

An Advanced Technique for Removal Of Salt & Pepper Noise In Images

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ABSTRACT: Transmission of images are overcome channels, Due to unwanted communication the salt and pepper noise is occur in images. The word salt and pepper noise is also speaks out a Impulse noise. The filtering mainly used for removal of impulse noise or salt and pepper noise for noise free images and fully recovered by minimum signal distortion also uncorrupted the images. For best solutions of removal of salt and pepper noise is a nonlinear digital filters which is based on order statistics of median filter. The Median filters are remove noisy signal and unwanted signals without damaging the corners .Median filter are operates in low densities but not in higher densities because at higher the image are blurred and damage the image. The filtering leaves the uncorrupted pixels and accepts the corrupted pixel. Median filter is applied to image unconditionally to practiced of conventional schemes for alert the intensities of remove the noisy signal from image then the results between the corrupted and uncorrupted pixels are prior to applying nonlinear filtering is highly desirable in images.

The process of "Adaptive Median "filter is to identifies the noisy images or pixels and then remove the noisy pixels and replace them at same position by using the median filters or its variants, where the remaining are same or unchanged. The Adaptive median filter is best for removal of noisy pixels at low level. But at high level noise the adaptive median filter is provide a large Window size it is not to fit the pixel. The Adaptive median filter is also known as "switching" and "decision based" system. The existing system are Robust Estimation Algorithm (REA), Adaptive Median Filter (AMF), Standard Median Filter(SMF), it shows best performances at low noise level and at high noise level bad. A new Weighted Median Filter (WMF) is best for high noise level is an proposed.

KEYWORDS:- Standard Median Filter, Adaptive Median Filter, DBA, REA, MDBUTMF, Impulse Noise, salt and pepper noise , switching filter, noise reduction.

I INTRODUCTION

The images which are corrupted by impulse or undesirable random variations in intensity values called noise. The images are corrupted by where the images are stored at default memory location in system of hardware & the images are damage by a noisy transmission channel. Digital images are affected by impulse noise where the camera sensors are malfunctioning. Many algorithms are proposed for removal of salt and pepper noise. The fundamental problem for removal of salt and pepper noise in images is preserving the features and processing. To remove the impulse noise is to process the segmentation carried out and edge detection. Dynamic range is a maximum and minimum value it is taken from the images of salt and pepper noise. For removal of

salt and pepper noise widely used nonlinear filter is a standard median filter (SMF).

However, the Weighted median (WM) and recursive weighted median (RWM), center weighted median (CWM) derivations are implemented typically across an image. It alerts the noise pixels and executes the blurred image. To remove the noisy on noise free pixels the median filters and impulse detector are used. In this paper, an advanced technique and simple method to remove salt-and-pepper noise is proposed. In this method, noise free pixels are kept same, noise pixels are changed by filter operation.

In the images, the window size is 3X3 and 5X5 where the noise and noise free pixels are

within the window. It requires a only one original uncorrupted image as data set. The median value or other values are not correct choice of noise pixel replacement. The non-noise original image are explained later and the output of filter is based on the equation of the system $X=A^{-1}B$, it's not require a threshold parameters. The proposed method is an effectively for removal of noise and preserving good details than other existing methods. The proposed system is fast and removes the noise level at high as 97%. This paper outline as fallows, the review of this paper is given in detailed of work in section II. The proposed system of this technique is given in section III. The results and implementation of paper comparison is providing at section IV. Finally, section V includes conclusions.

II PREVIOUS APPROACHES

There are many proposed systems of median filters for remove the salt and pepper noise in images. The "weighted median filter (WMF) is proposed by chang-you et al for remove salt and pepper noise in images. The process of weighted median is takes the pixel noise and comparing the block uniformity of 3x3 window with one entire image and then it's adjusts the size for filtering according through number of points in windows. Further, Toh and Isa has proposed the two stage noise adaptive fuzzy switching median (NAFSM) this filter detection of salt and pepper removal. To identify the noise pixels the detection of histogram of corrupted image is used. Haidi et al proposed the technique for removal of salt and pepper noise in images. It is a hybrid method of adaptive median filter, the approximate local noise density where the method adaptive median changes the window size of the median filter.

