

A New Filter for Improving the PSNR in Image Processing

Y.Muralimohanbabu¹, M.Lahithavarma², P.Bhavya³, M.Aravind⁴, K.Badrinath⁵

Professor¹, U.G.Student^{2,3,4,5}

Department of Electronics and Communication Engineering
SITAMS, Chittoor, Andhra Pradesh, India.

ABSTRACT: Proceeding with sufficient pictures of dull in lightning conditions using a handy camera is demanding. Suppose the camera is settled for a long time, the image is blurred due to the shaking of camera. If the image has noise and dark it is treated as short time, which has high camera gain. In this paper we are producing a high image quality by means of Peak Signal -To-Noise Ratio (PSNR). Our intension is to provide the accurate image which has blur and noise compared to original image. With the implementation of existing method i.e., Wiener filter, Mean filter, Median filter is compared with proposed method i.e., Lucy-Richardson, Regularized Filter and Inverse filter we got the output which is greater and accurate. To produce more sharp image & reduction of blur and noise we implement Inverse Filter which gives the accurate image quality after de-blurring.

Keywords: Inverse, gaussian blur, image processing, image deblurring.

I. INTRODUCTION

Image blurring is one of the most important distresses which simplify the quality of the image. Image blurring causes due to many different reasons i.e., camera misfocus, atmospheric problems and improper camera settings. Noise estimation can be especially difficult if the noise is spatially variant, for instance due to a dynamic scene or a camera rotation. The challenge is removing the noise to recover a noise-free image. Noise averages neighboring pixels and attenuates high frequency information of the scene.

So, the issue of healing noise-free image is ill-posed, and it needs to be addressed by deblurring systems or algorithms. Human visual systems are good at perceiving it. But the mechanism of this processing is not completely understood. Therefore, it is difficult arise metrics to estimate blur in images. They are many methods expanded for image processing to pass over image blurring issue [1]. Image blurring can be accomplished in different approaches. They are three types of filters of adding blurring to the image.

II. METHODOLOGY

There are so many approaches for the de-noising of an image. By using Lucy-Richardson algorithm, Regularized Filter, Blind Convolution method etc., by this we can improve the de-noising. In this paper we are using four types of methodologies by calculating the PSNR which provides the better improvement in the quality of an image which gives the approximate of the original image and it is the ratio between the max possible power of a signal & the power of noxious noise that influence the constancy of the description [4]. As many signals have a very effective range and it is normally expressed in terms of decibel scale

