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Generalized Equalization Model for Image Enhancement

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Abstract

Satellite images are used in many fields of research. Resolution is the major issue in these kinds of images. In Image processing the image with higher resolution gives better results. In this letter we have studied wavelet based approaches for image enhancement techniques. These are based on discrete and stationary wavelet transforms with the interpolation algorithms, which will be used as resolution[1]improvement. Afterwards, compared the experimental results of both algorithms and we proposed an adaptive image enhancement algorithm based on image fusion. Compared the simulated results with the two methods and the proposed method shown that it gives improved PSNR.

1. INTRODUCTION

Satellite images are used in many fields of research. Resolution is the major issue in these kinds of images. Resolution is[2]one of the important characteristics of an image. Images are transformed in order to obtain high resolution. One of the most commonly image resolution enhancement technique is interpolation. Interpolation is widely used while enhancing the resolution of an image. Three different interpolation techniques are present. Nearest neighbor interpolation, bilinear interpolation and bicubic interpolation are three interpolation techniques.

Image resolution enhancement using wavelet domain is a new topic and on this domain there are many algorithms present. Wavelet plays an important role in image resolution enhancement. Here, two wavelet based image resolution enhancement techniques are shown. The first technique is based on discrete wavelet transform and the second technique is based on discrete wavelet and stationary wavelet transform.[3]Both these techniques are

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compared using different satellite images.

2.BACKGROUND

First of all, why do we need a transform, or what is a transform anyway?

Mathematical transformations are applied to signals to obtain further information from that signal that is not readily available in the raw signal.[4]In the following tutorial I will assume a time-domain signal as a raw signal, and a signal that has been "transformed" by any of the available mathematical transformations as a processed signal. There are number of transformations that can be applied, among which the Fourier transforms are probably by far the most popular.

Often times, the information that cannot be readily seen in the time-domain can be seen in the frequency domain. Let's give an example from biological signals. Suppose we are looking at an ECG signal (Electrocardiography, graphical recording of heart's electrical activity). The typical shape of a healthy ECG signal is well known to cardiologists. Any significant deviation from that shape is usually considered to be a symptom of a pathological condition.

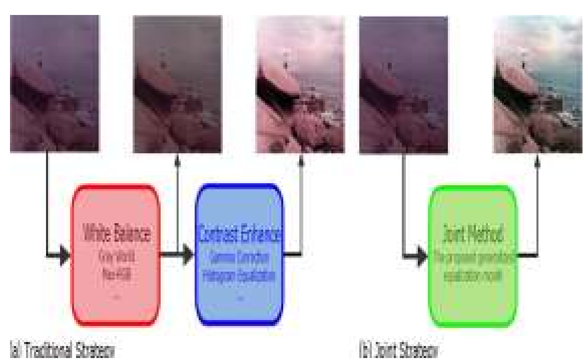
Let's take a closer look at this stationary concept more closely, since it is of paramount importance in signal analysis. Signals whose frequency content does not change in time are called stationary signals. In other words, the frequency content of stationary signals does not change in time. In this case, one does not need to know at what times frequency components exist, since all frequency components exist at all times!!! .

For example the following signal

$$x(t) = cos(2*pi*10*t) + cos(2*pi*25*t) + cos(2*pi*50*t) + cos(2*pi*100*t)$$

3. PROPOSED METHOD

The time and frequency resolution problems are results of a physical phenomenon (the Heisenberg uncertainty principle) and exist regardless of the transform used it is possible to analyze any signal by using an alternative approach called the multi resolution analysis (MRA). MRA[5] as implied by its name, analyzes the signal at different frequencies with different resolutions.



(a) Traditional strategy (existing method)

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(b) Joint strategy (proposed method)

DWT separates the image into different sub band images, namely, LL, LH, HL, and HH. A high-frequency subband contains the high frequency component of the image.The discrete wavelet transform can be used to analyze, or decompose, signals and images. This process is called decomposition or analysis. The other half of the story is how those components can be assembled back into the original signal without loss of information. This process is called reconstruction, or synthesis. The mathematical manipulation that effects synthesis is called the inverse discrete wavelet transforms (IDWT). To synthesize a[6]signal using Wavelet Toolbox software, we reconstruct it from the wavelet coefficients.

4.RESULTS

Optimal Image Enhancement Algorithm

Process:

0.Regard $\mathbf{NL_2}/\mathbf{G_2}$ as a function of β, $F(\beta)$.

1.For $j = 0 : 64$, calculate $F(\beta_j)$, $\beta_j = 0.01j$.

2.Choose $\hat{\beta}$ as the β_j minimizes F.

3.Get the output image corresponding to $\hat{\beta}$.

4.1 Optimal Contrast Enhancement

A basic application of the proposed algorithm is image contrast enhancement. In the experiments, the configuration of parameters is chosen according to the optimal image enhancement algorithm introduced in the former section. To demonstrate the validity of the proposed algorithm, we design a subjective experiment. In the experiment, 6 images are given simultaneously in a screen, including the original image from Berkeley Segmentation Dataset (BSDS300), the result corresponding to and 4 results with random selected. The 6 images are presented randomly. Each viewer selects the image that he or she thinks has the best visual effect.

