Security with an increased visibility of less visible colour image

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Abstract - As the significant growth in crime of murder, rape and robbery increased at night, it is very essential to read the number plate of vehicle used by the criminal and taken from infrared camera and weak in visibility. In this paper an image processing Strategy is proposed for those security applications where less visibility of colour images creates a stage of confusion in getting the numbers on the number plate.

Key Words: Pixel, hysteresis, non maximal Supression

1.INTRODUCTION

In law enforcement the numbers of less visible vehicle number plate image is a difficult task.As the criminal activity is mostly happened at night so the less visibility of light and dark creates less visibility of images taken by cameras. So for these challenges an image processing technique is required to find that number by increasing the visibility of the number plate. Detection of edges is an well known image processing method for enhancing the visibility of the edges of blurred image. It process by extracting discontinuities in brightness. Edge detection is used for segmentation of blurred images and edge detection in application such as image processing for security applications.

2.BACKGROUND

In number plate detection from a less visible number plate image by processing in image processing is very helpful for law enforcement. Here an algorithm used for numbers detection Which is based on background differencing and thresholding operations. The Performance of this method of image detection is heavily based on the background updating and threshold selection techniques.
Since different edge detectors work better under different conditions, it would be ideal to have an method that makes use of multiple process of edge detectors, applying each one when the scene situation are most ideal for its method of detection. In order to create this system, you must first know which edge detectors perform better under which conditions. multi-edge-detector system, which analyzes the scene and runs the edge detector best suited for the current set of data. For one of the edge detectors we considered two different ways of implementation, one using intensity only and the other using color information.

There are many methods for edge detection, but most of them can be grouped into two categories, search-based and zero-crossing based. The search-based methods detect edges by first computing a measure of edge strength, usually a first-order derivative expression such as the gradient magnitude, and then searching for local directional maxima of the gradient magnitude using a computed estimate of the local orientation of the edge, usually the gradient direction. The zero-crossing based methods search for zero crossings in a second-order derivative expression computed from the image in order to find edges, usually the zero-crossings of the Laplacian or the zero-crossings of a non-linear differential expression.

3. DESIGN ALGORITHUM

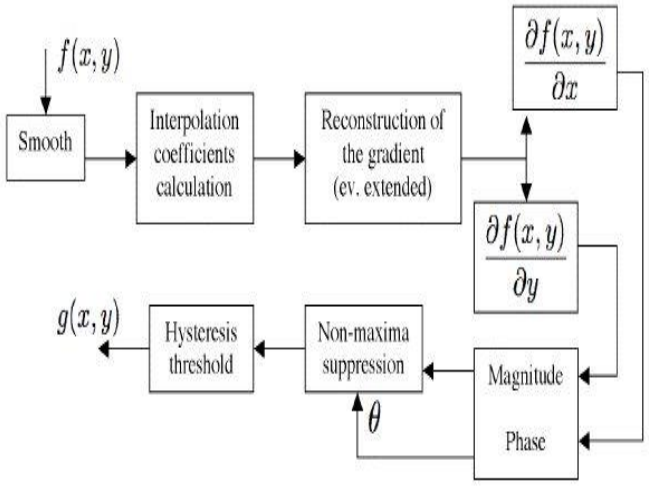

Fig -1: Illustration of process involved in canny detection technique.
It is hard to find the gradient by using equation (1)

$$G(x) = e^{-(\frac{x^2}{2\sigma^2})} \quad (1)$$

In order to simplify the computation, we adapt another equation equal to the equation (1), this equation is first-order derivative function of Guassian function.

$$G'(x) = (-\frac{x}{\sigma^2})e^{-(\frac{x^2}{2\sigma^2})} \quad (2)$$

Because the computation of 2-dimension convolution is complex and large. We find the gradient by convolve x-direction and y-direction individually in fact as below:

$$M_x(x,y) = G_x^{`} * I(x,y)$$
$$M_y(x,y) = G_y^{`} * I(x,y) \quad (3)$$

Now, the Second-Order Derivative Edge Detection:-

The Laplacian of a 2-D function $f(x, y)$ is a second-order derivative defined as

$$\nabla^2 f = \frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} \quad (4)$$

There are two digital approximations to the Laplacian for a 3×3 region:

$$\nabla^2 f = 4z_5 - (z_2 + z_4 + z_6 + z_8) \quad (5)$$

$$\nabla^2 f = 8z_5 - (z_1 + z_2 + z_3 + z_4 + z_6 + z_7 + z_8 + z_9) \quad (6)$$

The Laplacian is usually combined with smoothing as a precursor to finding edges via zero-crossings. The 2-D Gaussian function

$$h(x,y) = -e^{-\frac{x^2+y^2}{2\sigma^2}}, \quad (7)$$

where σ is the standard deviation, blurs the image with the degree of blurring being determined by the value of σ. The Laplacian of h is

$$\nabla^2 h(x,y) = -\left[\frac{x^2 + y^2 - 2\sigma^2}{\sigma^4}\right] e^{-\frac{r^2}{2\sigma^2}} \quad (8)$$

This function is commonly referred to as the Laplacian of Gaussian (LOG).

Because second-order derivative operator is sensitive to noise, we use low-pass filter to eliminate the noise first. We combine Guassian filter with Lapacian operator so that we get Laplacian of Gaussian Edge Detector. We take advantage of the property of Gaussian function to distribute the noise.

