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PERFORMANCE ANALYSIS OF WEIGHTED MEDIAN FILTER TECHNIQUE FOR HIGH DENSITY SALT AND PEPPER NOISE REMOVAL

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ABSTRACT:

In the Transmission of pictures over channels, pictures area unit corrupted by salt and pepper noise, as a result of faulty communications. Salt and Pepper noise is additionally stated as Impulse noise. the target of filtering is to get rid of the impulses so the noise free image is absolutely recovered with minimum signal distortion. The known and most generally used nonlinear digital filters, supported order statistics area unit median filters. Median filters area unit known for his or her capability to get rid of impulse noise while not damaging the sides. Median filters area unit known for his or her capability to get rid of impulse noise yet as preserve the sides. Adaptive Median may be a "decision-based" or "switching" filter that 1st identifies potential shrie pixels and so replaces them mistreatment the median filter or its variants, whereas exploit all different pixels unchanged. This filter is sweet at detective work noise even at a high amplitude. The adaptive structure of this filter ensures that almost all of the impulse noises area unit detected even at a high amplitude providing the Window size is giant enough. the present nonlinear filter like normal Median Filter (SMF), adaptive Median Filter (AMF), call based mostly formula (DBA) and sturdy Estimation formula (REA) shows higher results at low and medium noise densities. At high noise densities, their performance is poor. a brand new formula to get rid of high-density salt and pepper noise mistreatment changed sheer sorting methodology and Weighted Median Filter is planned.

Keywords:-Image, Noise, Filter Process.

1. INTRODUCTION:

Images square measure typically corrupted by impulse noises throughout acquisition and transmission. Supported the noise values, the noise may be classified because the easier-to-restore salt-and pepper noise and also the tougher random valued impulse noise. However, most of the median filters operate uniformly across the image and thus tend to modify both noise and noise-free pixels. Consequently, the effective removal of impulse often leads to images with blurred and distorted features. Ideally, the filtering should be applied only to corrupted pixels while leaving uncorrupted pixels intact. Applying median filter unconditionally across the entire image as practiced in the conventional schemes would inevitably alter the intensities and remove the signal details of uncorrupted pixels. Therefore, a noise-detection process to discriminate between uncorrupted pixels and the corrupted pixels prior to applying nonlinear filtering is highly desirable Adaptive Median is a "decision-based" or "switching" filter that first identifies possible noisy pixels and then replaces them using the median filter or its variants, while leaving all other pixels unchanged.

2. ENHANCEMENT:

Enhancement is a picture process filter that enhances the sting distinction of a picture or video in an endeavor to boost its acutance (apparent sharpness).The filter works by characteristic sharp edge boundaries within the image, like the sting between a subject matter and a background of a different color, and increasing the image distinction within the space directly round the edge. This has the result of making delicate bright and dark highlights on either aspect of any edges within the image, referred to as overshoot and undershoot, leading the sting to appear a lot of outlined once viewed from a typical viewing distance. It is quite easy, for example, to make an image lighter or darker, or to increase or decrease contrast. Advanced image enhancement software also supports many filters for altering images in various ways.

STANDARD MEDIAN FILTER:-

The median filter may be a nonlinear digital filtering technique, usually wont to take away noise. Such noise reduction may be a typical pre-processing step to boost the results of later process (for example, edge detection on AN image). Median filtering is extremely wide employed in digital image process as a result of, beneath bound conditions; it preserves edges whereas removing noise.

ADAPTIVE MEDIAN FILTER

Adaptive median filtering has been applied wide as a sophisticated technique compared with customary median filtering. The reconciling Median Filter performs abstraction process to work out that pixels in a picture are littered with impulse noise. The reconciling Median Filter classifies constituents as noise by scrutiny every pixel within the image to its encompassing neighbor pixels. The scale of the neighborhood is adjustable, still because the

threshold for the comparison. A constituent that's completely different from a majority of its neighbors, still as being not structurally aligned with those pixels to that it's similar, is labeled as impulse noise. These noise constituents square measure then replaced by the median pixel worth of the pixels within the neighborhood that have passed the noise labeling take a look at.

DECISION BASED ALGORITHM

In our approach median filter of adequate window size is employed for the detection of corrupted element. Absolutely the distinction between the element of interest and therefore the median filtered output is obtained and compared with the brink obtained from the minimum and most element values within the chosen window. A binary flag image is obtained with its values one for the corrupted pixels and zero for the uncorrupted pixels. The corrupted element values ar calculable for the new values victimization the median/mean filtering.

