A Comparative Study on Blur Families and Their Algorithmic Applications Methods to Make An Image Restoration By Image Deblurring

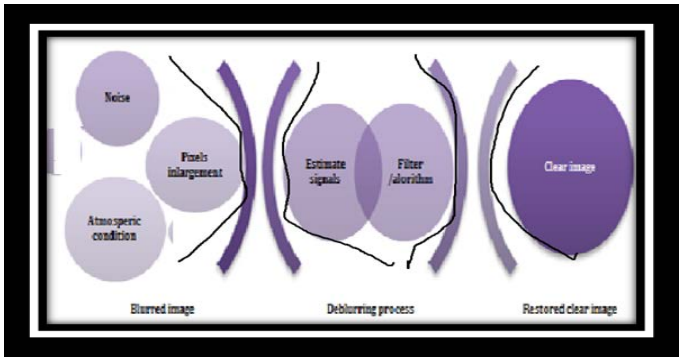
Vignesh R[1], Dr. Sivabalakrishnan M[2]
[1]*13PHD1138, EPT,SCSE, VIT University-Chennai Campus*
[2]*Associate Professor,SCSE, VIT University- Chennai Campus*

Abstract---The quality of an image is degraded by Gaussian blur, Bilateral blur, Box blur, CC Radial Blur, CC Radial Fast blur, CC Vector blur, Channel blur, Compound blur, Directional blur, Fast blur, Lens blur, Radial blur, Smart blur, Motion blur and Gaussian out -of-focus blur, this blur image is very tedious to understand the given content of an information in that particular image. Image deblurring and restoration is the most essential methods in the digital image processing, which is used to produce the sharp image by the method of mathematical derivative concepts. Image deblurring have an enlarge applications e.g. remove the motion blur, due to any camera get shake. There are many techniques that where proposed in this paper, we will examine various methods and techniques of deblurring. The analysis is done on the basis of performance, types of blur and PSNR (Peak to Signal Noise Ratio).

Keywords---Wiener Filter, Neural Network Approach, IterativeRichardson-LucyAlgorithm,Laplacian sharpening filters.

I. INTRODUCTION

A basic image pixels is 2562 to 65536 pixels and HD image has 5 to 10 million pixels.I,age was taken in the digital format,each image wahich contains group of pixel elements.These pixel elements are grid in the image.Each image pixel which hold some values.Image are obtained every day by photography to astronomy,remote sensing,medical imaging and microscopy.Unfortunately some image may end with a less or a more blurry.



This happened due to lot of interference in an environment as well as camera. Thedegradation of an image or blur of an image can be caused by many possibility like Gaussian blur, Bilateral blur, Boxblur, CC Radius blur, CC Radial Fast blur,CC Vector blur,Channel blur, compound blur, Directional blur,Fast blur, Lens blur, Radial blur, Smart blur, Motion blur & Gaussian out of focus blur.

A. Degradation Model

The input of an original image is a 2D image A(X,Y).This image works on degraded fn B(X,Y) and then the addition of noise parameter gets added to a dedraded function(X,Y) .Finally degraded image gets as a D(X,Y).

$$D(X,Y)=B(X,Y)*A(X,Y)+C(X,Y)$$

B. Blur Type

1. AVERAGE BLUR

An average blur is a tool,which is used for removing noise in the image.It was taken to an entire image.The blurring image may be presented in the both horizontal and vertical direction. This can be calculated by Radius

a. Radius®
b. (e) is the horizontal size of blurring direction
c. (i) is the vertical size of blurring direction

$$R = \sqrt{e^2 + i^2}$$

2. MOTION BLUR

Motion Blur is occur due to the movement of while capturing the image.The motion can be controlled by direction or angle(0 to 360 degrees or -90 to +90) and or by sistance or intensity in pixels (0 to 999).

3. GAUSSIAN BLUR

One of the result of blurring image is by a gaussian blur function.It was mostly used in a graphics software,typically to reduce an iamge noise.It can able to make an enchancement of

image structure at different pixel scale value.Its blur was happened in both an interior and as well as exterior edges. While applying Gaussian blur to an image for the Deblurring you want to take more control.

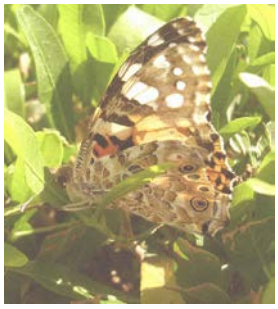
4. OUT-OF-FOCUS BLUR

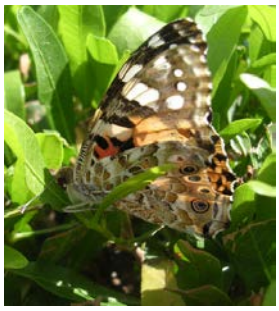
When a user capturing an image through the camera,suddenly the image got a blur.By analysis the blur,it came to know that focusing of an iamge is out of focus.Due tot that it was named as an Out-of focus Blur.Example when you capture an image in 2D but camera is 3D,here it gives out of focus blur.

