International Journal of Scientific Research in Computer Science, Engineering and Information Technology
© 2018 IJSRCSEIT | Volume 3 | Issue 1 | ISSN : 2456-3307

# License Number Plate De-blurring Methods for Fast Moving Vehicle

**Sayali B. Holkar[1], Prof. S. R. Mahadik[2]**
*[1]Student, Department of E&TC Engineering, JJMCOE, Jaysingpur, Maharashtra, India
[2]Associate Professor, Department of E&TC Engineering, JJMCOE, Jaysingpur, Maharashtra, India

## ABSTRACT

In Intelligent Transportation System the detection of the number plate of fast moving vehicles is an important part. This paper gives methods for detecting vehicles, which violates rules in real time traffic scenario. One of the problems is to recognize the license plate due to fast motion and uncertain condition. Firstly, taking the fast moving vehicle from camera kept in different position and angles. After removing motion blur in the image frame, detect the license plate from the front or the rear of a car by using morphological operation. Motion blur is occurred because of relative motion between the original scene and the camera, during the integration time of the image. Motion blurring obtain problems in license plate recognition, as the characters on the license plate cannot be recognized due to distortion occurred by blurring. Hence, de-blurring of license plate image is required, due to that character recognition is possible. De-blurring is the process of removing blurring artifacts from an image. The process of motion de-blurring can be divided into two parts: the estimation of the function that caused the blur (the degradation function), and application of a restoration algorithm to the de-blurred image.

**Keywords:** Convolution, De-blurring, De-converge, Morphology, Kernel, Motion Blurring, De-noising, Estimation, Artifacts

## I. INTRODUCTION

With increasing number of vehicles on roads, it becomes difficult to manually enforce laws and traffic rules for smooth traffic flow. Toll-booths are constructed on freeways and parking structures, where the car has to stop to pay the toll or parking fees. Traffic Management systems are installed on freeways to check for vehicles moving at speeds not permitted by law. All these processes have a scope of improvement. In the center of all these systems lies a vehicle. In order to automate these processes and develop them more effective, a system is required to easily identify a vehicle. Vehicle's number plate is mainly used for vehicle identification.[1]

In every country, vehicles have their unique license number, which is written on its license plate. This number differentiates one vehicle from the other, which is useful especially when both are of same model[2]. An automated system can be implemented to identify the license plate of a vehicle and extract the characters from the region containing a license plate. The license plate number generally used to retrieve more information about the vehicle and its owner, which is useful for further processing. This type of automated system should be small in size, portable and be able to process data at adequate rate. Blurring is the obscuration of something, or making something unclear or indistinct. Blurring means obscured or unclear image, because of noise or some other artifacts.

### A. Types of blur:

#### 1)Defocus aberration:

Defocus is the aberration in which an image is out of focus. Defocus means translation along the optical axis away from the plane, or the surface of best focus. This aberration gives results in reduction of the sharpness and contrast of the image.

#### 2) Gaussian Blur:

A Gaussian blur is the result of blurring an image by a Gaussian function. It is mainly used effect in graphics. Gaussian blurring is generally used to reduce detail and image noise.

#### 3) Motion Blur:

Motion blur [3] is the result of the relative motion between the camera and the original scene during the integration time of the image. It is clearly seen in the pictures that were taken with long exposure times, and in pictures of fast moving objects. The motion blur effect is widely used in computer graphics to generate synthetic images and animations look more realistic and improve additional information about the direction of the motion. Motion blurring occurs due to movement of the object or movement of the camera (i.e. camera shake) or both.

#### 4) Average Blur:

Average blur caused by the distribution of blur in the form of horizontal, vertical and circular direction by radius. The radius can be calculated by using the below formula.

$R^2 = h^2+v^2$

Where,

h is the horizontal direction

v is the vertical direction

R is the radius of the circle.

### B. Motion De-Blurring:

Motion de-blurring mainly includes two parts: the estimation of the function that introduces the blur (the degradation function), and applying a restoration algorithm. Since the motion path can be arbitrary, the first problem can be hard to solve.

### C. Convolution:

Convolution [4] is a mathematical concept which is an important tool in data processing, particularly in digital signaling and image processing.

### D. Kernel:

A kernel [5] (also known as mask or convolution matrix) is a small matrix which is generally used for, embossing, blurring, sharpening, edge detection, and for applying many more effects. This is achieved by convolution in between a kernel and an image.

### E. De-blurring :

The biggest difficulty in image processing is de-blurring an image without any artifact from theoretical and also from the practical point of view. The image is also corrupt by noise so that de-noising as well as it is to be done to enhance the image. Image de-noising is also one of the parts of image de-blurring process. The image is degraded because of different types of the blur effect.

**Figure 1.** Example of fast-moving vehicle image and final de-blurred result.

## II. METHODS AND MATERIAL

### A. Morphological Operation

Morphology is a set of theory. In image processing the morphological operation deals with the shape of an image. It is based on the analysis of two images in terms of predetermined geometric shape known as a structuring element for generating the output of the

same size as the input image. License plate recognition is the crucial part. It has the advantage of having the record of vehicle image is important such as hit and run accident, stolen cars, parking areas, etc. For this type of detection several types of morphological operation like erosion, dilation, and subtraction are used.

