International Journal of Electronics, Electrical and Computational System
IJEECS
ISSN 2348-117X
Volume 6, Issue 8
August 2017

Academic Science

Image Denoising and Visibility Restoration using bi-orthogonal Wavelet Transform

V U HariPriya[1],Shaik.TajMahaboob[2]

[1] PG Scholar, Dept of ECE, JNTUACE, Pulivendula, Andhra Pradesh, India

[2] Assistant Professor, Dept of ECE, JNTUACE, Pulivendula, Andhra Pradesh, India

ABSTRACT:

In today's era, almost all information is transmitted in the form of digital image or video. But after transmission, the obtained image is often corrupted with noise. Hence, we have to recover the original image by removing noise and then enhance it for a specific application. The visibility restoration of unclear images using colour analysis and depth estimation with bi-orthogonal wavelet transform technique was proposed in this paper. The restoration process uses median filter and adaptive gamma correction technique to defect color distortion and inadequate depth information. Adaptive gamma correction is used for enhancing the transmission to avoid halo effect problem and visibility restoration for restoring a better quality image.

Keywords: Image denoising, Depth estimation, Bi-orthogonal Wavelet Transform, color Analysis, Visibility restoration.

INTRODUCTION:

Images are habituallyruined by the turbid medium in the atmosphere. the irradiance expected by the camera from the prospect point is attenuated along the line of sight. The corrupted images loose-the contrast and colour reliability where the quantity of scattering depends on the distance of the scene point from the camera degradation in altitudinal variant .De-noising is highly necessary in both computational photography and computer vision application, eradicating haze can pointedly increase the visibility and correct the color shit triggered by air-light and computer visualization algorithms, form low level image analysis to high-level objective recognition. We recommend a simple image prior –dark channel to remove mist from the image. it is based on the key -observation utmost outdoor images contain some pixels with very low intensity in at least one color channel. But procedure is simple and more effective for objects devising similar to the atmospheric light. By exhausting this we can directly recover the high quality image.

From the fig: we say that considering an input image of any standard test image. the input image is degraded with some noise such as haze, fog, sandstorms and smoke to overcome this restoration model is proposed with exploitation of Median filter and Adaptive gamma correction procedure and dark channel prior method this overcomes the color distortion, artifacts and inadequate depth information. Basically hazy removal is having three categories among them only one method is proposed for median filter and adaptive gamma correction. Dark channel prior is recycled to estimate the scene depth in the particular image to get at least one color channel with appropriate low intensity.

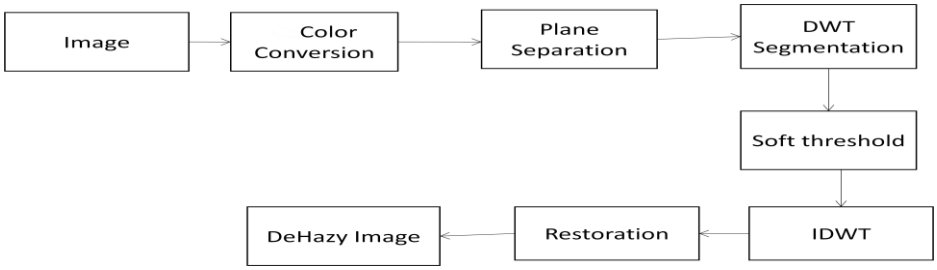


Fig: Block diagram

Noise Removal methods:

There are many methods which are used to produce high-quality, noise free images from a particular image from dark channel prior. These approaches are categorised as Image Segmentation, Image Enhancement and image restoration methods.

1. Image Segmentation:

Image segmentation is a method in which sections or features scattering similar structures are recognised and assemblies together. The objective of the segmentation is to basically alteration the demonstration of the image into somewhat that is more expressive and cooler to evaluate. pixels in a province are related according to certain homogeneity criteria such as color, intensity or texture so as to allocate and identify object limitations in an image.

