INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 4.295
(Volume3, Issue3)
Available online at www.ijariit.com

Survey Paper Analysis On Deblur Image Using Various Technique Method

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Abstract**: The **image processing is an important field of research in which we can get the complete information about any image. One of the main problems in this research field is the quality of an image. So the aim of this paper is to propose an algorithm for improving the quality of an image by removing blur, which is an image blur. Review of different deblurring techniques is obtained for a good quality image. The deblurring techniques are basically used to sharp an image using different methods & parameters. Image restoration and recognition have been of great importance nowadays. Face recognition becomes difficult when it comes to blurred and poorly illuminated images and it is here face recognition and restoration come to picture. There have been many methods that were proposed in this regard and in this paper, we will examine different methods and technologies discussed so far.

Keywords: Deblur, Salt & pepper, Subspace, PSNR, Gaussian Noise, Impulse, DIP, and MSE.

I. INTRODUCTION

An image may be defined as a two-dimensional function, for example, let f(x, y) is a function and it depend on two variable so f is dependent on independent variable x and y, where x and y are plane coordinates. We know when we take an image which is a function of x and y then with help of x and y we can calculate the intensity level of the image or can say pixel. As we know intensity value lies between o to 255. At every point intensity level would be different it depends upon which type of image we fetched. When x, y and the amplitude values of f are all finite, different quantities, we can call the image a digital or binary form. Note that a digital image is composed of a finite number of pixels or elements, each of which has a specific location and his own value. Digital image processing is the use of computer algorithms to perform image processing on digital images. As we know digital image processing (DIP) subcategory of digital signal processing (DSP), digital image processing has a lot of attractive features as compared to analog image processing. It allows the very wider scope of algorithms to be applied to the input data and can avoid difficulties such as noise in the signal and signal variation during processing. Since images are defined over two dimensions. DIP may be designed in the form of Multidimensional Systems.

Images as Matrices: The coordinate system approach to the following representation of a digitized image function:

$$f(x, y) = \begin{bmatrix} f(0,0) & f(0,1) & \cdots & f(0,N-1) \\ f(1,0) & f(1,1) & \cdots & f(1,N-1) \\ \vdots & \vdots & & \\ f(M-1,0) & f(M-1,1) & \cdots & f(M-1,N-1) \end{bmatrix}$$

Fig1.1 Image as Matrices

A blurred image can be considered as a convolution function of a sharp image and a blur kernel or PSF. So in order to retrieve the sharp image we need to split the image into its blur kernel and sharp image. But the problem here is the estimation of the blur

kernel. This unknown blur kernel estimation is known as the deconvolution. Most of the deblurring techniques make use of these concepts.

Fig.1. Blurred and Deblurred Image

II. LITERATURE SURVEY

J. Biemond et al. [1] proposed recurring restoration methods for the elimination of linear blurs from images that are corrupted by point wise nonlinearities such as film saturation and additive noise. Jubien et al. [2] proposed two different algorithms that can be combined with the neural network for blind image renovation. J. G. Nagy et al. [3] implemented iterative Matlab tools for efficient matrix-vector multiplication, and for solving the linear system for pre-conditioners, efficiently for image restoration. P. C. Hansen et al. [4] considered a blurring model that is more robust than the previous one. The blurring is generated on the rows and columns of the image concurrently.

Z. Hongying et al. [5] analyzed some techniques that working with neural network, to converge the recorded blurred image to the sharp image. J.Jiaya et al. [6] proposed that blurring model can be described as a blend of two operations; the first operation is convolving the original image with the unknown kernel; the second operation is the addition of some noise to the consequential image. A. Beck et al. [7] analysed a bunch of Iterative Shrinkage-Thresholding Algorithms (ISTA) to solve linear inverse issues for image analysis. They investigated that these methods are extremely easy but converge extremely slowly. Cai et al.[8] presented adaptive light weight selection, which is an input in a progression of nominal sub-lexicons. It characterized each neighbourhood to repair a sub-word indication as for the inadequate neighbourhood. Et al. [9] proposed a method that is helpful for straight estimating spatially changing point multiply method. This function can't work for multiple images. D. S. Rao et al. [10] described that Optical Transfer Function is a Fourier transfer of the point Spread Function (PSF) and the PSF is a converse Fourier transform of OTF. Inside the frequency reign, the OTF considers the reaction of a linear, position-invariant method to an inclination. Subashini et al. [11] used highly nonlinear back propagation neuron for image renovation to get a better quality restored image and achieve fast neural computation. A. K. Soe et al. [12] described motion blur as clear streaking of fast movement of objects in a motionless image. Neetin Kumar et al. [13] find out the true value of PSF applying reverse propagation algorithm for several iterations applied in deblurring method, before applying deconvolution algorithm on the blurred image. D. Singh et al.[14] described the causes of blurring of the digital image, for example, motion at the time of capture process, having large exposure duration, using wide angle lens, etc. G. Anil [15] described that Gaussian filter blends exact count of pixels incrementally, followed by a bell-shaped