4. METHODOLOGY

Steps for An Algorithm for Blurred Thermal image edge enhancement for security by image processing technique

1) acquiring blurred image of less visible number plate of vehicle

2) Enhancing the less visible image

Here, less visible image is enhanced by image processing.

3) Boundary detection:

Boundaries detected by canny edge detection method of both processed and original blurred thermal image

4) Combination of quality information

Fusion of processed blurred thermal images and unprocessed image.

5. RESULT

The less visibility of images is processed by proposed image processing method and the experiment shows the good visibility of numbers on number plate which are taken by cameras. So for these challenges Proposed image processing technique is effective to find that number by increasing the visibility of the number plate.

Results of this proposed method as follows:-

Fig -2: Illustration of colour image obtained by camera.

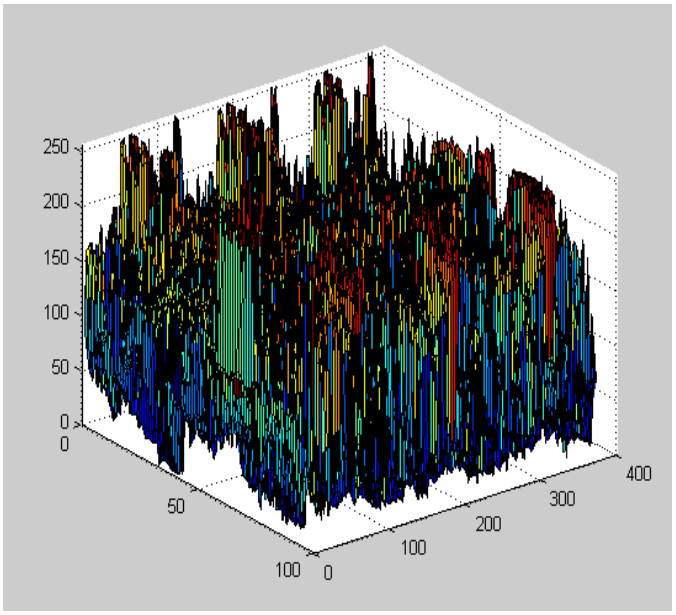

Fig -3: Illustration of graph of brightness of colour image

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Fig -4: Illustration of high lightening the essential target object by proposed algorithm.

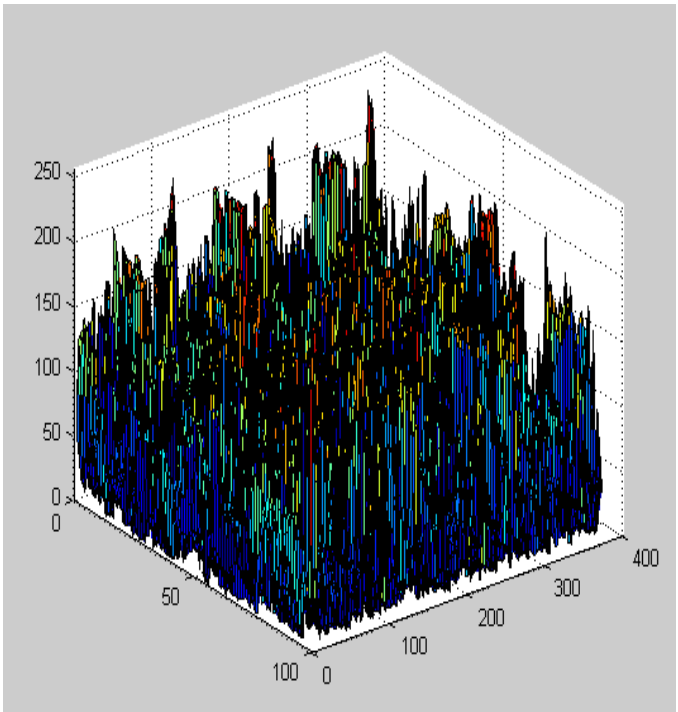

Fig -5: Illustration of graph of brightness of high lightening colour image

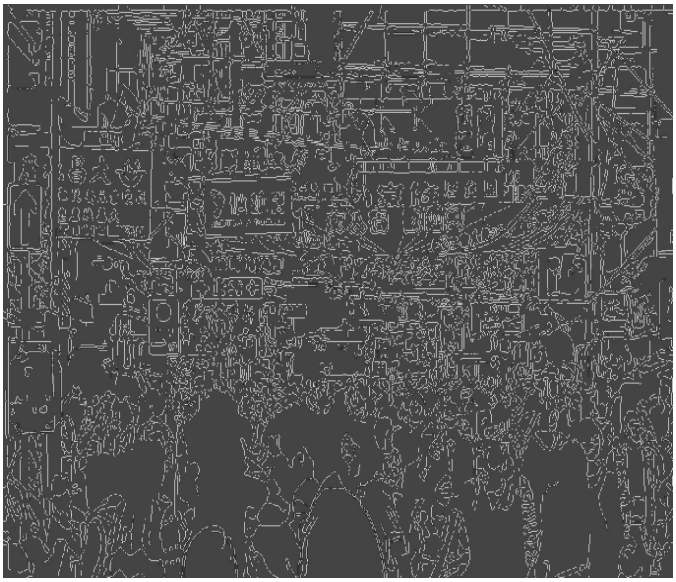

Fig -6: Illustration of fusion of processed and unprocessed colour image.

6. CONCLUSION

Original blurred images which are acquired from infrared camera are processed and highlighted essential edges of the object of blurred thermal image and outcome of image fusion of the processed and unprocessed blurred thermal image from canny edge detector show the much enhanced outcomes specially for security application.

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