

REVIEW OF SALT AND PEPPER NOISE PRESENT WITHIN THE IMAGE DURING IMAGE COMPRESSION

¹Kavita Bains , ²Mrs. Taqdir

¹Student of MTECH(CSE) Regional Campus Guru Nanak Dev University

²Assistant Professor , Regional Campus Guru Nanak Dev University

Abstract

This paper conducts the analysis of salt and pepper noise present within the images. Because of this noise black and white pixels appear over the image. The noise will cause the image to be distorted. The impact of this noise is studied over the image. The mechanisms are also presented through which the impact of noise can be reduced. These types of noise are reduced using the concept of contra harmonic mean filter. This filter will be applied wither to the salt noise or pepper noise.

Keyword: Salt and Pepper, filter, contra harmonic filter, noise.

Introduction

The salt and pepper noise is one of the common types of noise which is present within the image. The image can be distorted through the noise. This noise can be minimized by the use of the filters. The most common type of noise reduction mechanism is filters. The median filter is commonly used for this purpose. The image enhancement mechanisms are used to remove the noise from the image. Noise can be generated from the independent sources or from the dependent sources. The independent sources do not depend upon the current image data. Hence distortion cannot be removed by adjustment in

the image data. The dependent noises will be affected by the adjustment in the image data. So it will be easy to rectify than the independent source of image distortion. The SNR(Signal to Noise Ratio) can be used in order to detect the noise present within the image.

$$SNR = \frac{\sigma_s}{\sigma_n} = \sqrt{\frac{\sigma_f^2}{\sigma_n^2} - 1}$$

All recorded noise of certain kind present within all the images is called detector noise. In case of salt and pepper noise spikes are produced within the image. These spikes have to be removed in the proposed paper. The detection mechanisms

could be many however the most efficient is median filters.

Salt and pepper noise

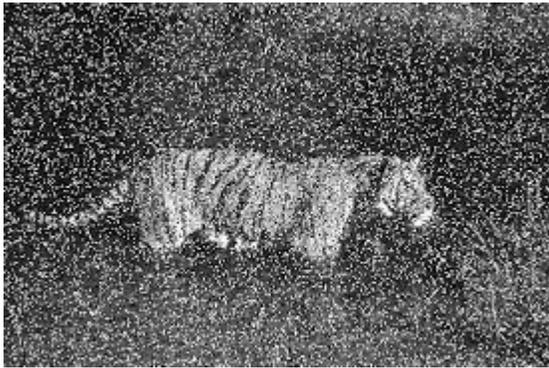


Fig 1

Median Filter

In image processing there should be some mechanism with the help of which noise can be reduced from the image. Median filter is one of such mechanism. It is a preprocessing step before the output is produced. The main task of the median filter is to run through the signal entry by entry. The replacement of current signal with the median of neighboring pixels will be made. The image having odd number of entries than the median is easy to define. If the image contains odd number of entries than the median will be difficult to calculate. Also median filters does not operate well if noise is high.

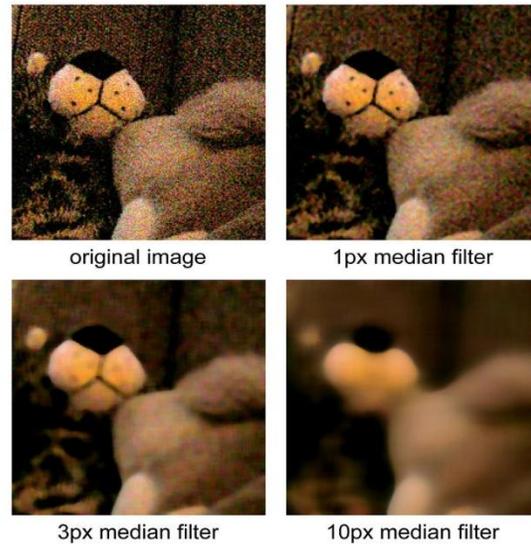


Fig 2

The Example of median filter will be as describe below

To demonstrate, using a window size of three with one entry immediately preceding and following each entry, a median filter will be applied to the following simple 1D signal:

$$x = [2 \ 80 \ 6 \ 3]$$

$$\begin{aligned} \text{So, the median filtered output signal } y \text{ will be:} \\ y[1] &= \text{Median}[2 \ 2 \ 80] = 2 \\ y[2] &= \text{Median}[2 \ 80 \ 6] = \text{Median}[2 \ 6 \ 80] = 6 \\ y[3] &= \text{Median}[80 \ 6 \ 3] = \text{Median}[3 \ 6 \ 80] = 6 \\ y[4] &= \text{Median}[6 \ 3 \ 3] = \text{Median}[3 \ 3 \ 6] = 3 \end{aligned}$$

$$\text{i.e. } y = [2 \ 6 \ 6 \ 3].$$

Related work

There is a lot of work which has been done in the area of detection and removal of noise present within the image. Salt and Pepper noise is one of the most common type of noise present within

the image. The noise from the image will be reduced by the use of median filter. Median filter is one of the mechanisms of image enhancement. The image enhancement mechanism will produce the enhanced images. The image enhancement will remove the spikes and hence clarity of the image will be introduced. The mechanisms which are followed in various papers will be described in this section. [1] In this paper salt and pepper noise is handled. Theory of imprinting is used in this case. The image restoration algorithm is used to remove noise from the image. [2] In this mean absolute gradient is used in order to enhance the image. The adaptive noise reduction scheme is presented in this case. The impulse noise is handled in this paper. [3] The image restoration technique is used in order to enhance the quality of the image. The selective arithmetic filtering is used in order to enhance the quality of the image. [4] This paper proposes a two-phase scheme for removing salt-and-pepper impulse noise. [4] In the first phase, an adaptive median filter is used to identify pixels which are likely to be contaminated by noise (noise candidates). [4] In the second phase, the image is restored using a specialized regularization method that applies only to those selected noise candidates. [4] In terms of edge preservation and noise

suppression, our restored images show a significant improvement compared to those restored by using just nonlinear filters or regularization methods only. This scheme can remove salt-and-pepper-noise with a noise level as high as 90%. [4] The concept of median filter is used in this case. The median filter is used to enhance the quality of the image. The noise which is handled is known as salt and pepper noise. The noise produces spikes within the image which is handled in this paper. [5] Noise detector is used in this case. The noise detector detects the salt and pepper noise. However nothing is suggested to recover from that noise.

Conclusion

Salt and pepper noise is one of the common type of noise present within the image. This kind of noise can be reduced by the use of median filter. But the problem with median filter is that it will operate well when noise is very high. So some modification in the future must be made in order to enhance median filter so that noise can be detected in the extreme conditions also.

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