### B. Robust Blur Kernel Estimation

For license plate image blurring caused by fast motion, the blur kernel can be viewed as a linear uniform convolution and parametrically modeled with length and angle[6]. Identification of the blur kernel the proposed scheme is based on sparse representation. Analysis of the sparse representation coefficients of the recovered image determines angle of the kernel. It depends on the observation that the recovered image has the sparsest representation when the kernel angle corresponds to the genuine motion angle. Then, Radon transform in Fourier domain is estimated by the motion kernel length.

### C. Neural Networks for Motion De-blurring

Neural Network is an approach to blind deconvolution which relies on convolutional neural networks (CNN) [7] which are trained on a large set of artificially blurred images to directly de-blur images. It demonstrates that neural networks trained on artificial data gives superior reconstruction quality on real images when compared with traditional blind deconvolution methods.

### D. Edge-based Blur Kernel Estimation

For kernel estimation and blind deconvolution a patch-based strategy is introduced. Both statistical priors learned from a natural image dataset and a simple patch prior from synthetic structures are examined to select proper patch priors[8]. It is examined that the patch prior prefers sharp image content to blurry ones. Based on the patch priors, the partial latent image and the blur kernel can be iteratively recovered. This approach achieves state-of-the-art results for uniformly blurred images.

### E. Kernel fusion for image de-blurring

Kernel estimation for image de-blurring is a challenging task. There are so many number of algorithms have been developed for kernel estimation. For complete de-blurring of the image individual kernels estimated using different methods alone are generally inadequate. The problem of fusing multiple kernels estimated using different methods into a more accurate one that can properly support image de-blurring as compared to each individual kernel has been addressed[9]. This method is inspired by a similar principle of kernel fusion in the context of image de-blurring, to directly obtain a kernel by merging/combining principles of two or more kernels.

### F. De-blurring by different type of filter

#### 1) De-blurring with Lucy-Richardson Filter Algorithm

Lucy Richardson algorithm gives an iterative method of image restoration for a given Point Spread Function (PSF). This is a Bayesian Based Iterative method ,also known as the Richardson-Lucy De-convolution method in which the PSF is known.PSF describes the impulse response of an image. Using this algorithm, we can reduce the noise effect on image restoration, Resolution of restored image can be improved by sub sampling, Camera read-out and background noise can be handled, Non uniform quality of the image can be accounted.

#### 2) De-blurring with Regularized Filter

When constraints are implemented on the recovered image and limited additive noise information are known in such a case regularized filter is used. Constrained least square restoration algorithm uses a regularized filter to restore blurred and noisy image. In Matlab the function called de-converge is help to de-blur an image.

#### 3) De-blurring With Wiener Filter

Among filters, Wiener filter is one of the best filters to restore an image from blur and noise. The Small amount of frequency characteristics of the image and

additive noise are known then such a case wiener filter is used. De-converge Matlab function is used to de-blur an image by using wiener filter. The PSF value is known exactly then the de-blurring can be effective. This method is good for the reconstruction of noisy signal. It applies in orthogonal function in different basis gives different results. If the signal separate from the noise it will be best.

Noisy components are moving towards zero by the universal wiener filter. It is mostly applied between the difference of image and a leveled image. On spatial basis, Wiener filter act as a low pass filter.

## III. CONCLUSION

Automobiles are recognized from a vanity plate by identifying a digit on a license plate and retrieving the data related to vehicle from record. In this paper, a novel method is proposed of parameter estimation calculation for license plate from quick moving vehicles. Under some exceptionally powerless suspicions, the license plate de-blurring issue can be decreased to a parameter estimation issue. The quasi-convex property of sparse representation of kernel parameter is uncovered and exploited. The obscure portion of license plate which is can't be perceived by human eye the de-blurred result gets to be coherent.

All paragraphs must be indented. All paragraphs must be justified, i.e. both left justified and right-justified.

## IV. REFERENCES


[1] H. Cho, J. Wang, and S. Lee, "Text image deblurring using text-specific properties," in Proceedings of European Conference on Computer Vision(ECCV), Oct 2012, pp. 524–537.

[2] Zhigang Zhang and Cong Wang, "The Reseach of Vehicle Plate Recogniton Technical Based on BP Neural Network," AASRI Procedia, vol.1, pp. 74-81, 2012.

[3] Q. Shan, J. Jia and A. Agarwala, "High-quality motion deblurring from a single image," ACM Trans. Graph., vol. 27, no. 3, p. 73, 2008.

[4] Xiaoyi. Jiang, Dr. Da-Chuan Cheng, Steffen Wachenfeld, Kai Rothaus, "Image Processing and Pattern Recognition", Department of Mathematics and Computer Science, University of Muenster, Winter Semester 2004/2005.

[5] Kernel (image processing), Wikipedia, March 22, 2017 [Online]. Available:

[6] Qingbo Lu, Wengang Zhou, Lu Fang, and Houqiang Li, "Robust Blur Kernel Estimation for License Plate Images from Fast Moving Vehicles" IEEE Transactions on Image Processing, 2016.

[7] Pavel Svoboda, Michal Hradis, Lukas Marsik, Pavel Zemcik, "CNN for License Plate Motion Deblurring" , February 2016.

[8] Libin Sun, Sunghyun Cho, "Edge-based blur kernel estimation using patch priors" IEEE International Conference on Computational Photography (ICCP), Brown University, 2013.

[9] Long Mai, Feng Liu, "Kernel Fusion for Better Image De-blurring" 2015 IEEE Conference on Computer Vision and Pattern Recognition, Portland State University, 2015.