www.ijecs.in
International Journal Of Engineering And Computer Science ISSN: 2319-7242
Volume 4 Issue 8 Aug 2015, Page No. 13852-13854

Weighted Guided Image Filtering For Image Fusion

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Abstract: ***This Weighted Guided Image Filtering(WGIF) is which involves the smoothening technique. It involves the condition that can cocerve sharp edges. The edges are given higher weightage than other areas. This is actually an extension on filtering.. The images get fused using the weighted guided filter. For fusion the image decomposed to base layer and detail layer. Using this filter the image get fused and obtain more visual quality output.***

Keywords: Weighted guided filter, image fusion,smoothening**.**

1. Introduction

Based on modality images, fusion methods aim at obtaining information. Minimize various error between fused and input images is the criterion based method. On the concept of medical and diagnosis, important of investigating for medical image fusion is the edges and outliers of the objects is more curtail than other areas of images. It is therefore to preserve for the edge like features is. As known, the image with grater contrast delivers more edge features. On this basis, proposes a new image of medical fusion scheme based in Weighted Guided Image Filtering .

The weighted guided filtering is incorporated such that weightage is given to each pixel value. Based on this compute the variance of all pixel. The normalized variance gives the weightage including the edges and smooth areas. Compared to presently existing image fusion schemes , visual and assessments of images demonstrate the effectiveness of weightage method on WGIF..

2. Weighted Guided Filtering

Let guidance image denotes theG and denoting σ2 G,1(p) be the variance of G in the specified window, 1(p). The edge specified weighting G(p) is defined by using local variances of specified windows of all pixels as defines:

ΓGp'=∑_(p=1)^Nσ_^2G,1(p')+ε/σ^2G,1(p')+ε (1)

where guidance image can be indicated to,G,1(p')-Variance of G in the particular window where ε value is as square of 0.001×L2 and denotes small constant, its value is selected while L the input image with the dynamic range. Used in the computation of G(p) using Eq.(1),all pixels in the guidance image .To the whole guidance image in specified addition, the weighting G(p) measures the importance of pixel p with respect. The complexity of G(p) is O(N) for an image with N pixels due to the box filter . In a smooth area the value of G(p) is usually less than 1 if p is at an edge the value is larger than 1 if p.

WGIF is the edge preserving smoothening technique.The smoothening technique in the scenes decompose an image into base layer and detail layer. The base layer contains homogeneous structure contains sharp edges. They are such that variations with high pixel intensity values. The detail layer contain random structure with repeated regular structure. Low pixel intensity values are contained in detail layer.The weighted guidance image filtering is an extension to guided filtering.

Weighted filter, the basic assuming was that the WGIF is a linear model between the filtering output Z the guidance image . With the cost function E(ap,bp) the specified weighting G(p) is associated. The system ensures that if G belongs to the edge then the output also belonging to an edge which is assured. The resulted solution is resulted and grandees minimizing to difference between the image that undergone filtered X for which filtering output. They by a cost function E minimization which is defined as maintain the linear method.

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G(p) is associated with the cost function E(ap,bp).The system ensures that if the guidance image G has an edge then the output has an edge which is assured. The resulted solution is resulted by minimizing the difference between the image to be filtered X and the filtering output. They by minimizing a cost function E(ap,bp) which is defined as maintain the linear model i.e.,

E=∑_(pεΩζ (p')[ap'G(p) + bp'-X(p))+ λ/⟦ΓGp'a⟧] (2)

The specified values of ap'and bp' are computed as ap’=(μGΘX,ζ1(p^')-μG,ζ1(p^'))/(σ^2G,ζ1(p^')+λ/ΓGp' (3)

bp’=μX,ζ1(p^')-ap’μX,ζ1(p^') (4)

where is the element to the-element product of matrices.The mean of the values of, G and that of X are μGX,ζ1(p), μG,ζ1(p) and μX,ζ1(p) respectively. z ̂(p) the final value is given as

z ̂(p)=a ̅p’G(p)+b ̅p’ (5)

a ̅p’and b ̅p’are the mean values of in the window computed as

a ̅p=1/|Ωζ1(p)|∑_(p'εΩζ1(p))〖ap’〗 (6)

b ̅p=1/|Ωζ1(p)|∑_(p'εΩζ1(p))〖bp’〗 (7)

|ζ1(p)| is the cardinality of ζ1(p).

The same images images X that of G are taken. Consider X(p) is much larger than 1,the value of the pixel p is at an edge such. WGIF to 1 than ap in the GIF ,shows that edges are cared more presveratively by the WGIF than that of the GIF. As given in Fig. 1, edges are preservating much more better by the WGIF. In case of the complexity of the WGIF,gif is O(N) for an image with N pixels . Edges are also preserved well by the ABF in while the complexity of the ABF is an issue relating.

The image to be filtered while both the spatial similarity and the range similarity parameters the range of much specified similarity parameter in that of BF in is adaptive. The a BF (ABF) cannot in case to the procession via the adaptation of the parameters will destroy convolution edition form.Thus desired to design a filter which preserves edges as that of the specification the WLS filter fast as in the extraction of GIF.This explains sharp and sophticated edges are better by the WGIF than GIF.