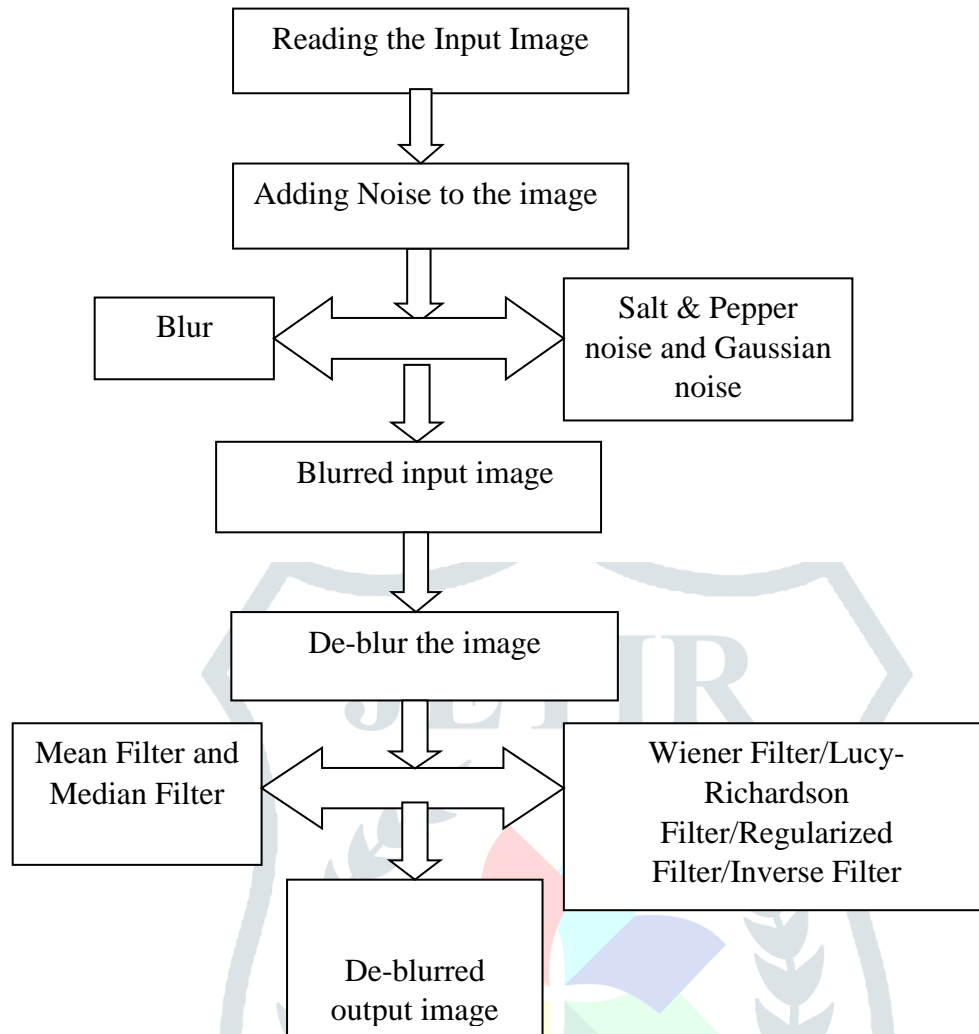


Fig 1: Generalized method of Image De-Noising Method

The four methodologies we are used in this paper are:

1. Wiener Filter
2. Lucy-Richardson
3. Regularized Filter and
4. Inverse Filter

1. WIENER FILTER

The Wiener filter minimizes the mean square error between the estimated random process and the desired process. This shows the usage of wiener deconvolution to de-blur the images, when Point Spread Function (PSF) & noise level are either know or estimated [3]. This is used to remove the blur& noise in a particular image. Wiener Filtering is a compressed approximation of the original image. Here we are using Salt and Pepper noise & Gaussian blur for the better and accurate of the restored image compared to degraded image.

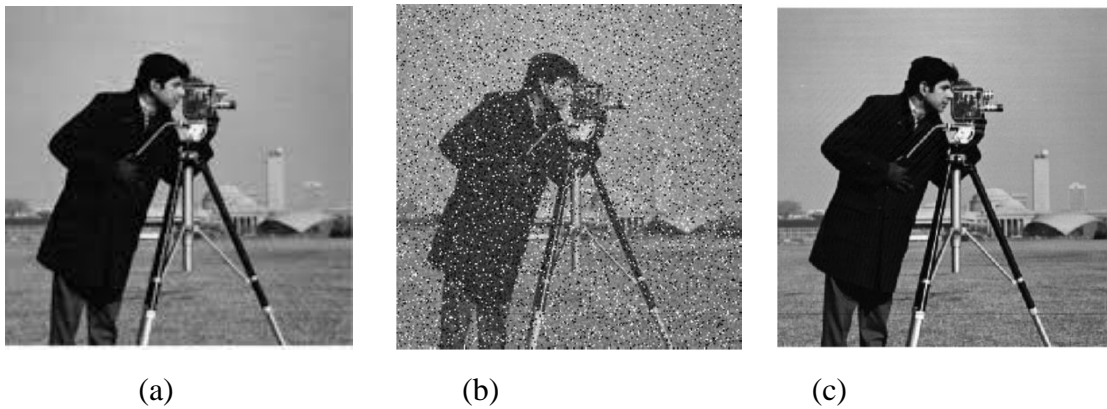


Fig 2: Removal of blur and noise in Cameraman image.

(a) Original image (b) Addition of Salt & Pepper noise and Gaussian Blur
(c) Restored image

2. LUCY-RICHARDSON

Lucy-Richardson filter is an insistent procedure for healing a primary image that has been blurred by PSF. Using the function “deconvlucy” it can de-blur an image using the accelerated, damped, Lucy-Richardson algorithm. It maximizing the similar restore image when lapped with the PSF is an example of the blurred image premise of Poisson noise statistics. It is effective, when it depends on PSF and additive noise to the image. In fig 3 it shows the output of this algorithm [2]. In this we simulate the blurred noise image by turning a Gaussian Filter PSF for an image using imfilter and then adding Gaussian noise to the blurred image using imnoise.