4.2 Joint White Balancing and Enhancement

The proposed method is close to white balancing. To demonstrate performance of the proposed method in white balancing, we test the proposed method on three color constancy data sets. The angular error between the estimated light source and the ground truth is calculated as. Table 6.1 gives the median angular error on three data sets for various color constancy methods. Compared with gray-edge method, under suitable configuration, our method provides[7]comparable Color constancy results. As a major contribution, the generalized equalization model provides a joint strategy for image enhancement. If we relax to a small positive number, we can combine white balancing and enhancement into an integrated algorithm. We compare the proposed method with some existing white balancing algorithms, where we can see that the proposed method not only corrects the tone bias in original images but also enhances the contrast.

ImageName	Fattal'08[13]		He'09[26]		Kopf'08[10]		Tan'08[37]		Tarel'09[38]	
	Ori	Postprocess	Ori	Postprocess	Ori	Postprocess	Ori	Postprocess	Ori	Postprocess
ny12	1.28	**1.51**	1.39	**1.78**	1.40	**1.64**	2.18	**2.65**	1.76	**2.04**
ny17	1.53	**1.55**	1.62	**1.73**	1.61	**1.65**	2.18	**2.72**	1.70	**2.11**
y01	1.21	**1.44**	1.31	**1.74**	1.63	**1.89**	2.22	**2.85**	1.99	**2.41**
y16	1.20	**1.32**	1.36	**1.67**	1.34	**1.48**	2.06	**2.63**	1.96	**2.33**

Results Improved By Proposed Method

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4.3 Post-Processing for De-hazing Algorithm

The proposed method is also suitable for post-processing of many existing enhancement algorithms. For example,[8]although the existing de-hazing algorithms can remove the needless white-light components in the background of the images, they may lead to tonal distortion in the foreground. So, we can apply the proposed method as a post-processing step of the de-hazing algorithms to rectify the tonal distortion. To evaluate the performance of our method, we apply the two blind contrast restoration assessment methods described in, namely the increase of the number of visible edge, , and the mean of the visibility level, .We denote the number of visible edge in original[9]image and that in processing result as and respectively. The increase of visible edge is denoted as. The larger we get, the better the performance of contrast enhancement. Similarly, the increase of the value of also indicates the enhancement of visibility of an image.

Satellite Image Resolution Enhancement techniques have been tested on several different satellite images to show the superiority of these techniques. Images 1 shown below in that figure (a) is input image, (b) is high resolution image obtain from resolution enhancement using DWT technique and (c) is high resolution image obtain from resolution enhancement using DWT and SWT technique.

Original low resolution image

Proposed technique with DWT and SWT

5. CONCLUSION

In this project, we will analyze the relationships between image histogram and tone/contrast of image, and establish a generalized equalization model.[10]We will propose a series of definitions for context-free contrast, tone distortion and its nonlinearity, and clarify their relationships in terms of different parameters in the unified model.

The generalized equalization model amalgamates histogram-based tone mapping algorithms in a generalized framework of convex programming and therefore is a joint strategy Extensive experimental results show that the proposed method can be widely used in a series of enhancement applications with promising results. The rest of the paper is organized as follows. We establish the relationship between histogram and contrast/tone of images. It is shown that white balancing is realized by the linear transform of histogram, while contrast enhancement is achieved by the nonlinear transform of histogram, and both of which are generalized in the proposed model Here we proposed an adaptive method for image resolution enhancement to improve the PSNR performance, which is based on image fusion, and also compared the simulation results with the existed DWT with interpolation and DWT-SWT based techniques. By observing the results we can conclude that the proposed image fusion based enhancement has given better performance than the existed methods.

6. REFERENCES

1. T. Arici, S. Dikbas, and Y. Altunbasak, "A histogram modification framework and its application for image contrast enhancement," IEEE Trans. Image Process., vol. 18, no. 9, pp. 1921–1935, 2009.
2. M. Ashikhmin, "A tone mapping algorithm for high contrast images," in Proc. 13th Eurographics Workshop Rendering, 2002.
3. K. Barnard, L. Martin, B. Funt, and A. Coath, "A data set for colour research," Color Res. Applicat., vol. 27, no. 3, pp. 147–151, 2002.XU et al.: GENERALIZED EQUALIZATION MODEL FOR IMAGE ENHANCEMENT 81
4. G. Buchsbaum, "A spatial processor model for object colour perception," J. Frank. Inst., vol. 310, 1980.
5. Z. Chen, B. Abidi, D. Page, and M. Abidi, "Gray-level grouping (glg): An automaticmethod for optimized image contrast enhancement—Parti: The basic method," IEEE Trans. Image Process., vol. 15, no. 8, pp. 2303–2314, 2006.
6. F. Ciurea and B. Funt, The SunBurst Resort, Scottsdale, AZ, USA, "A large image database for color constancy research," in Proc. IS&T/SIDsColor Imaging Conf., 2004, pp. 160–164.
7. D. Coltuc, P. Bolon, and J.-M. Chassery, "Exact histogram specification,"IEEE Trans. Image Process., vol. 15, no. 5, pp. 1143–1152,2006.
8. F. Drago, K. Myszkowski, T. Annen, and N. Chiba, "Adaptive logarithmic mapping for displaying high contrast scenes," in Proc. Computer Graphics Forum, 2003, vol. 22, no.3.
9. E. D. P. et al., "Contrast limited adaptive histogram image processing to improve the detection of simulated speculations in dense mammograms," J. Digital Imag.vol. 11, no.4, pp. 193–200, 1998.
10. J. K. et al., "Deep photo: Model-based photograph enhancement and viewing," ACM Trans. Graph.—Proc. ACM SIGGRAPH, vol. 27, no.5, 2008.