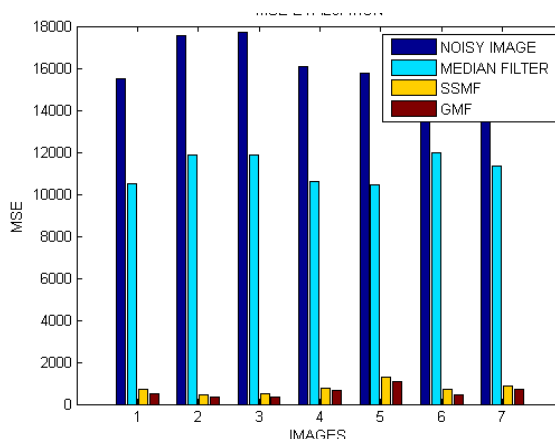


Fig.6 MSE Evaluation

Table 3 and Figure 7 is showing the comparative analysis of the Peak Signal to Noise Ratio (PSNR). As PSNR need to be maximized; so our goal is to increase PSNR as much as possible. Table 3 and Figure 6 is clearly shown that PSNR is maximum in our case therefore proposed algorithm is providing better results.

Table III : Peak signal to Noise Ratio

IMAGE	NOISY IMAGE	MEDIAN FILTER	SSMF	GMF
Image1	6.2210	7.9272	19.7110	19.8636
Image2	5.6898	7.3874	21.6472	22.4021
Image3	5.6506	7.3958	21.3274	21.7062
Image4	6.0658	7.8831	779	665
Image5	6.1572	7.9276	17.0689	17.3644
Image6	5.6710	7.3539	19.7486	20.8069
Image7	5.8769	7.5816	18.8366	18.9768

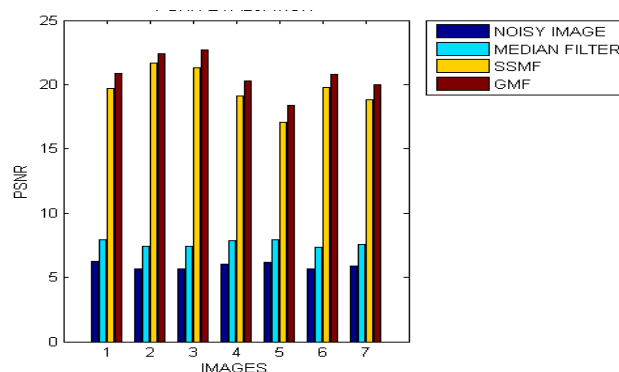


Fig.7 PSNR Evaluation

VIII. CONCLUSION AND FUTURE WORK

Filtering may be defined as a process of removing noise from an image in order to recover the original image. Noise may be defined as the unwanted signal in an image. Several nonlinear filter has been proposed for the restoration of images contaminated by salt and pepper. The Improved Modified Decision Based Switching Median Filter algorithm removes impulse noise at high noise density and gives better Peak Signal-to-Noise Ratio (PSNR) this paper has proposed a new improved median filter which has ability to reduce the high density of the noise and also when image is noise free. The proposed method has also preserves the edges than available methods. The proposed method has been designed and implemented in MATLAB using image processing toolbox. Different kind of the images has been taken for experimental purpose. Proportion's study has shown significant improvement of the proposed algorithm over the available methods. The proposed method uses the global median filter over seven different image shows 77.56% noise removal as compared to the other filter or existing method.

In near future we will evaluate the swiftness of the proposed algorithm. in this work no measure is selected which has ability to measure the edge preserving value so in near future we will try to evaluate edge preservation performance using some standard formula for the same

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