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Reinforced Edges by Masking

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Abstract. We present an unsharp masking technique. By changing parameter sets (α,β), we find the best combination. Simulations were completed on 18 images, and their corresponding subjective and objective performances are provided.

Keywords: Unsharp masking, frequency analysis

1 Introduction

The contrast is an important perceptual characteristic of an image [1-3]. Image quality is significantly affected by stressing its high frequency part to improve the details or edge information [4-7]. Masking methods are widely used to make an image clear.

There are few drawbacks [8,9]. For example, the appearance of the high pass filter causes the system relatively sensitive to unwanted noise [10-14]. This causes artifacts, especially in uniform areas of even slightly noisy images. the unsharp masking process can over-improves high contrast areas, and eventually images are not well showed [15-18].

2 Proposed Method

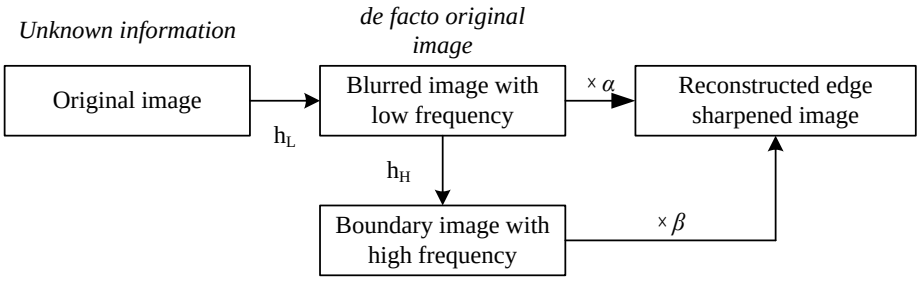

Fig. 1 Block diagram of the proposed method.

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Figure 1 shows the block diagram of the proposed method. The proposed method is performed as follows:
(1) Obtain blurred image by low pass filter.
(2) Detail detection by high pass filter.
(3) Parameters set (α,β) determination.

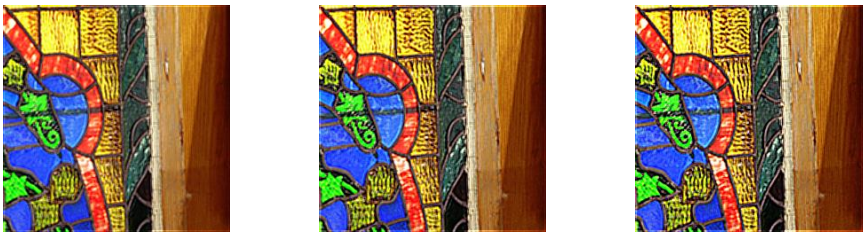
3 Simulation Results

In this section, we provide the simulation results comparison on 18 McM dataset, with different (α,β) conditions. Different (α,β) combinations are compared with each other and we find the most appropriate (α,β) condition. The McM dataset is shown in Fig. 2.

Fig. 2 18 images in McM dataset.

Figure 3 shows result images. We tested experiments to evaluate the subjective quality of the different (α,β) combinations. Figure 3 shows performance comparison on #1 McM image, where Fig. 3(a) is original image, and Figs. 3(b-f) are with different β values with the factor of 2. Note that α is set to 1 in all cases. As can be found in Fig. 3, visual quality of Fig. 3(c) gives the best performance, and Fig. 3(d) is comparable. However, Fig. 3(b) is too vague (high frequency components are lost), and Figs. 3(e) and 3(f) are over sharped images.

(a) (b) (c)



(d) (e) (f)

Fig. 3. McM image #1: (a) original image, (b) (α,β)=(1,0), (c) (α,β)=(1,2), (d) (α,β)=(1,4), (e) (α,β)=(1,6), (f) and (α,β)=(1,8).

4 Conclusions

This paper proposed an unsharp masking method, which uses two parameter α and β. By testing with different (α, β) combination, it can be found that (α,β)=(1,2) gives the best performance.

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