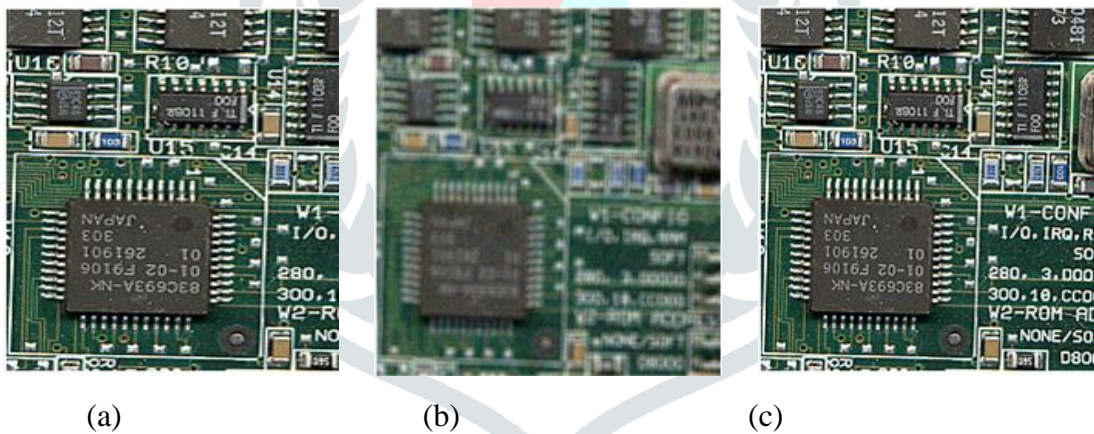


Fig 3: Restored output of a Board image

(a) Original image (b) Degraded Image (c) Restored image

3. REGULARIZED FILTER

Regularized filter uses the function “deconvreg” for the purpose of de-blurring an image and it is used effectively when little information is recognized about the addition of noise [5]. In this we simulate a blurred image by means of gaussian filter PSF with an image using imfilter and adding noise in the image by adding gaussian noise using imnoise for the blurred image.

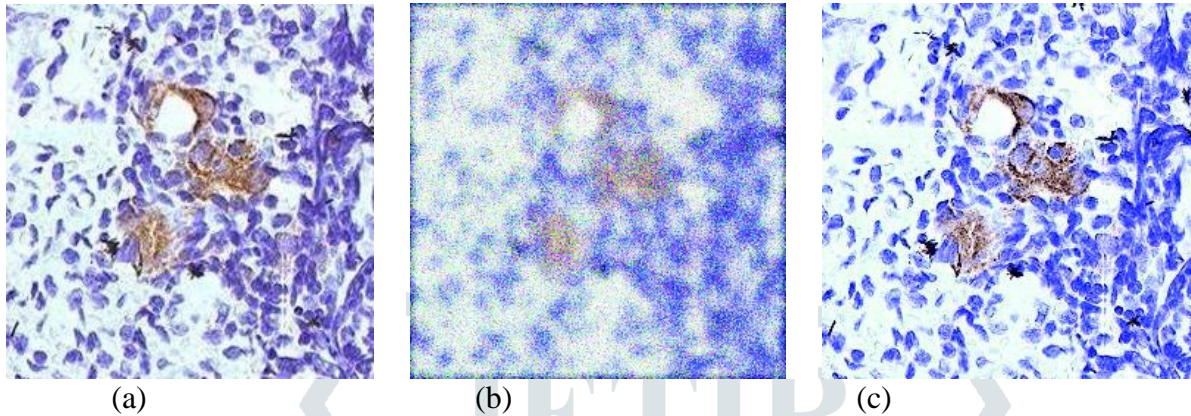


Fig 4: Image Restoration using regularized filter
(a) Original Image(b) Burred & noisy (c) Restored Image

4. INVERSE FILTER

Inverse filtering is the process which heals the input structure from the output and it is a technique used for the purpose of image restoration to get a retake image from the data of an image. The use of this restoration of an image is to find/heal the location without image misuse caused by the view of the camera setting.