III.METHODOLOGY

There are various techniques which are used to deblur the image out of which some are described below:

(A)Deblurring using Subspace Analysis

Here in this method, there is a training set which consists of blurred images. From this set, more knowledge can be derived. Then a feature space is constructed so that the blurred faces with the same point spread function are quite similar. In the training phase, a model of each point spread function or blur kernel is computed in the feature space. For the blur kernel inference, we compare a query image of blur kernel which is not known for each model and selects the closest one. The given query image is deblurred using the blur kernel corresponding to that particular model and then it can easily be recognized. In short, this algorithm inferred PSF using learned models of facial appearance variation under different amounts of blur. Then the inferred PSFs were used to sharpen both query and target images. This method can also be used for recognizing textual character, hand and body postures

under blur. The disadvantage of this method is that it may not work well for other objects consisting of uniform texture like a plastic cup. This approach has not yet been proven for images blurred with multi unknown factors or with severe blur such as camera shake

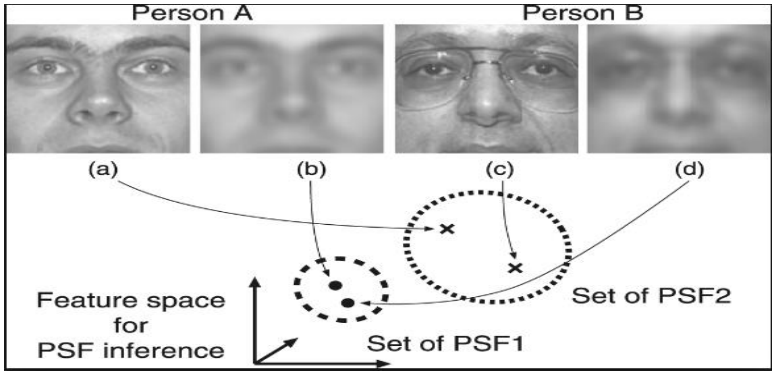

Fig.2. Deblurring using sub space analysis

(B) Removing Blur with Image Statistics

In most cases, the blurred image is deblurred with a single blur kernel. But when an image having motion in a different direction is considered then it can cause serious problems. As a result, different kernels need to be considered. Here in this approach, a single frame is considered for the whole image with the help of segmentation. It can be seen that the statistics of the derivatives are very much changed under different blur kernels. This algorithm searches for mixture model that can best define the distribution observed in the image. It results in two blur kernels and then by taking smooth layers assignment, the likelihood is maximized. The output produced is a real world image with rich texture. But it has also got some limitations like the use of box filters, unknown direction of the blur, failure to describe the blur size etc. The blur patterns in real images can also turn much complex. Taking features other than simple derivative is seen improving the performance.

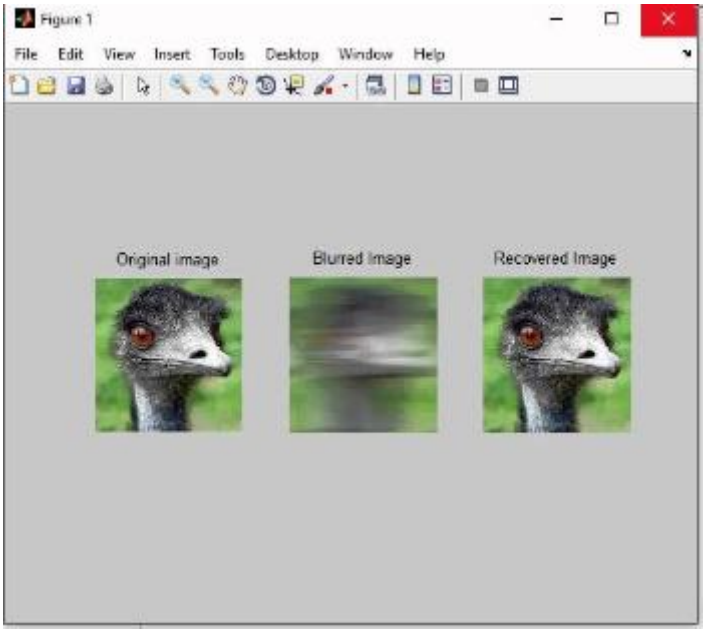

Fig3. Removing Blur with Image Statistics

(c) Deblurring with Blur Estimation Algorithm

In general, the focal deblurring process is done with modeling as Gaussian low pass filtering. So the problem of blur estimation will include the estimation of the blur kernel. Here the input image (blurred) is first re-blurred by Gaussian blur kernels having different blur radius. After that, the difference ratios between the different re-blurred images are used for determining the unknown blur radius. With the edge model, it can be seen that the blur radius can easily be measured from the difference ratio and is not dependent on edge amplitude or position. The maximum of difference ratio can be seen at the edge positions. Here the advantage of this approach includes robust estimation in areas having multiple neighbouring edges and this method also does not require detection of edge position and angle.

