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Restoration of Image Using DCT and Modified Decision Based Unsymmetrical Trimmed Median Filter

P.Harsha Vardhan Reddy, B.Karthik, Dr.T.V.U.Kiran Kumar

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P.Harsha Vardhan Reddy, PG/ECE Department, Bharath University, (e-mail: me.harshavardhan@gamil.com). Chennai, India, Mobile No 08885555581.
B.Karthik, Assistant Professor/ECE Department, Bharath University, Chennai, India, (e-mail: karthikguru33@gmail.com).
Dr.T.V.U.Kiran Kumar, Professor/ECE Department, Bharath University, Chennai, India.

Abstract—
Image reconstruction is the process of eliminating or removal of noise from a degraded image with an objective to recover the original image. Noise is a quality degradation factor that is measured as unwanted information present in the image. Several nonlinear filters have been proposed for the restoration of images contaminated by salt and pepper. The Modified Decision Based Un symmetric Trimmed Median Filter (MDBUTMF) algorithm removes impulse noise at high noise density and gives better Peak Signal-to-Noise Ratio (PSNR) and Edge preserving ratio values but by time complexity theory it is time consuming and also it does not preserve edges in the image. This paper has proposed a new improved relaxed 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 algorithm has also used DCT based compression to improve the speed of the proposed method. The proposed method has been designed and implemented in MATLAB using image processing toolbox. Different kinds of the images are taken to validate the performance of the proposed algorithms. Comparative analysis has shown significant improvement over the available methods.

Index Terms—
Salt and pepper noise; Median filter; Smoothing; Sharpening

I. INTRODUCTION

In image processing, noise reduction and restoration of image is expected to improve the qualitative

inspection of an image and the performance criteria of quantitative image analysis techniques. Digital image is inclined to a variety of noise which affects the quality of image. The main purpose of de-noising the image is to restore the detail of original image as much as possible. The criteria of the noise removal problem depend on the noise type by which the image is corrupting. In the field of reducing the image noise several types of linear and nonlinear filtering techniques have been proposed. Different approaches for reduction of noise and image enhancement [1] have been considered, each of which has their own limitation and advantages.

Image de-noising is a vital image processing task i. e. as a process itself as well as a component in other processes. Many ways to de-noise an image or a set of data and methods exists. The important property of a good image denoising model is that it should completely remove noise as far as possible as well as preserve edges. Traditionally, there are two types of models i. e. linear model and non-liner model. Generally, linear models are used. The benefits of linear noise removing models is the speed and the limitations of the linear models is, the models are not able to preserve edges of the images in a efficient manner i. e. the edges, which are recognized as discontinuities in the image, are smeared out. On the other hand, Non-linear models [2] can handle edges in a much better way than linear models.

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II. Problem Formulation

A. Problems in existing Work

Image restoration is the process of eliminating or reducing noise from a degraded image with an objective to recover, the original image. Noise is a quality degradation factor that is measured as unwanted/unrelated information present in the image. Several nonlinear filters have been proposed for the restoration of images contaminated by salt and pepper. The Modified Decision Based Unsymmetrical Trimmed Median Filter (MDBUTMF) algorithm removes impulse noise at high noise density and gives better Peak Signal-to-Noise Ratio (PSNR) and Image Enhancement Factor (IEF) values but by time complexity theory it is time consuming and also it does not preserve edges in an image.

B. Problem Definition

Removal of noise in an image is a very important task. Denoising finds extensive applications in many fields of image processing. Image Denoising is an important pre-processing task before further processing of image like segmentation, feature extraction, texture analysis etc. The purpose of denoising is to remove the noise while retaining the edges and other detailed features as much as possible. In the present work effort are made to remove impulse noise(salt and pepper noise).Impulse noise frequently corrupts the images due to the limitations and defects in the process and/or media of acquisition and transmission. This noise gets distributed over the image in terms of non-correlated neighboring pixels. The proposed method will effectively remove noise using hybrid median technique and produce better quality image.

