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Image Restoration and implementing using Wiener Filter in Digital Image Processing

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ABSTRACT

No image is perfect. An image is corrupted by so many degradations which start from the stage of image acquisition itself. Images are degraded by noise, blur and distortions, are artefacts. This process of the image degradation happens in all the stages of image acquisition, image processing, image storage, and transmission. Noise is a disturbance which causes fluctuations in the pixel values. Similarity, the image capturing system itself does not capture a point as a point. Instead, it produces a Blur. The image formation itself introduces problems. Image Restoration is the process of retrieval of the original image from a degraded image. The idea is to obtain an image as close to the original image as possible. This is possible by removing or by minimising the degradations. In this paper implementation of image Restoration technique by using wiener filter is presented.

Key words: Digital Image, Degradation, Restoration, noise, wiener filter

I.INTRODUCTION

Point spread function for modulation transfer function provides quantitative information about the effectiveness of the imaging system. There are many ways of restoring the image. one can attempt to construct a model and two characters are the degradations this is called estimation approach image Restoration starts with an image degradation model.

II.LITURATURE SURVAY

Estimation of Degradation function can be achieved in the following methods.

Estimation by observation: This is a method of finding information from the observed image itself. Motion of the image that is usually employed. Let it be K(x,y) and the observed image be the g(x, y).The degradation function can be estimated by applying an Inverse Fourier transform to the ratio of the Fourier transform of the observed image and the Fourier transform of the Sub-image.

Estimation by experimentation when the instrument is used for obtaining the observed image is available, then the device setting can be studied. This knowledge is used to image a simple impulse function using the same device settings. As the Fourier transform of an impulse function is a constant, the degradation function can now be estimated by applying an Inverse Fourier transform to the ratio of the Fourier transform of the observed image and the Fourier transform of the impulse function.

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Estimation by modelling model is a set of equations that approximate the real system. an effort is made to construct a model of the system. Many models have been developed for modelling such as motion blurs and atmospheric turbulence. Using the constructed models, the degradation functions can be approximated.

Now there are three possible scenarios.

1. Complete knowledge of the blood is available. This is a simple case where the attempt can be made to retrieve the original image by applying an Inverse filter. This approach is called de-convolution.

2. There is only a partial knowledge of the following function H is available. Wiener filter is a technique that is helpful in this scenario.

3. There is no knowledge of the blurring function. Approaches such as blind Restoration techniques are used in this scenario. Blind Restoration is a procedure where an attempt is made to convert the degraded image without any prior knowledge of the cause of Degradation.

III. IMAGE RESTORATION MODEL

Let the original image bi f (x, y). When the image is acquired by the image system, the degradation starts. The degradation function is denoted as h(x, y). Noise is known to affect the image and is denoted as n(x, y). For such a linear space invariant system, the degrade image is given as.

$$g(x,y) = f(x,y) * h(x,y) + n(x,y) \quad (1)$$

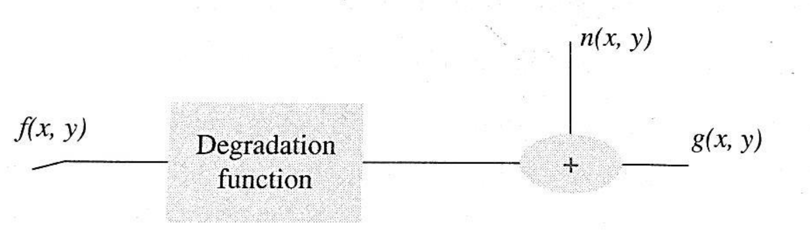

Figure 1: Shows the Degradation Modelling

Here * convolution operation. In the LSI system, the degradation model is an operator H. H has the following properties.

1. H is a linear operator.
2. It obeys the rules of Homogeneity.
3. it is position in variant

By applying the Fourier transform, the equation in the frequency domain becomes

$$G(u,v) = F(u,v) \times H(u,v) + N(u,v) \quad (2)$$

The original image can be retrieved by rearranging the equation to get

$$F(u,v) = \frac{G(u,v)}{H(u,v)} - \frac{N(u,v)}{H(u,v)} \quad (3)$$

The original image effects can be obtained by applying an Inverse Fourier transform to f(u, v). The idea of removing both noise and blur is called inverse filtering. The whole concept of image Restoration revolves around estimating the degradation function h(x, y).

