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A Survey on Technique Used for Deblurring Licence Plate of Fast Moving Vehicles Using Sparse Representation

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Abstract— Vehicle number acts as a unique number that can be used to identify a vehicle in case of any traffic violation. Surveillance camera used by traffic control system captures images of the vehicle number plate which may be subjected to noise and hence blurred. Numerous techniques are proposed and used to deblur the blurred image. Deconvolution (BID) model has attracted lots of consideration from the researchers. The blur caused due to fast motion of the vehicle lacks the edge information. In this paper, we suggest a better technique which is based on sparse representation to recognize the blurred portion.

Keywords— blurred image, Deconvolution, sparse representation, blind image Deconvolution (BID)

I. Introduction

Vehicles involving pay parking violation, pay tax violation and stolen by thief are tracked by CCTV surveillance camera.Several automatic number plate recognition(ANPR) technology are being used by government officials to automatically capture an image of moving vehicle's. When capturing vehicle images by CCTV camera, there are different causes of blur such as the blur due to the motion of camera and the out-of-focus. They identify number plate location and number then compare the number plate to the database of vehicles. Due to low speed and nearer distance in the parking lot, the images are clear. But in case of faster moving vehicles the captured image will be blurred. Deblurring of the image is main problem in image restoration. The existing system deblur the image of licence plate of slowing moving vehicle but not the fast moving vehicles. To overcome this issue, the technique for deblurring of an image based on the sparse representation is used. The input image is split into image patches and processed one by one. For each image patch, the sparse coefficient is estimated. The estimation is repeated for all patches and finally merge all the patches. The merged patches are subtracted from blurred input image to obtain deblurred image. This algorithm is implemented using matlab.

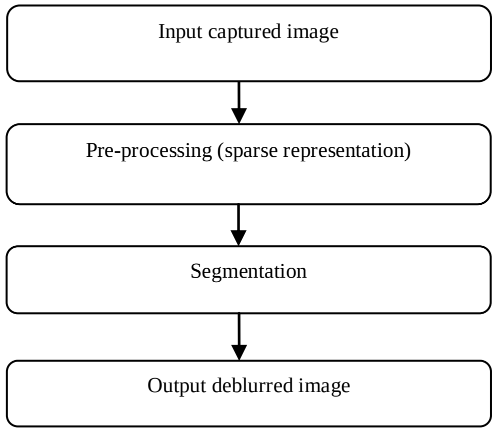

Fig. 1 Flow Chart

II. Related Work

Sudha. S et al [1]. To identify the blur kernel of captured blurred image, sparse representation is used. When the kernel angle nearer to the movement angle, the blurred image has the most sparse representation. At that situation, the length of the movement kernel is valued using Linear Interpolation. This system holds considerable movement kernel blur even when the license plate is distorted by human eyes. By using kernel estimation text of license plate image is estimated.

Kalaivani.R et al [2]. Based on the sparse representation coefficients of improved image, the blur kernel angle, and by using Hough transform ,the length is estimated. This method can well handle large motion blur even the license plate is not recognizable by human eyes. They proposed an algorithm of new kernel parameter estimation for license plate from fast moving vehicles. Under some fragile assumptions, the license plate deblurring problem can be reduced to a parameter estimation problem. In this system we use sparse representation. The main advantage of the algorithm is that it can handle very large blur kernel and it is more robust. By this result, human can read the deblurred image of license plate.

Abinaya G et al [3]. They described a method for detecting vehicles, which break up the rules in real time traffic condition. One of the problems is to recognize the license plate due to fast motion. The captured video is converted into image frames. 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. With less effort to human eyes, moving vehicle’s license plate is recognized.