C. Justification of Problem

Image filtering is used in order to remove noises in images and improve the quality of images. The proposed method will decrease the time consumption by using the technique of DCT compression and also it suppresses the impulse noise with higher degree of edge preservation by combining the hybrid median filter and relaxed median filter. The combination of these two filters is possible as both of them are non linear spatial filters possessing the same category i.e. median filter and moreover both the filters produce best result in improving edges and preserving lines in image after filtering.

III. The JPEG Algorithm

The Joint Photographic Experts Group developed the JPEG algorithm in the late 1980's and early 1990's. They developed this new algorithm to address the problems of that era, specifically the fact that consumer-level computers had enough processing power to manipulate and display full color photographs. However, full color photographs required a tremendous amount of bandwidth when transferred over a network connection, and required just as much space to store a local copy of the image. Other compression techniques had major tradeoffs. They had either very low amounts of compression, or major data loss in the image. Thus, the JPEG algorithm was created to compress photographs with minimal data loss and high compression ratios.

IV. Flow Chart

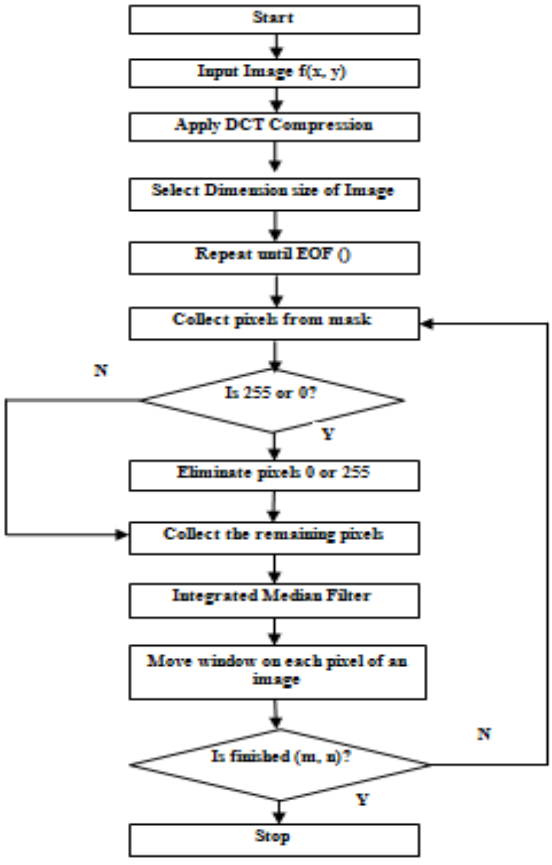

Fig 1. Flow Chart of Proposed Method

Step 1: Select image from computer memory into current program. Any given digital image is

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represented as an array size M*N pixels.
Step 2: Apply DCT compression which will help in reducing number of bits in an image.
Step 3: Select the dimension size of an image in order to calculate the values of pixel in a current image which will also help in obtaining end of file.
Step 4: Repeat the following steps until all the pixels of an image is not checked and end of file is not conquered.
Step 5: Collect all the pixels from mask following different size 3*3, 5*5, 7*7 in order to obtain pixels values in a selected mask.
Step 6: Check whether value of center pixel is 0 which represent pepper noise or 255 which represent salt noise is present or not.
Step 7: Eliminate all pixel values 0 or 255 and collect the remaining pixels which are uncorrupted.
Step 8: Apply integrated median filter which is the combination of hybrid and relaxed median filter to calculate value of median of remaining pixels which will be used to replace center corrupted pixel in a mask.
Step 9: Move mask on each pixels of an image in order to remove all salt noise and pepper noise from current image.
Step 10: When all the corrupted pixels are removed we will obtain the filtered image.

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.

V. Experimental Results

Fig 2 has shown the input image which is passed to the simulation.

Fig 2 Input image

Fig 3 has shown the noisy image with density =.8. It is clearly shown that the noise has degrades the visibility of the image.

