

A Review: RSA Algorithm for blurred image and restoration in different blur techniques

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Abstract- Image deblurring is a process which makes picture sharper and perfect then the original picture. The restoration and deblurring is necessary for digital image processing. Image blur is obtained due to the many reasons. Remove the blur of imaging system we applying many method and technique to secure the picture from unwanted users through encryption algorithm.

A comparative study is performed for different images deblurring techniques likes Lucy-Richardson algorithm technique[10], Neural network approach[3][4][5], Blind de convolution technique, Deblurring and noisy image pairs[2], Deblurring with motion density function[2], Deblurring with handling outliers[2], Deblurring by ADSD-AR[2]. These techniques have been evaluated on basis of simulation result and performance measures and security provide by encryption algorithms.

I. INTRODUCTION

Image deblurring has become increasingly important occurs many scientific applications such as astronomy, medical imaging and others. A number of real world problems from astronomy to consumer imaging find applications for image deblurring and restoration is easily visualized example of a larger class of inverse problem that arise in all kinds of scientific, medical, industrial and theoretical problems. It is an important issue in high level image processing which deals with recovering of an original from degraded Image restoration is used to estimate the original image from the degraded data. In this age of image technology is a significant part of scientific research, recovering an approximation of an original image is the process of image de-blurring. To obtain true image it is essential by removing the effect of blur and noise on a corrupted image. Images both of a personal nature and of a scientific importance, they all carry information. However, any other form of data, the information within each picture can be affected by errors. These error scan come from various sources: while the image is taken, unfocused lens, illumination, or in the case of astronomical images, from atmospheric turbulence. These errors are often responsible along with the noise for the blurred and unclear images. Image restoration is an important issue in high level image processing which deals with recovering of an original and sharp image using a degradation and restoration model [1]. During image acquisition process degradation occurs. Image restoration is used to estimate the original image from the degraded data. The main motive of this research paper is to provide a comprehensive overview of most useful restoration models and comparison between them. The objective of image restoration is a process of reconstruction the primitive scene from degraded image.

II. REVIEW OF PAPERS

A. BLURRING

Blur is an unsharp image area caused by camera or subject movement, inaccurate focusing, or the use of an aperture that gives shallow depth of fields[9] . The blur effects are filters that smooth transitions and decrease contrast by averaging the pixels next to hard edges of defined lines and areas where there are significant color transition . In digital image there are five common types of blur effects.

B. TYPE OF BLUR

There are five type of blur effect:-

- 1).Average blur: The average blur is one of several tools one can use to remove noise and specks in an image. This type of blurring can be distribution in horizontal and vertical direction and can be circular averaging by radius R which evaluated by the formula:

$$R^2 = a^2 + b^2$$
 Where a is the horizontal size blurring direction and b is vertical blurring size direction is the radius size of the circular average blurring.[8]
- 2). *Atmospheric blur*: It occurs due to random variations in the reflective index of the medium between the object and the imaging system and it occurs in the imaging of astronomical objects
- 3). *Gaussian blur*: Gaussian blur is that pixel weights aren't equal and they decrease from kernel center to edges according to a bell-shaped curve .The Gaussian blur effect is a filter that blends a specific number of pixels incrementally to a bell shaped curve. The blurring is dense in the center and feathers at the edge. Apply Gaussian blur to an image when one want more control over the blur effect. Gaussian blur depends on the size and alpha.[8]
- 4). Motion blur: The motion blur effect is a filter that makes the image appears to be moving by adding a blur in a specific direction. The motion can be controlled by angle or direction.[8]
- 5). Out of focus blur: *When a camera images a 3-D scene onto a 2-D imaging plane, some parts of the scene are in focus while part are not, the aperture of the camera is circular, the image of point source is a small disk, known as the circle of confusion (COC)[10] . The degree of defocus (diameter of the COC) depends on the focal length and the aperture number of the lens, and the distance between camera and object. An accurate model not only describes the diameter of the COC, but also intensity distribution within the COC.[8]*

