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A Review of Various Deconvolution Techniques for License Plate Recognition

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Abstract: ***A number plate is specific identification of a vehicle used to uncover the one who involves in hit and run accidents. The image capture from the fast moving vehicles will be unrecognizable by human because snapshot provide a shaken image. Some of the techniques like optical character recognition, character segmentation are used to uncover the blurred image. Like wise to recovered those number plate images, various deconvolution techniques will be used that will be reviewed in this paper.***
Keywords: BID-Blind Image Deconvolution, NBID- Non Blind Image Deconvolution.

I. INTRODUCTION

One of the major problem in image recovering process is that number plate image recovery .Number plates play a major role in this increasing population. To uncover the trouble makers vehicle license plate is a great challenge. license plate contain both the numerical and alphabets. The main roads contains the surveillance camera to find out the overspeed vehicles and also various cases such as theft, robbery, etc. The snapshot of the image from the moving vehicles will cause more blur and it will be unrecognised by human eyes. The high resolution cameras and hybrid cameras are also used to avoid this problems. Obtained images from cameras had loss in edge information. And then many edge detection techniques such as vertical edge detection, horizontal edge detection and cranny edge dectection are developed to get lossess image recovery.There are many techniques are developed to retrieve the number so that the owner of the vehicles will be easily identified.

II. CHALLENGES IN LICENSE PLATE RECOVERY

The camera used for image capturing in traffic will be designed to cover whole area of roads that includes whole vehicles. In that whole vehicles, the license plate cover only small portion that will provide less information about kernel information. Then due to fast motion of vehicles, the edge information are lost atmost so many algorithms are failed due to this reason. During the capturing of vehicles in fast motion, the blurring will be more and it is unrecognisable by human. But the image of license plate is simple and its edges lie in horizontal and vertical directions alone and also contain alpha-numeric characters.

III. LICENSE PLATE RECOGNITION

A. Blind Image deconvolution

In image processing BID works well for many applications. It tackles much more difficult problems when the degradation is unknown. BID is a most valuable tools used for image recovery with good quality without more complex algorithms.For BID, kernel and sharp image are not be known. BID is ill-posed in its nature. It uses many regularisation and minimisation techniques to uncover the blur. In one of the BID algorithm, we have to estimate a blur using four parameters such as kernel size, sampling size and trade off parameters . By estimating this parameter sharp image has been obtained. BID problem can be categorised into 2 forms.

1) Uniform bid: In uniform deblurring, for natural images the BID is used. Here blur kernel is estimated through the marginal probability maximization by applying a Bayesian variantional scheme. The latent images and blur kernel are estimated iteratively by extending Bid to Map framework. But it also needs more preprocessig methods to provide ‘no blur’ image.
2) Non uniform BID: The non-uniform BID is happened due to shake in image captured by camera. It can be modelled to spatially variant blur. Some hardware solutions are made to deblur those shaken images. A hierarchical framework are also made for non-uniform deblur image to recover the original one.

B. Single Blind Image deconvolution

It has number of unknowns exceeds the number of observed data and it forms the parametric forms for the kernels.For single image

deblurring many techniques has been used to solve optimisation problem in an iterative manner. The map framework will also be developed but it requires more heuristics to get a good deblurred image. Various methods were developed to deblur a single image but they takes several minutes to uncover the blur.Variational Bayesian techniques are used to overcome map estimation problem. VB techniques are depends on mean field approximation and cost function. It leads multiple integration made a method more complicate to provide good deblur result. By decreasing noise values, VB techniques provides better results in case of single blind image deconvolution.

C. Fast Blind deconvolution

It produces a single image deblurring in a few seconds. In this fast blind deconvolution, two steps are involved to deblur the image. Here iteration process is takes place for kernel and latent image estimation. For latent image estimation, image having strong edges are considered and provide noise suppressed and sharp edge restored image result. The latent image estimation involves simple deconvolution and prediction. For kernel estimation, many methods are used . CG method is work well for kernel estimation in fast blind deconvolution. CG method works with image derivatives that reduces the computation steps of fourier transforms.In this deconvolution process c++ techniques is used rather than c techniques. For moderate size image, it only takes less than one minutes to deblur image which is about 20-25 times faster than c language implementation.

D. Non Blind image deconvolution

It is applied whenever the blur kernel of image is known and from the blurry version, the latent image has to be estimated. In most of the case NBID is applied at the end of any deconvolution process to uncover the blurred image. There many techniques applied to perform deconvolution process some of them are,

1) *Wiener filtering:* This filter is used to remove unwanted noise from the blurred image. It is mainly operated on fourier domain and it uses the fourier transform to make the filter more efficient.
2) *Lucy-Richardson method:* Used to restore blured image with known blur kernel.it is an iterative process. Here using point spread function, the pixels are represented.
3) *Tikhonov regularisation method:* It is used for both BID and NBID. In NBID, it works well for image without added noise. It uses the least square algorithm to restore the image. It provides the output image with smoothy edges. It also need less prior information than other methods.