In addition, K.S.Srinivasan and D.Ebenezer have proposed a restoration of images where they are corrupted by salt and pepper noise it is an technique of decision based algorithm (DBA). This technique is good for image quality rather than standard median filter (SMF), threshold decomposition filter (TDF), recursive nonlinear filter, and adaptive median filters (AMF). It process, where the corrupted images are taken first and replace them without changing the uncorrupted.

The detection of noise free pixels and noisy pixels are checking the value of processed pixels values lies between minimum and maximum values in occurs within window of selected. The dynamic ranges (0, 255) lies between the maximum and minimum for salt and pepper noise pixels. When the values are lies between the (0, 255) then it is an uncorrupted pixels and remaining pixels are same. If the dynamic range is not lies between (0, 255) then it is an noisy pixel. Then it is replaced by the neighborhood values or median values of window. Furthermore, Cangju Xing was proposed a removal of impulses noise in heavy .This technique includes the three steps method. In the first step, the noise pixels are distinguished from the signal pixels; then set initial values for noise pixels; finally, compute the output result and the main difference of other switch type filters is the means to change values of noisy pixels.

Further, the proposed modified decision based unsymmetrical trimmed median filter (MDBUTMF) is used to remove the impulse noise in images at highly corrupted. This modified decision based unsymmetrical trimmed median filter (MDBUTMF) is replaces the noisy pixel by trimmed median value when the selected window range is (0, 255) are present.

Where all the values of pixel 0's and 255's then the noise pixel is replaced by mean value of all the elements present in the selected window.

III PROPOSED APPROACH

We proposed weighted median filter (WMF), it is smoothers for robust non-parametric regression in general. This method is an proposed to allows the remove sequences of outlying and it preserve the discontinuities (shifts) in underlying regression function (the signal) it is in the presence of local linear trends and it is suitable for reduces the bias of arising from nonlinearities where the weighting of the observations according to their distances in the design space. It allows the improving efficiency of (un-weighted) repeated median filters which using the high bandwidths, for keeping the properties for distinguishing between long-term shifts and sequences.

To determine the noise points of images are provides an important basis for the classification of image pixels, the first step of

weighted algorithm filtering is the important step. There are many different ways to determine the noisy points. A 3x3 window size of discrete is used for determine the noise by calculating its difference between the average gray scale value of all pixels. The comparison between the difference of given threshold is within the central pixel and given window.

Where the noise point is considered as greater than threshold value in pixels and non-noise point is considered as lower than threshold value in pixel. After determining the size and noise of filtering window, the image is divided into non-noise points and noise points. The new weighted median filter remove the noise points, but the gray values are reserved and kept from filtering for non-noise points. According to the weighted median filter method, the gray value of pixels of filtering window to that of central pixel, then the higher the weighted value and then result are obtained.

It removes the noise before filtering to avoid the negative impact of noise on calculating the filtering value and get the best filtering result. This paper adopts the following classical weight function when calculating the weighted coefficient.

$$y(x) = \frac{1}{e^{|x|}}$$

Here x denotes the difference value between and the central value of non-noise points and the gray value of pixel of filtering window. Here easy to this function corresponds to the condition of weight selecting. Assuming pixel point (m, n) to be noise point, $FW_{m,n}$ to be the filtering window size, the process of calculating the weighted coefficients is as follows:

Calculate the central pixel value of non-noise points in the filtering window:-

$$\text{Median}(FW_{m,n}) = \text{Mid}\{f(m+s, n+t)\}.$$

Here $s, t \in [-1, 1]$,

and pixel point $(m+s, n+t)$ is the non-noise point in the filtering window.

Calculate the sum of the weighted coefficients of the non-noise points $(m+s, n+t)$:-

$$\text{sum} = \sum_{s=-1}^1 \sum_{t=-1}^1 \frac{1}{e^{|\text{Median}(FW_{m,n}) - f(m+s, n+t)|}}$$

Calculate the weighted coefficient of the pixel point $(m+s, n+t)$:-

$$\text{Weight}(m+s, n+t) = \frac{1}{e^{|\text{Median}(FW_{m,n}) - f(m+s, n+t)|} \times \text{Sum}}$$

Finally, conduct weighted median filtering to the center pixel point (m, n) within filtering window, the corresponding gray value after noise points are filtered is

$$g(m, n) = \sum_{s=-1}^1 \sum_{t=-1}^1 f(m+s, n+t) \times \text{Weight}(m+s, n+t).$$

Then output result of the weighted filter is got then it is used to replace the gray value $f(m, n)$ of a noise point (m, n) by the following rules: If the inequality $\text{Min}(PM \times N) < g(m, n) < \text{Max}(PM \times N)$ is true, then $f(m, n)$ is equal to $g(m, n)$; Else if n is equal to 1, then $f(m, n)$ is equal to $f(m-1, 1)$; otherwise, $f(m, n)$ is equal to $f(m, n-1)$.