The corrupted pixels ar obtained once the binary flag image b(i,j) is 1. These elements ar replaced by the new calculable pixel worth victimization median filter for lesser noise densities or mean filter for higher noise densities. to search out the estimate, let the ascertained element be delineated as y(i,j) and therefore the variety of corrupted pixels within the window Wx i,j be "n." For illustration purpose, we have a tendency to assume that the corrupted pixels take values, xmax = 255 and xmin = zero. The pixels can also take alternative values within the intensity vary [0,255].

MODIFIED BASED UNSYMMETRIC TRIMMED MEDIAN FILTER

The planned changed call based mostly Un-symmetric cut Median Filter (MDBUTMF) rule processes the corrupted pictures by 1st detective work the impulse noise. The process element is checked whether or not it's abuzz or abuzz free. That is, if the process element lies between most and minimum grey level values then it's noise free element, it's left unchanged. If the process element takes the most or minimum grey level then it's abuzz element that is processed by MDBUTMF. Each and every pixel of the image is checked for the presence of salt and pepper noise.

WEIGHTED MEDIAN FILTER

We propose weighted repeated median filters and smoothers for robust non-parametric regression in general and for robust signal extraction from time series in particular. The projected strategies permit to get rid of far sequences and to preserve discontinuities (shifts) within the underlying regression perform (the signal) within the presence of native linear trends. Appropriate weight of the observations consistent with their distances within the style house reduces the bias arising from nonlinearities. It additionally permits up the potency of (un-weighted) continual median filters victimization larger bandwidths, keeping their properties for distinctive between outlier sequences and long shifts. Strong smoothers supported weighted L1-regression ar enclosed for the rationale of comparison. The determinative of the noise

points of the pictures, that provides a vital basis for the classification of image pixels, is that the beginning of filtering algorithmic program and is also the crucial step. There ar several strategies for determinative the noise points. A three 3× distinct window is employed to see the noise by conniving the distinction between the typical grey price of all the picture elements inside the window and therefore the central pixel, and creating a comparison between the distinction and a given threshold. The picture element whose distinction is bigger than the brink price is taken into account as noise purpose, otherwise non-noise purpose. however there ar 2 disadvantages for this method: the primary one is that the selection of threshold is extremely random, and if it's too massive, the noise filtering isn't clean whereas if it's too little, the image details are going to be broken to form the image fuzzy; the second disadvantage is that the brink, that may be a mounted price antecedently given and doesn't amendment within the filtering method, cannot really mirror the sensitivity of every picture element to the noise. A KXK window over the image is employed to seek out the most and minimum grey level. If the grey price of central picture element of the window is capable the most or minimum price, it's thought of because the noise purpose, otherwise the non-noise purpose. The disadvantage of this technique is that it takes the most and minimum grey price of the native window because the noise criterion. Though it's self adaptation to some extent, the noise points are going to be mistaken for non-noise points if the most and minimum noises don't seem to be truth noise points. The 2 strategies higher than ar integrated and combined with block uniformity. Once the block uniformity of the window is capable that of the full image, the picture element is taken into account as noise purpose, otherwise non noise purpose. The matter of this technique is that it doesn't rule out the noise points having been determined once conniving the block uniformity of the window. And therefore it's simple to mistake the sting frequency signal points as noise points, particularly once the noise density is high.

3. RESULT ANALYSIS:

Mean Square Error

In statistics, the **mean squared error (MSE)** of an estimator is one of many ways to quantify the difference between values implied by an estimator and the true values of the quantity being estimated.

$$MSE=\sum\sum [A(i,j)-B(i,j)]/mxn$$

A (i, j)-Input Image B (i, j)-Noisy Image

mxn= no of pixel values

Peak –Signal Noise Ratio

When the pixels are represented using 8 bits per sample, this is 255. More generally, when samples are represented using linear PCM with B bits per sample, MAX_I is 2^B-1. For color images with three RGB values per pixel, the definition of PSNR is the same except the MSE is the sum over all squared value differences divided by image size and by three. Alternately, for color images the image is converted to a different color

space and PSNR is reported against each channel of that color space

PSNR=20log10 (1/MSE)

4. CONCLUSION:

In our project, a new algorithm Weighted Median Filter is proposed which gives better performance in comparison with SMF, AMF,MDBUTMF and other existing noise removal algorithms in terms of PSNR and MSE. The performance of the algorithm has been tested at low, medium and high noise densities on both gray-scale and color images. Even at high noise density levels the WMF gives better results in comparison with other existing algorithms. Both visual and quantitative results are demonstrated. The proposed algorithm is effective for salt and pepper noise removal in images at high noise densities.

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Fig: 1 Results of different algorithms for Lena image.(A) input image,(B)noisy image,(c)SMF image,(D) AMF image,(E) MDBUTMF image,(F) Weighted Median Filter image.

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