Image Deblurring Algorithm using Accelerated Gradient Method

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Abstract— Blur is a common and unwanted artifact of image acquisition. The most common reason of blurry images is camera shake. The camera movement may be very little, but still causes blurry images. Most recent approaches attempt to removal of images blur happened due to camera shake. There are many reasons why images become blurred such as, slow shutter speed or incorrect focal distance. Because blurry images are confusing, they are often less appealing and so it is desirable to deblurr images for purely aesthetic reasons. Outside of photography, variable blurring creates problems for feature tracking algorithms which rely on the existence of consistent image structures. Blur removal may be used to precondition these algorithms and greatly improve performance. Recently, the field of blur removal has gained increasing interest in a lot of researches. The problem is known as blind convolution if the only available information is the blurred image. In image deblurring using Accelerated gradient descent algorithm we introduced a comprehensive study on the image deblurring, type of blur, noise model and finally a comprehensive study.

Keywords: Image Deblurring Algorithm, Accelerated Gradient Method

I. INTRODUCTION

Blur type in digital camera there are four common types of blur effects:

1) Average Blur: The Average blur is one of several tools you can use to remove noise and specks in an image. Use it when noise is present over the entire image.
2) Motion Blur: The Many types of motion blur can be distinguished all of which are due to relative motion between the recording device and the scene. This can be in the form of a translation, a rotation, a sudden change of scale, or some combinations of these.
3) Gaussian Blur: A Gaussian blur is the result of blurring of an image by Gaussian function. It is a widely used effect in graphics software, typically to reduce image noise and reduce detail. 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 other parts are not. If the aperture of the camera is circular, the image of any point source is a small disk, known as the circle of confusion (COC).

It's been less difficult to remove blurriness due to known convoluted noise as compared to unknown convoluted noise due to different an unknown reasons. A digital image is composed of picture elements called pixels. It is extremely necessary to remove the blur from the images. With the help of image deblurring we would be able to make sure that we can get the clear image in vehicle monitoring, it would be used in medical field to get the proper images of the MRI scans conducted.

Each pixel is assigned intensity, meant to characterize the color of a small rectangular segment of the scene. A small image typically has around 65536 pixels while a high resolution image often has 5 to 10 million pixels.

Image deblurring uses a point spread function (PSF) to deconvolve the blurred image. Deconvolution is classified into two types: blind and non-blind Deconvolution. Blind Deconvolution uses only blurred image for deblurring and in non-blind Deconvolution use blurred image and known point spread function for deblurring.

II. RELATED WORK

Blur which arises due to camera wobble is common in consumer-level photography. It occurs when a long disclosure is essential and the camera is not held still. As the camera movement progresses, the image formation process integrates a stream of photographs of the scene taken from slightly different viewpoints.

Extracting blur arisen due to shaking of camera is currently a very active area of research. Given only a single photograph, this blur removal is known as blind Deconvolution that is concurrently recovering both the blur kernel and the deblurred, sharp image. Blurred image is not acceptable for many scientific applications, such as astronomical imaging as well as consumer photography. Image restoration is used to get the original sharp image from the corrupted data.

1) Mr. Raj Kumar Sahu and Deeje Singh [1] proposed a detailed description of various challenges involved in deblurring an image. The analysis is done on the basis of performance, types of blur and PSNR. A higher value of PSNR is good because it means that the ratio of peak signal-to-noise is higher.
2) Himani, Dr. S. L. Lahudkar [2] discussed software-based methods use image priors and kernel priors to constrain an optimization for the blur kernel and the latent image. This convolution model does not account for variations in depth and view-dependent illumination changes
3) Fagun Vankawala, Amit Ganatra and Amit Patel Charusat [3] said if type of blur is unknown it is difficult to get better result. Therefore, Blind Convolution can be applied. Performance of the algorithm was tested for an image with noise present in it. To carry out this analysis, an image was blurred using Gaussian smoothing and Gaussian noise function was applied to the image

III. IMAGE DEBLURRING ALGORITHM USING ACCELERATED GRADIENT METHOD

The objective of the proposed systems is to design and develop an efficient deblurring approach. Initially we take a normal image with exact position. Then we would use Gaussian blur to blur the image. Then we convert the image to grey. We would then filter the given image using Gaussian filter. Contrast enhancement is a process that makes the image features standout more clearly by making optimal use

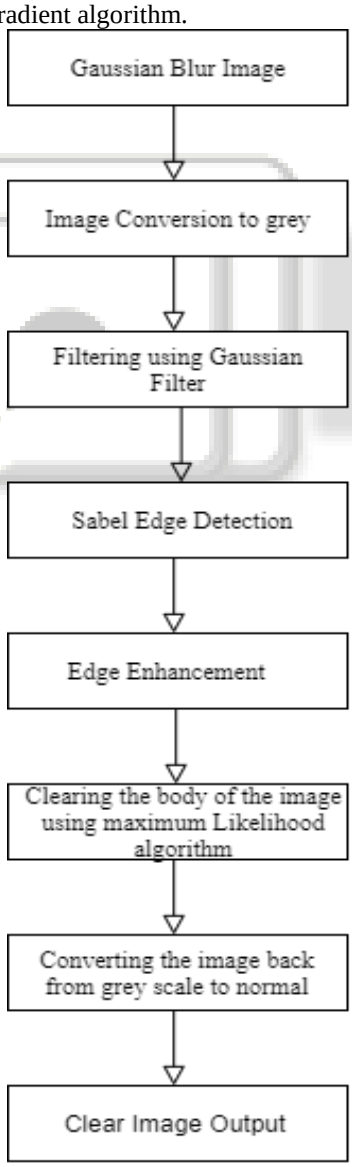
of the colors available on the display or output device. Contrast manipulations involve changing the range of values in an image in order to increase contrast. Then we remove the graying of the image. Therefore we would get the normal image. It is very efficient method and we would get the result in an efficient manner

A. System Design

In the proposed system, Gaussian Blur image is given as input. The process of deblurring begins with the clearing the edges and then the image is deblurred. The output is displayed on the user interface.

IV. FLOWCHART

Initially, Image will be inputted on to the system. Later degradation of image takes place. Gaussian blurring of image takes place and later some noises are further added to image via noise modules such as Impulse, Gaussian, Poisson, Speckle etc. Later deblurring of image is done using maximally specific algorithm and local minima are found via accelerated gradient algorithm.



V. RESULTS AND DISCUSSION

The figure displays the deblurred clear image along with the PSNR value. The higher the PSNR value, the better is the quality of the reconstructed image.

VI. CONCLUSION

Using this project blurred image will be reconstructed. The project code will be built using MATLAB going through all the stages of focus-deblurring. Since the need of image deblurring is increasing every day, the project will serve a better purpose. Images are nowadays an integral part of our lives, whether in scientific applications or social networking and where there is an image, the concept of blurring might occur. Blurring is a major cause of image degradation and decreases the quality of an image. In the past years, deblurring proved to be Resolvable problem that can aid in many domains, from medical imaging to space photography. Noise removal is challenging because many noise image pairs can explain the noisy photograph and we need to pick the correct pair from them. The challenge is aggravated since the blur can be spatially variant depending on the relative motion between the camera and the scene. Hence the above proposed approach that is Image deblurring using accelerated gradient descent would serve a better purpose.

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