II. VARIOUS DEBLURRING TECHNIQUES OF CAMPARISON TABLE LISTED BELOW, LET US SEE THAT TABLE NOW

S. No	Methods used for -Deblurring techniques	Different types of blur	Rating	PSNR Value
1.	Laplacian	Gaussian	Best	31.02
2.	Regularized filter	Gaussian	Good	21.75
3.	Wiener Filter	Gaussian	Worst	17.06
4.	Blind Image deconvolution	Motion	Better	26.76
5.	Motion Density Function	Motion	Better	24.30
6.	Using Handling outliers	Gaussian	Good	21.91
7.	Adaptive Sparse Domain-Autoregressive	Gaussian	Best	31.20
8.	Neural Network	Gaussian,out-of- focus	Best	30.10

III. DEBLURRING TECHNIQUES





Before *Now By Deblurring Techniques*

A. Lucy-Richardson Algorithm Technique:

The Lucy-Richardson algorithm is also known named as “Richardson-Lucy deconvolution,is an iterative methods for getting back of a latent image that has been the blurred by a known “Point Spread Function”

B. An approach for Neural N/W

Neural network is in the form of multiprocessor computer system.It has a simple processing elements as an adaptive interconnection between elements, a high degree of interconnection.Inside a neural network,if any elements get fails then it can continue without any problem by their parallel nature.ANN(Artifical Neural Network) provides an algorithm approaches is Backpropagation and perceptron use gradient-decent method tune the network parameters to fit a good i/p-o/p examples.In their approach we use Back Propagation neural network algorithm for image restoration.This approach have a capable of learning complex non – linear function,for to produce good structure, especially in high frequency domain of an image.

Wiener filter

In Weiner filter,we will give more important to a weighted value to center.Due to that contribution of deblurring will be high at center. When compare to other area, properties of wiener filter is

i)It must be odd ordered,not to be an even ordered.

ii)The sum of all the elements to be 1

iii)The weightage given to center of image is more then other edges of an image.

C. Blind Deconvolution Technique:

There are two methods for deconvolution first one is projection based blind deconvolution and second one is maximum likehood restoration. In this approach it make simultaneously restoring the true image and point spread function.Estimating first as psf and then only image gete estimate.The problem occurred in this approach is not an unique and this method have so many error.In second approach is got low computational complexity.

D. Deblurring with Blurred/Noisy Image pairs

In this method,the image get deblurred with the help of noisy image.It has several steps.

1.Both blur image and noisy image finding out an accurate blur kernel. Since it has very difficult to identify the kernel in one image.

2.Here it use residual denconvolution

3.Third and Final steps are artifacts which is taken to the non-sharp images.

The greatest advantage of this method is that it takes both blurred & noisy image to produce a high quality reconstructed image.

E. Deblurring with Motion Density Function

In this approach,image deblurring is taken with the help of MDF. An image is blur,due to camera gets shake while capturing the image.Here frame work is used fro recover the camera motion and latent image.The camera motion is representing "the MDF".For this approach limitations is that it make dependence on imperfect spatially invariant deblurring.

F. Deblurring with Handling outliers

In this approach different types of outliers such as pixel saturation and non-gaussian noise are analysis and then a deconvolution techniques has been proposed.Image pixels are splitted in two categories i) Inlier pixels ii) Outlier Pixels.

G. Deburring by Adaptive sparse Domain Selection

In this approach it was classified into six categories

i) Learning the subdictionaries

ii)Adaptive selection of the sub-dictionary

iii)Adaptively reweighted sparsity regularization

iv)Training the AR –models

v)Adaptive selection of the AR model for regularization

vi)Adaptive regularization by non-local similarity.

IV. DISCUSSION

Blur is an image processing is a huge problem to resolve, From above the table analysis we can see clearly that the method called using Adaptive Sparse Domain-Autoregressive.it gives type of blur is Gaussian.It show a performance result is 31.20, by that it is very efficient methods in deblurring.In the above the comparision table,a method which produce the lowest value is Wiener filter it also have a type of Blur is Gaussian with PSNR value is 17.06 for deblurring PSNR ratio should be higher.

V. FUTURE WORK

In My conclusion of future proposed method of deblurring PSNR ratio value to be higher,like that target is PSNR 35.00 to get high quality image.

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