IV.WIENER FILTER

The winner filter is an optimal Filter. It not only restores the image, but also removes noise by image smoothing. it is assumed that a partial knowledge of the declaration of function is available. So to design a winner filter, and estimation of the original and the additive noise is required. Similar to the unconstrained method, wiener filter finds and estimation functions.

Code Implementation:

```
mygrayimg=imread('grayleaf.jpg');
mygrayimg=imresize(mygrayimg,[256 256]);
subplot(3,3,1),imshow(mygrayimg), title('Original image');
filt1 = ordfilt2(mygrayimg,1,ones(3,3));
subplot(3,3,2),imshow(filt1);
title('Min Filter Result');
noisyimg = imnoise(mygrayimg,'Salt & Pepper', 0.5);
subplot(3,3,3),imshow(noisyimg);
title('Noisy Image');
wienerimg = wiener2(noisyimg,[5,5]);
subplot(3,3,4),imshow(wienerimg);
title('Wiener filter with 5 X 5 mask');
gausspsf = fspecial('gaussian',[64,64],5);
subplot(3,3,5),imshow(gausspsf,[]);
title('Gaussian PSF');
motionpsf = fspecial('motion',64,64);
subplot(3,3,6),imshow(motionpsf,[]);
title('Motion PSF');
gaussblur = imfilter(mygrayimg,gausspsf);
y1 = edgetaper(mygrayimg,gausspsf);
subplot(3,3,7), imshow(gaussblur);
title('Gaussian Blurred Image');
randpsf =rand(64);
retrievedimg1 = deconvblind(y1,randpsf);
subplot(3,3,8),imshow(retrievedimg1);
title('Blind deconvolution(random)');
retrievedimg2 = deconvblind(y1,gausspsf);
subplot(3,3,9),imshow(retrievedimg2);
title('Blind deconvolution');
```

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VI. RESULTS AND DISCUUSIONS

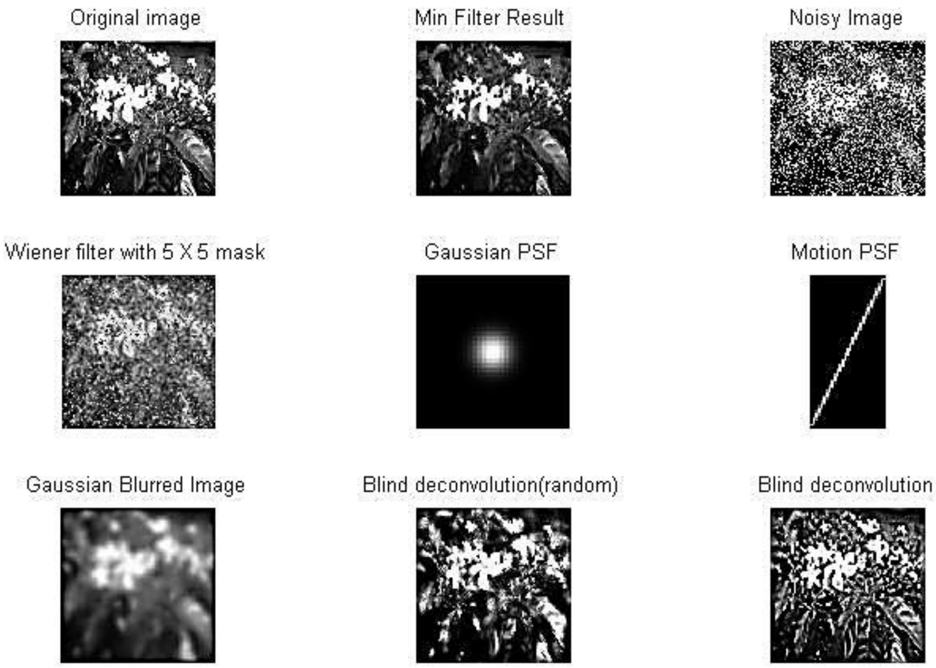

Figure 2 : Shows the different filters applied on original image

In the implementing code we are reading the test image and displaying it. Create an order filter and filter with 3X3 mask. Create a noisy image. create wiener filter with 5X5 mask, apply wiener filter to the test image full stop create motion Blur, display the blood image full stop create motion blur, and apply it to the test image and display the blood image full stop retrieve the original image from the blood image using the command blind deconvolution random and display it. So, this is the implementing of the code.

V. CONCLUSION

A Blurred image can be created by involving The Matrix with the images. The special command is used to create three types of glass with the parameter disk is used to create out of focus blur. Parameter Ocean is used to create a Gaussian blur as shown in the program. Parameter motion is used to create motion Blur.

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