Sinduja C et al [4]. Sparse representation is used to identify the blurred images from the license plate of fast moving vehicles. The detection of fast moving vehicle is an important part in Intelligent Transportation System. The kernel angle is estimated using sparse representation. The length of the motion kernel is estimated using Random transform in Fourier domain which handles large motion blur even when the license plate is unrecognizable by human eyes. It is used to identify the vehicle which crosses the speed limit and also it is useful in hit and run accidents. The results show that this method can be used improve the efficiency of the moving vehicles license plate detection without blur.

R. Nandini el at [5]. Blur kernel estimation can be considered as the best solution in a large blur kernel space. By constraining the blur kernel, the search boundary can be greatly reduced, which can considerably improve the robustness of blur kernel estimation. The experimental results shows that such constraints on blur kernels are very effective. In this system a fresh kernel parameter estimation algorithm of fast-moving vehicles is proposed. An interesting quasi-convex property of sparse representation coefficients with kernel parameter (angle) is determined and implemented. To estimate the blur angle efficiently, coarse-to-fine algorithm is used. The advantage of this system is to handle very large blur kernel and robustness.

S. Bemila Joy el at [6],In this system, de-blurring of fast moving license plate is made, which is severely blurred and even unrecognizable by human eyes. The main goal is to recover a sharp license plate that can be recognized by human eyes effortlessly. Generally, the blur kernel is dominated by the relative motion between the moving car and static surveillance camera, which can be modeled as a projection transform. However, the kernel can be approximated by linear uniform motion blur kernel. The task of blur kernel estimation can be reduce to two parameters in the linear motion kernel angle (θ) and length (l). Given a linear kernel I^θ, l, kθ, l, a corresponding de-blurred image I^θ, l can be obtained by applying NBID on the blurred image B with kθ,l. Then the sparse representation coefficients of I^θ, l on pre-trained dictionary can be denoted as A(θ, l), which is a function of θ and l. We observe that A(θ, l) shows very useful quasi convex characteristic under a fixed l. By utilizing this interesting characteristic, we can infer the true angle of the blur kernel efficiently. Once the angle is determined, on the direction parallel to the motion, the power spectrum of blurred image is obviously affected by the linear kernel based on which the spectrum is a sinc-like function, and the distance between its two adjacent zero-crossings in frequency domain is determined by the length of kernel. In order to reduce the effect of noise and improve the robustness of length estimation, we utilize the Radon transform in frequency domain. After kernel estimation, we obtain the final de-blurring result with a very simple NBID algorithm.

III.PROPOSED SYSTEM

A few challenging aspects for license plate deblurring are,

1) Whole image of the vehicle is captured using surveillance camera but the number plate only occupies a small region of the whole image. This effects in less details for kernel estimation.
2) The size of blur kernel is very large. Due to the fast motion vehicles. The edge information is lost severely. Therefore, the algorithm based on large scale edges cannot work robustly and even may fail in some situations.
3) The content of licence plate image is very simple, most of edges lie in horizontal and vertical directions. Thus, the methods based on isotropy assumption may also not work well for license plate image.

Generally, the blur kernel depends on the relative motion between moving vehicle and fixed surveillance camera. The captured image will be blurred as the vehicles will be moving in the faster speed. In order to remove the blur the following steps are implemented. They are,

A. Angle estimation
B. Length estimation
C. Convolution
D. Text recognition

A. ANGLE ESTIMATION

Sparse representation coefficients show great possible in the angle estimation of linear uniform kernel. A natural extension is to apply it to the length inference. The problem solved by the sparse representation is to search for the most compact representation of a image in terms of linear combination of pixels in an over complete dictionary. Sparse representation works well in applications where the original blurred image needs to be reconstructed inorder to get deblurred image.

$(V, I) = \{-p(I) + |M\Theta * S - B|i^1\}$

Where B is the blurred image

I denotes the deblurred image to be recovered

MΘ is the linear uniform movement kernel determined by angle Θ and p(I) is the prior of the sharp image.