IV. RESULTS AND DISCUSSION

Fig:1 moving vehicle and estimated license plate image

By using BID algorithm, the output is obtained. While using BID technique , we have to pay more attention to semantic content of images. License plate image is obtained through deblurring processs and still some artifacts are there in image. Likewise all deconvolution works, provide their results. In most of the cases, the BID algorithm is used to get good results.

V. CONCLUSION

In this work, we just know about the various deconvolution methods involved to uncover the blurred image. Due to many vehicles involves in crime process will be able to identify using this type of recovery methods. Other than this, many software such as

MATLAB and LABVIEW softwares are used for automatic detection of number plate of vehicles. Hardware solutions are also developed to do this process in more efficient manner. But still there is lack in recovering the some type of blurred image with good results.

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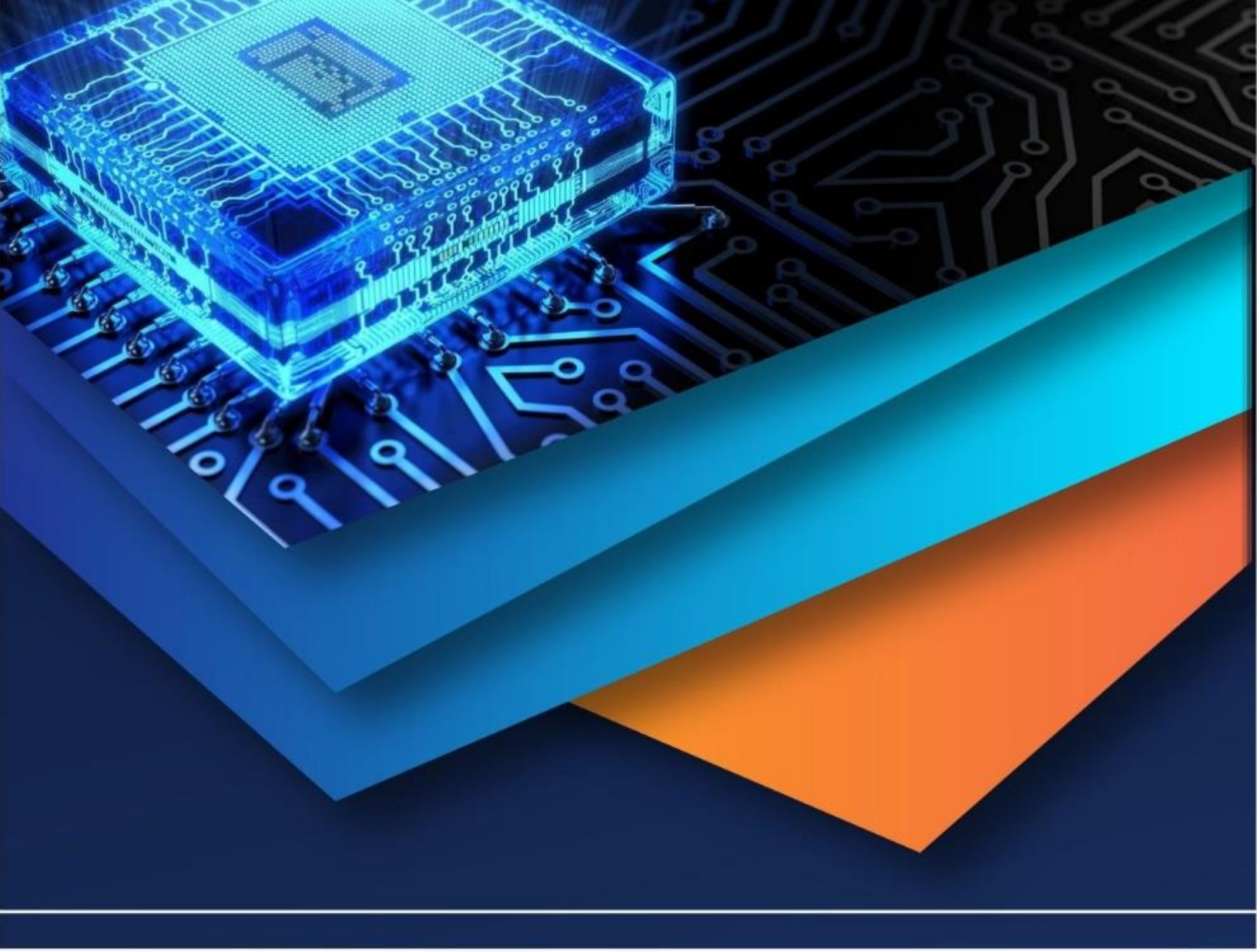

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