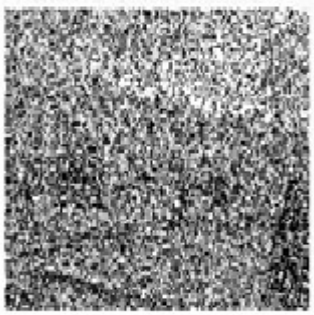

Fig 3 Noisy image

Fig 4 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 5 has shown that the noise has been reduced using the relaxed median filter but results are not much effective

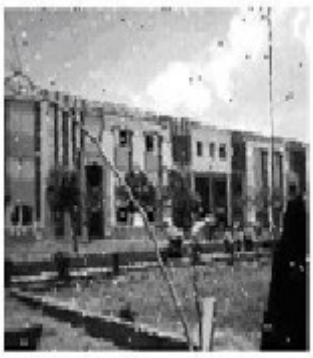

Fig 6 has shown that the results are quite effective and has much more better results than the available methods. Thus the proposed algorithm has shown quite significant improvement over the available methods

Fig 6 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. Fig 4 is clearly shown that MSE is less in our case therefore proposed algorithm is providing better results.

VI. CONCLUSION

Image restoration is the process of eliminating or reducing noise from a degraded image with an objective to recover, the original image. Noise is a quality degradation factor that is measured as unwanted/unrelated information present in the image. Several nonlinear filters have been proposed for the restoration of images contaminated by salt and pepper. The Modified Decision Based Un symmetric Trimmed Median Filter (MDBUTMF) algorithm removes impulse noise at high noise density and gives better Peak Signal-to-Noise Ratio (PSNR) and Edge preserving ratio values but by time complexity theory it is time consuming and also it does not preserve edges in the image. This paper has proposed a new improved relaxed 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 algorithm has also used DCT based compression to improve the speed. 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. Comparative analysis has shown significant improvement of the proposed algorithm over the available methods.

REFERENCES

[1] B Karthik, TVUK Kumar, MA Dorairangaswamy, E Logashanmugam, Removal of High Density Salt and Pepper Noise Through Modified Cascaded Filter, Middle East Journal of Scientific Research 20 (10), pp 1222-1228-2014.

[2] B Karthik, TVUK Kumar, Noise Removal Using Mixtures of Projected Gaussian Scale Mixtures, World Applied Sciences Journal 29 (8), pp-1039-1045, 2014.

[3] S. Esakkirajan, T. Veerakumar, Adabala N. Subramanyam, and C. H. PremChand. 2011 Removal of High Density Salt and Pepper Noise Through Modified Decision Based Unsymmetric Trimmed Median Filter.IEEE SIGNAL PROCESSING LETTERS, VOL. 18, NO. 5

[4] PriyankaKamboj, Versha Rani. 2013 Image Enhancement Using Hybrid Filtering Techniques. International Journal of Science and Research.Vol 2, No. 6, June 2013.

[5] Shanmugavadivu, EliahimJeevaraj. 2012 Laplace Equation based Adaptive Median Filter for Highly Corrupted Images. International Conference on Computer Communication and Informatics

[6] Shanmugavadivu P and EliahimJeevaraj P S. 2011 Fixed–Value Impulse Noise Suppression for Images using PDE based Adaptive Two-Stage Median Filter. ICCCET-11 (IEEE Explore), pp. 290-295.

[7] K. S. Srinivasan and D. Ebenezer. 2007 A new fast and efficient decision based algorithm for removal of high density impulse noise.IEEE Signal Process.Lett, vol. 14, no. 3, pp. 189–192

[8] V. Jayaraj and D. Ebenezer. 2010 A new switching-based median filtering scheme and algorithm for removal of high-density salt and pepper noise in image.EURASIP J. Adv. Signal Process.

[9] K. Aiswarya, V. Jayaraj, and D. Ebenezer. 2010 A new and efficient algorithm for the removal of high density salt and pepper noise in images and videos. Second Int. Conf. Computer Modeling and Simulation, pp. 409–413.

[10] GnanamballIlango and R. Marudhachalam. 2011 new hybrid filtering techniques for removal of Gaussian noise from medical images.ARPN Journal of Engineering and Applied Sciences.

[11] P. E. Ng and K. K. Ma. 2006 A switching median filter with boundary discriminative noise detection for extremely corrupted images. IEEE Trans. Image Process. vol. 15, no. 6, pp. 1506–1516

[12] Afrose. 2011 Relaxed Median Filter: A Better Noise Removal Filter for Compound Images. International Journal on Computer Science and Engineering (IJCSE) Vol. 4 No. 07