$V = \text{argmin} \sum | \beta i | \text{ s. t. } \Psi i$

$Y = D \beta i \; Y = \{|I|TV + | M\Theta * S - B|i^1\}$

Where D is pre -learned over-complete dictionary on the sharp license plate image

Ψi is the patch extraction operator, and αi is the sparse representation coefficients of the i th patch.

However, it is difficult to directly solve such a two-layer optimization problem. In order to investigate the relation between ∑|αi|. We first solve the following optimization problem.

$Y = \{|I|TV + | M\Theta * S - B|i^1\}$

Then the sparse representation coefficient ∑|αi| can be computed by solving,

$\min \sum |\alpha i| \text{ s. t. } \Psi i \; Y = D \alpha i$

Here, for simplicity, we define C = ∑ |αi|. C (n, m) can be regarded as a function of kernel parameters (n, m).

B. LENGTH ESTIMATION

For BID, Linear interpolation is proposed to estimate the motion blur kernel, especially when the captured image is corrupted by noise. In our length estimation algorithm, we adopt the modified Linear interpolation which only considers the center area of blurred image. Linear interpolation is used to estimate the blur kernel in spatial-temporal domain. The Linear interpolation represents an image as a collection of projections along various directions. The Linear interpolation is the projection of the image intensity along a radial line oriented at a specific angle.

C. CONVOLUTION

Convolution is an important operation in image processing. The input blur is convoluted with the blur kernel to get the enhanced output. The blur kernel can be viewed as linear uniform convolution and parametrically modelled with angle and length. The angle is estimated using the sparse representation and the length using the Linear interpolation.

D. TEXT RECOGNITION

Blur kernel estimation can be regarded as searching the best solution in a large blur kernel space. The license plate blur should be considered as the linear blur. The text is recognized after deblurring the license plate. The angle is estimated using the sparse representation and length using linear interpolation. The angle and length of kernel is estimated and convoluted with an input blur image. The kernel is estimated to find the enhanced output image. The enhanced output image contains the semantic information.

IV. EXPECTED RESULT

Images of different license plates having various background conditions, light condition and image quality are given as input. After processing the input image we obtain deblurred image.

Fig. 2 Input blurred image by θ=90°, l=15

Fig. 3 Output deblurred image after 80 iterations with θ=88°, l=14

V. CONCLUSION

The proposed system has tried to remove blur of the licence plate image which is captured from the camera. The information lost due to blurring and it is restored by estimating a blur kernel using sparse representation. The sparse representation coefficient with angle is determined and implemented. The length estimation is completed by exploring well-human, the deblurred result becomes is more robust. Along with this, the characteristics of motion blur are also taken into consideration while founding the blur kernel.Then, NBID method is applied to get a deblurred licence plate.

REFERENCES

[1] Sudha. S, Suganthi. K and Deepika. R, "*Intelligent Image Acquisition of License Plate Image Using Kernel Estimation Algorithm*", International Journal of Innovative Research in Computer and Communication Engineering, 2016.

[2] Kalaivani.R and Poovendran.R, "*A Recognition of License Plate Images from Fast Moving Vehicles Using Blur Kernel Estimation*", International Journal of Innovative Research in Science, Engineering and Technology, 2017.

[3] G. Abinaya, R. Banumathi, V. Seshasri and Mr. A. Niranjil Kumar, "*Rectify The Blurred License Plate Image From Fast Moving Vehicles Using Morphological Process*", International Journal of Electronics and Communication Engineering, 2017

[4] Sinduja C[1], Manickam T, *" Deblurring license plate images with kernel Estimation*", International Journal of Intellectual Advancements and Research in Engineering Computations.

[5] R. Nandhini1, Prof. M. Jothi, "*License Plate Image Recognition From Moving Vehicles Using Kernel Estimation Method*", International Journal of Advanced Research in Computer and Communication Engineering July 2017.

[6] S. Bemila Joy, Dr.M. Kanan "*Deblurring Of License Plate Image Using Blur Kernel Estimation*", International Research Journal of Engineering and Technology (IRJET) June 2017.