C. DEBLURRING TECHNIQUES

a) RICHARDSON-LUCY ALGORITHM:-

The Richardson–Lucy algorithm, also known as Richardson Lucy de-convolution, is an iterative procedure for recovering a latent image that has been blurred by a known PSF[9]. Noise amplification is a common problem of maximum likelihood methods that attempt to fit data as closely as possible. After much iteration, the restored image can have a speckled appearance, especially for a smooth object observed at low signal-to-noise ratios. These speckles do not represent any real structure in the image, but are artifacts of fitting the noise in the image too closely. To control noise amplification, damping parameter threshold level is set for the deviation of the resulting image from the original image, below which damping occurs. It is not a blind techniques of image restoration, used to restored a de graded image that has been degraded by known as PSF .

$$D_i = \sum p_{ij} u_j$$

D_i is the observed value at pixel position,, p_{ij} is the fraction of light coming from true location „j”. The main objective is to compute the most likely, preference of observed d_i and known PSF p_{ij} as follows

$$C_i = \sum p_{ij} u_j$$

this method for deconvolution of image convolved with a point spread function. It is derived from a statical point of view as it converges to maximum likelihood solution under the condition that the data follow a poisson distribution .This assumption holds true for image dedected by digital camera.[10]

b) NEURAL NETWORK APPROACH:

A multilayer neural network based on multi-valued neuron (MLMVN) .This network consist of multi-value neurons(MVN).That neuron with complex value weight and activation function , defined as a function of the argument of a weighted sum. It is based on principles of multi-valued threshold logic over the field of complex numbers formulated and development. A comprehensive observation of the discrete value MVN, its properties and learning .The most important properties of MNV are the complex-value weight, input and output lying on unit circle ,and the activation function which map the complex plan into the unit circle. It is important that learning is to reduced to the movement along the unit circle .The MVN learning algorithm is based on a simple linear error correlation rule and it does not requires differentiability of activation function.MVN as a basic neuron in the cellular neural network .basic neuron of the neural-based associative memories ,as the basic neuron in a variety of pattern recognition system .The MLMVN outperform a classical multilayer feedback network and different kernel –based based networks in the terms of learning speed ,network complexity, and classification rate tested for such popular benchmarks problem as the parity n, the two spiral ,the sonar. These properties of MLMVN show that it is more flexible and adapts faster in comparison with other solutions. [3][4][5]

c) BLIND DE CONVOLUTION TECHNIQUE

when convolved with the resulting PSF, is an instance of the blurred image, assuming Poisson noise statistics. The blind de-convolution algorithm can be used effectively when no information about the distortion (blurring and noise) is known as blind deblurring . The blind de-convolution restores the image and the PSF simultaneously, using an iterative process similar to the accelerated, damped Lucy-Richardson algorithm. The blind de-convolution can reduce the effect of noise on the restoration, account for non-uniform image quality and handle camera read-out noise. Definition of the blind deblurring method can be given by

$$g(x, y) = \text{PSF} * f(x, y) + \eta(x, y) \quad (5)$$

Where $g(x, y)$ is the observed image, PSF is point spread function, $f(x, y)$ is the constructed image and $\eta(x, y)$ is the additive noise term. When convolved with the resulting PSF, is an instance of the blurred image, assuming Poisson noise statistics. The blind de-convolution algorithm can be used effectively when no information about the distortion (blurring and noise). The blind de-convolution restore the image and the PSF simultaneously, using an iterative process similar to the accelerated, damped Lucy-Richardson algorithm. The blind de-convolution can reduce the effect of noise on the restoration, account for non-uniform image quality and handle camera read-out noise. Definition of the blind deblurring method can be given by

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Where $g(x, y)$ is the observed image, PSF is point spread function, $f(x, y)$ is the constructed image and $\eta(x, y)$ is the additive noise term[8].(PSF: Point spread function-it is the degree to which optical system blurs a point of light. The PSF is the inverse fourier transform of optical transfer function (OFT).In the frequency domain, the OFT describes the response of a linear, position-invariant system to an impulses.