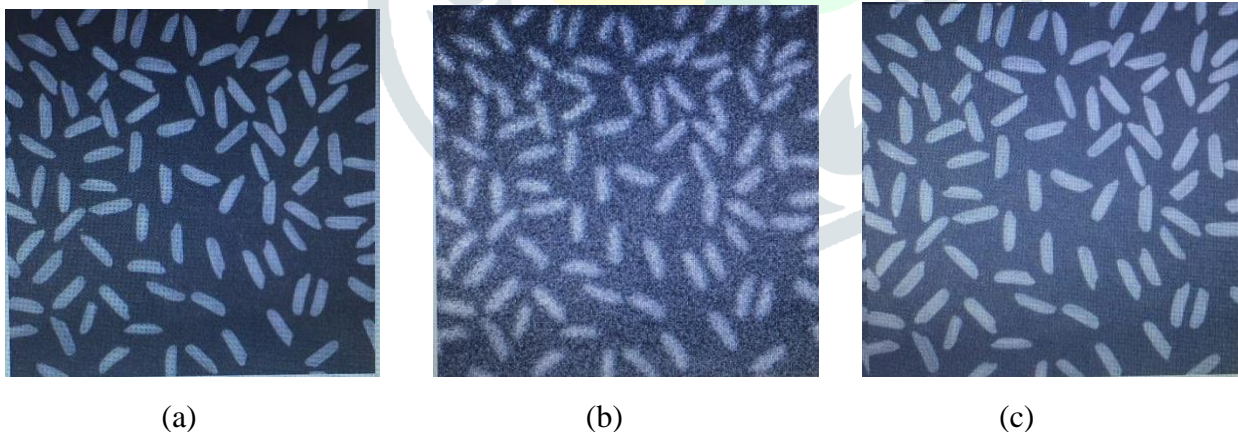


Fig 5: Restoration of Rice image
(a) Original image (b) degraded image (c) Restored image

III. RESULTS AND DISCUSSIONS

Cameraman.tif is taken as the input image. To make the input image as blurred and noisy image we used PSF with motion blur and noise variance V of 0.03 is added. Now the degraded image is deblurred by Wiener filter, Regularized filter, Lucy-Richardson filter & Inverse filter and their PSNR values are 17.02,21.63,24.05,26.21.Among these filters, Inverse filter performance is good with the accurate PSNR value

Table 1: Comparison of PSNR value for “Cameraman.tif”

S. no	Filters	PSNR
1.	Wiener filter	17.02
2.	Regularized filter	21.63
3.	Lucy-Richardson filter	24.05
4.	Inverse filter	26.21

Table 2: Comparison of PSNR value for “rice.png”

S. no	Filters	PSNR
1.	Wiener filter	18.52
2.	Regularized filter	20.8
3.	Lucy-Richardson filter	24.13
4.	Inverse filter	26.5

Rice.png is taken as the input image. To make the input image as blurred and noisy image we used PSF with motion blur and noise variance V of 0.03 is added. Now the degraded image is deblurred by Wiener filter, Regularized filter, Lucy-Richardson filter & Inverse filter and their PSNR values are 18.52,20.8,24.13,26.5. Among these filters, Inverse filter performance is good with the accurate PSNR value.

Table 3: Comparison of PSNR value for “board.tif”

S. no	Filters	PSNR
1.	Wiener filter	17.02
2.	Regularized filter	20.96
3.	Lucy-Richardson filter	23.02
4.	Inverse filter	27.05

Board.tif is taken as the input image. To make the input image as blurred and noisy image we used PSF with motion blur and noise variance V of 0.03 is added. Now the degraded image is deblurred by Wiener filter, Regularized filter, Lucy-Richardson filter & Inverse filter and their PSNR values are 17.02,20.96,23.02,27.05. Among these filters, Inverse filter performance is good with the accurate PSNR value.

Table 4: Comparison of PSNR value for “tissue.tif”

S. no	Filters	PSNR
1.	Wiener filter	17.52
2.	Regularized filter	25.14
3.	Lucy-Richardson filter	26.78
4.	Inverse filter	27.69

Tissue.tif is taken as the input image. To make the input image as blurred and noisy image we used PSF with motion blur and noise variance V of 0.03 is added. Now the degraded image is deblurred by Wiener filter, Regularized filter, Lucy-Richardson filter & Inverse filter and their PSNR values are 17.52, 25.14, 26.78, 27.69. Among these filters, Inverse filter performance is good with the accurate PSNR value.

IV. CONCLUSION

A number of methods have been developed by various researchers for image Deblurring or image restoration. Till now, image Deblurring is a demanding issue. Restoring the original image from blurred image using different filters such as Wiener filter, Lucy-Richardson filter, Regularized filter and Inverse filter each filter staging is different. Among all these filters Wiener performance is incoherent. By analyzing various methods, it is concluded that in different types of Deblurring methods inverse filter gave good performance. Its PSNR value is coherent as compared to other filters such as Wiener filter, Lucy-Richardson filter, & Regularized filter.

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