Step (2) ensures that the output value $g(m, n)$ of filter could not produce new noise points when the weighted central value $f(m, n)$ is equal to $\text{Min}(PM \times N)$ or $\text{Max}(PM \times N)$. So the value $f(m, n)$ is replaced by the value $f(m, n-1)$ and the value $f(m, 1)$ of a line by the value $f(m-1, 1)$. Then the average gray value of the whole image is calculated as follows:

Figure

IV EXPERIMENTAL RESULTS

Finally the improved PSNR image will be shown in the below figure. Noisy image & all filter resulted images are described with their values in the below Table 1.

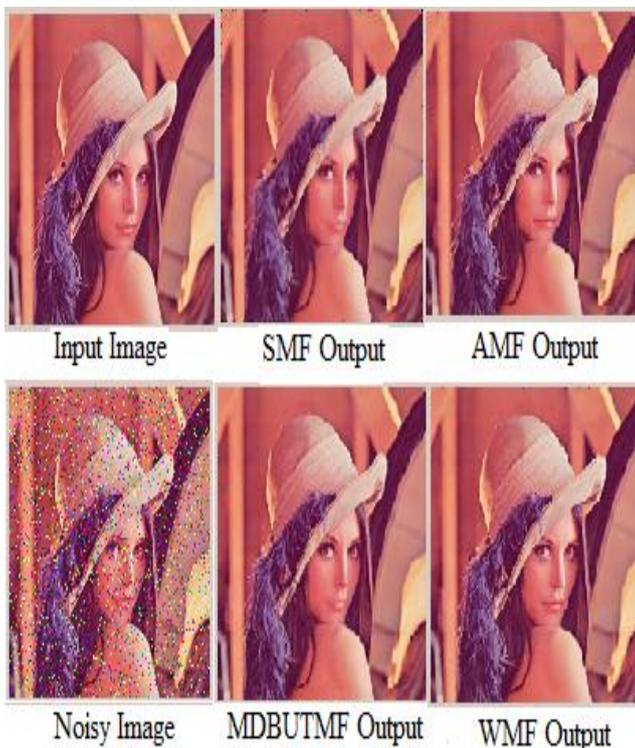


Figure 1: Noise Corrupted & Result Images

METHOD NAME	PSNR	MSE
SMF	35.6792	17.6396
AMF	40.3887	5.96434
MDBUTMF	40.6099	5.9204
WMF	43.3618	3.01575

Table 1: Comparing of All Filter Results

V CONCLUSION:

In this paper, a new weighted median filter (WMF) algorithm is proposed to remove noise in gray and color images which gives best performance in comparison with SMF, AMF and other existing noise removal algorithms in terms of PSNR and MSE. These filters are known for capability to remove salt and pepper noise in image and preserve the shape. The detection of noise process between corrupted pixels and the uncorrupted pixels prior to applying the non-linear filtering is highly desirable to protect the signal details of non-noise pixels.

The performance of the weighted median filter algorithm has been tested at low, medium and high noise densities on both gray-scales of images. When compare to existing algorithms the weighted median filter (WMF) gives better results even at high noise density levels. The proposed weighted median filter algorithm is effective for impulses noise removal in images at high noise densities.

In this project, we have presented a new efficient multiple thresholds switching filter the decision-based filter, for restoration image. Because the new salt and pepper noise detection mechanism can accurately tell where noise is, only the noise-corrupted pixels are replaced with central noise-free mean value ordered. As a result, the restored images can preserve and edges cannot damage in the image while effectively suppressing salt and pepper noise. The results of project is included demonstrated that the proposed filter significantly outperforms a number of well-accepted weighted median filters.

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