Edges are incidently preserved more curiously WGIF. Complexity of the WGIF is O(N) with N pixels which is for an image the GIF. Edges are also preserved well by the ABF in while the complexity of the ABF is an issue.The range of the BF in is adaptive content the image be ,the spatial similarity and the range of the BF are adaptive to the content filtered. Unfortunately, parameters enhance destruction of the the 3D, and the (ABF) cannot be accelerated approach.

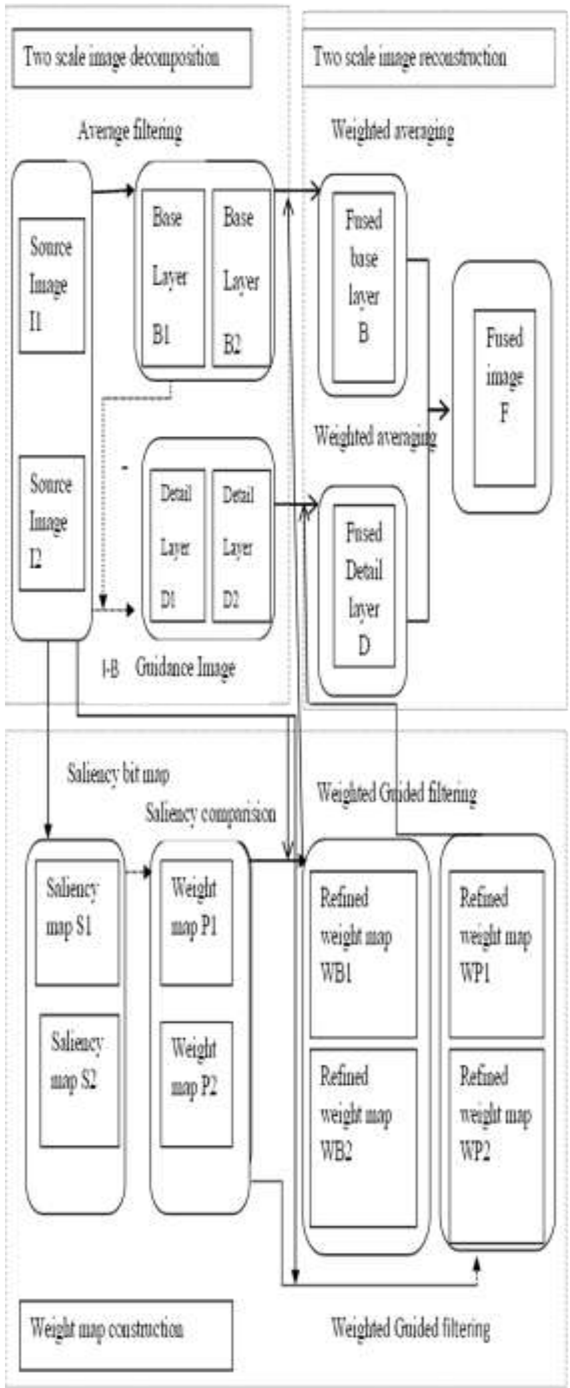

Fig.1.Image Fusion using weighted guided filtering

3. Image fusion

3.1 Image Decomposition

The base layer decomposed on the basis of source image is obtained by

$$B_n = I_n * Z \quad (8)$$

$$D_n = I_n * B_n \quad (9)$$

where the size of the average filter set to various filter, nth source image, Z specifies average filter.Fig.1: is a schematic diagram of fusion Image using weighted guided image filter.

Base layer and a detail layer explaining high values of variations in intensity and the small value variations respectively. The representations by average of the filtering in which source images are undergone decomposed.

3.2 Weight Map undergone Construction

First, to obtain the high-pass image H_n Laplacian filtering is added to source image

$$H_n = I_n * L \quad (10)$$

where Laplacian filter L is specified window. Then, H_n is used to cconstruct in the spacies of the saliency maps S_n.

$$S_n = |H_n| *_g r_g \sigma_g \quad (11)$$

where the r_g and σ_g are specified to 5, pass filter of size defined g is a Gaussian low. Good saliency level characterization of the of detail of undergone information is the measured saliency maps provide . The weightage specifing maps are constructed by comparing the saliency maps which determine where of source images, Skn is the k in the nth image saliency value of the pixel.. Weighted image filtering is performed on the each weight map.

3.3 Image Reconstruction

Image reconstruction of all given images are fused together by weighted averaging.

$$\overline{B} = \sum_{n=1}^{n} W_n^B B_n \quad (12)$$

$$\overline{D} = \sum_{n=1}^{n} W_n^B D_n \quad (13)$$

By the fusing base layer B and the fuseing detail layer D the fused image F is obtained

$$F = \overline{B} + \overline{D} \quad (14)$$

4. Conclusions

Weighted guided filtering for image fusion gives efficient visual quality fused image. As specifies the weightage to pixels ,edges can be well preserved. It can be implemented in MATLAB and can produce the desired output. . It has many applications in the fields of photography and image processing due to the simple attitude of the WGIF. Single picture fusion of differently exposed images ,detail enhancement, inhaze removal, and it is applied. The algorithms can make to produce images with excellent visual quality as those of global filters. Comparable to the GIF based algorithms the running times.

5. Recommendations

As the implementation speed of the output is very slow. It is essential to save the pixel values of windows using mod method.Thus can ensure the calculation of varience.

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