(D)Deblurring with noisy image pairs

In this approach, the image is deblurred with the help of a noisy image. As a first step both the images, the blurred and noisy image are used to find an accurate blur kernel. It is often very difficult to get blur kernel from one image. Following that a residual deconvolution is done and this will reduce artifacts that appear as spurious signals which are common in image deconvolution. As the third and final step the remaining artifacts which are present in the non-sharp images are suppressed by gain controlled deconvolution process. The main advantage of this approach is that it takes both the blurred and noisy image and as a result produces a high-quality reconstructed image. With these two images, an iterative algorithm has been formulated which will estimate a good initial kernel and reduce deconvolution artifacts. There is no special hardware is required. There are also disadvantages with this approach like there is a spatial point spread function that is invariant.

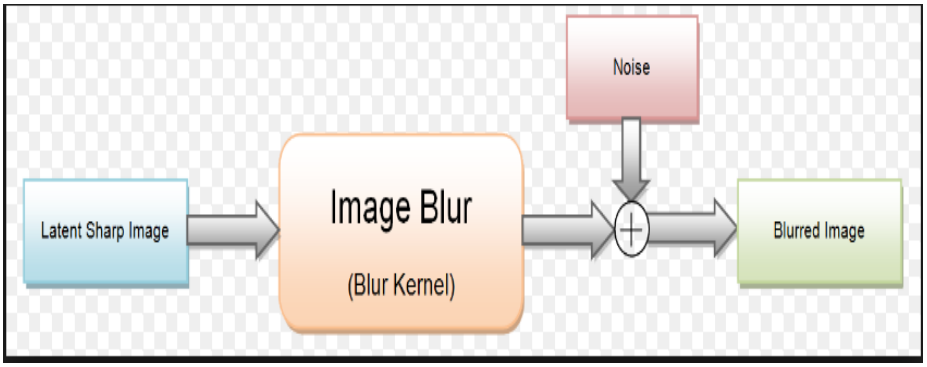

Fig4. Deblurring with noisy image pairs

TABLE 1Comparison between Different Techniques

Aspect / Method	Accuracy	Different Type of blurs
SubSpace Analysis	Medium	Low
Blind Image Deconvolution	Medium	Medium
Image Statistics	High	Medium
Local Phase Quantization	High	Medium
Set theoretic Approach	High	High

IV. SOFTWARE USED AND SIMULATION RESULT

Software: MATLAB Version R2015a: It is powerful software that provides an environment for numerical computation as well as a graphical display of outputs. In Matlab, the data input is in the ASCII format as well as binary format. It is a high-performance language for technical computing integrates computation, visualization, and programming in a simple way where problems and solutions are expressed in familiar mathematical notation.

- Acquisition, Data Exploration, Analysing &Visualization
- Engineering complex drawing and scientific graphics
- Analysing of algorithmic designing
- Mathematical and Computational functions
- Modeling and simulating problems prototyping
- GUI (graphical user interface) building environment.

Using MATLAB, you can solve technical computing problems very easily and time-saving as compared to traditional programming languages, such as C, C++, and FORTRAN.

The name MATLAB stands for matrix laboratory.

MATLAB Features

- MATLAB is a high-level language used for numerical computation, visualization, and application development
- It create very friendly environment for iterative exploration, design, and problem-solving
- Mathematical functions for solving ordinary differential equations, Fourier analysis, linear algebra, statistics, filtering, optimization, numerical integration
- Development tools for enhancing code quality and maximizing performance
- Tools for building applications with custom graphical interfaces (GUI)
- Functions for integrating MATLAB based algorithms with external applications and we can able to generate code in hex file, c, embedded etc.

CONCLUSION

After studying many review papers we find that there are different parameters for various techniques for deblurring the image. The overall complete review is about the image quality. Many of parameters are used to improve the quality of an image. So the proposed algorithm is about the image quality. Deblurring uses different parameters such as degraded model, restoration techniques, different algorithms and other techniques. Several methods have been developed by various researchers for image deblurring or image restoration. Till now, image deblurring is a challenging issue. Blur Detection is a technique to remove the blur from a blurred region of an image which is due to defocus of a camera or motion of an object. After deblurring, we check two parameters PSNR and MSE and value of PSNR must be high. PSNR and MSE both are inversely proportional teach other.

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