d). DEBLURRING WITH BLURRED/ NOISY IMAGE PAIR:-

In this technique deblurred with the noisy image .To find the accurate blur kernel both the images and noisy images are used. It is difficult to get blur kernel from one image. That a residual deconvolution is done and this will reduce artifact that appear as spurious signal which are common in image deconvolution. The final step the remaining artifact which are present in the non-sharp images are suppressed by gain controlled deconvolution process. The main advantage of this approach is to take both the blurred and noisy image as a result produced high quality reconstructed image. With the help of these images an iterative algorithm has been formulated which will estimated a good initial kernel and reduce deconvolution artifacts. There is no special hardware is required. There are also disadvantages with this technique there is spatial point spread function that is invariant.[2]

e) .DEBLURRING WITH MOTION DENSITY FUNCTION:-

In this approach image deblurring obtain with the help of motion density function. Unmagnified model of camera shake blur is obtain and camera motion, latent image from a single blurred image using framework. Camera motion is represent as motion density function (MDF). Which records the fraction of time spent in each discretized portion of the all possible camera position. Spatially varying blur kernels are derived directly from the MDF. One limitation of this methodis that depends on imperfect spatially invariant deblurring estimate for initialization[2].

f). DEBLURRING WITH HANDLINING OUTLIER:-

IN this technique various type of outliers such as pixels and non- gaussian noise are analysed and then a deconvolution method has been proposed which contain an explicit component for outlier modeling .Images pixels are classified into two main categories :Inlier and pixel and outlier pixel . after that an expectation –maximization method is employed to iterative refine the outlier classification and the latent images.[7]

g). DEBLURRING BY ADSD-AR:- Adaptive spares domain selection is introduced . Which learn a series of compact sub –dictionaries and assigns adaptively each local patch a sub dictionary as the spares domain? With ASDS, a weighted L1 norm spares representation model will be proposed for IR tasks . Further two adaptive regularization terms has been introduced into the spares representation framework. First, a set of autoregressive (AR) models are learned from the dataset of example image patches. The best fitted AR models to regularize the image local structures. The images nonlocal self- similarity is introduced an another regularization term[2][6].

D. Encryption:

Translation of data into a secret code. Encryption is the most effective way to achieve data security. To an encrypted file, you must have access to a secret key or password that unable to decrypt it. Unencrypted data is called plaintext; encrypted data is cipher text.

There are two type of encryption

a).Asymmetric encryption (also called public-key encryption)

b).Symmetric encryption

The issue of privacy solved with used of RSA algorithm in different techniques that discussed above. The growth of the internet and electronic commerce have brought to the issue of privacy in electronic communication. Larges the volume of personal and sensitive information are electronically transmitted and stored every day. What a guarantee does one have that messages sent to another person is not intercept and read without their knowledge? Tools to ensure the privacy and confidentiality. Encryption is the standard method for making a communication private.

RSA algorithm is Rivest -Shamir -Adleman algorithm is most popular and secure public-key encryption method .we proposed to work with Neural network applying RSA algorithm to secure image by key protection method.

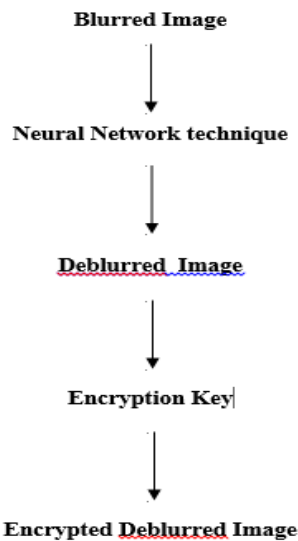
Encrypted Deblurred Image



The key distribution problem:-

Private-key system suffer from the key distribution problem. In order for secure communication is occurs , the key must be securely send to other party .An unsecure channel such as a data network cannot be used .Message can be encrypted with a public key and decrypted with a private key.

III. THE PROPOSED WORK



IV. CONCLUSION

The conclusion of this paper is to solve blurred images using given deblurred and image restoration techniques and also provides the security features to deblurred images using RSA Algorithm.

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