Blur Estimation and Image Fusion Using Gaussian Derivatives

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I. INTRODUCTION

Image fusion is an important technique in image processing. It is needed when we image non-flat objects while the depth of field of the optics is not enough to sharply image the whole object at once. The solution is to combine several images, each focusing on other parts of the object. Those images should fuse to reach an image with as much sharp parts as possible. In literature a lot of methods have been proposed for image fusion. A survey has been done in [1].

In previous paper we proposed a new wavelet-based image fusion method[2]. In our method first, the edge pixels are detected and their blur level are estimated using Ducottets method (he uses the first derivative of the Gaussian as the wavelet)[3]. One problem in that method is reporting different locations for same features with different blur level. This problem has been illustrated in Fig.1. To solve this problem firstly we have to set scale step at most to 0.5 and secondly, we use a looking and elimination procedure. In this paper we proposed to also use second derivative of the Gaussian as the wavelet to overcome this problem.

II. THE NEW METHOD

After calculating the wavelet transforms using Gaussian first and second derivatives separately we can continue with two methods. The first method is detecting edge pixels separately and then combining the results and the second method is calculating energy of quadrature filters and then do edge detection part.

![Wavelet Coefficients](image)

(a)

(b)

Figure 1. (a) Profiles of two blurred lines with blur levels ($\sigma$) of 2 and 3 (b) Modulus maxima of wavelet coefficients of (a)

III. CONCLUSIONS

By every new methods, the computational cost will reduce because firstly we do not have to set scale step at most to 0.5 and secondly looking for corresponding edge pixels across scales and also between different images will reduce.

REFERENCES