2. Image Restoration:

. Image restoration is the procedure of enchanting a degraded image and approximating the original image. Image restoration is accomplished by retrogressive the process that blur the image and accomplished by imaging a point source and custom the point source image called as point spread function to renovate the image information vanished during blurring process. The main purpose of the image restoration procedure is to diminish noise and recover the loss. But in image restoration technique the darken image with improved quality and brightness more advanced processing procedure must be smeared to recover cumulative the resolution in the axial trenderadicates noise and increases the contrast.

Discrete Wavelet Transform:

The Discrete wavelet transform distinguish a multi-resolution disintegration procedure in terms of enlargement of an image on to a set of wavelet basis function.DWT function employed in instruct to sanctuary the high frequency components of the image. It splits the image in to dissimilar sub band images namely LL, LH, HL, and HH. Disintegration and reconstruction filters are FIR and oblige the comparison but not in closed-form appearancecommonly not symmetric. Haar transform wavelet is the simply real-valued wavelet which gives efficiently sustained in the exertion of symmetric and orthogonal.

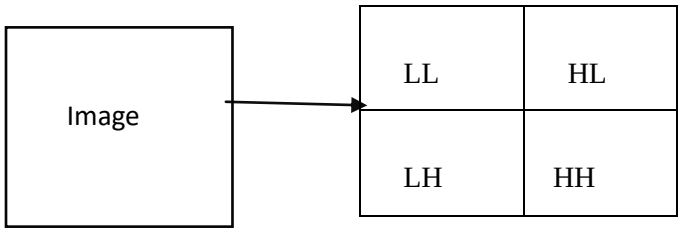


Fig: Image decomposition

Color Analysis:

There are altered approaches to analyse individualcolouring ,variouscolortesting system categorize an individual's personal arrangement of hair color, eye color and skin tone with labels that refer to a color's "temperature" (cool blue vs warm yellow). In this paper we are coming across YCbCr for testingis a relations of color space used as a part of color image pipeline in video and digital photography system. Y' is the luma component and Cb and Cr are the blue-difference and red- difference chroma components. The atmospheric light will be approximated from dark channel of noisy image with brightest 0.1% of pixel. the dark channel prior is estimated by minimum filter which applies on input image .

It is used to conclude the transmission map and it is articulated by,

Jdark= min(min(I(x))

Where min(I(x)) finds minimum value among each point of RGB and second min filter gives minimum of local patches.

International Journal of Electronics, Electrical and Computational System
IJEECS
ISSN 2348-117X
Volume 6, Issue 8
August 2017

Academic Science

Color plane separation is very useful in processing color document images. It is a multi-classs classification problem while overlapping color regions. In the output plane the intention should have high reaction and other should have low response as it assumes that foreground colors is low, typically one to four overlapped areas with mixed color instead of opaque covering.

The conversion can be expressed as

From 8-bit RGB to 8-bit YCbCr

Y=0.299R+0.587G+0.114B

Cb =128-0.168736R-0.331264G+0.5B

Cr = 128+0.5R-0.418688G-0.081312B

Visibility restoration:

In the image processing visibility restoration is problem in preserving outdoor images due the existence of noise, some images which fades the color and reduce the contrast of the object. In the proposed method the main advantage is visual quality and speed when compared to the other systems. The differentimprovement is to switchboth color images orgray level images as color saturation is solved by superciliousmall size color with low saturation.

The restoration function is as follows

$$J^c = \frac{\alpha^c (I^c(x) - A^c)}{max(t(x), t_0)} + \alpha^c A^c$$

where, c€$\{r, g, b\}$, $J^c(x)$ represent the scene radiance , $I^c(x)$is the hazy image captured by the digital camera. $A^c$is the global atmospheric light, α^crepresent the adjustable color parameters and $t_0$is set to 0.1. by using this restoration function the visibility of the hazy input image can be restored effectively.

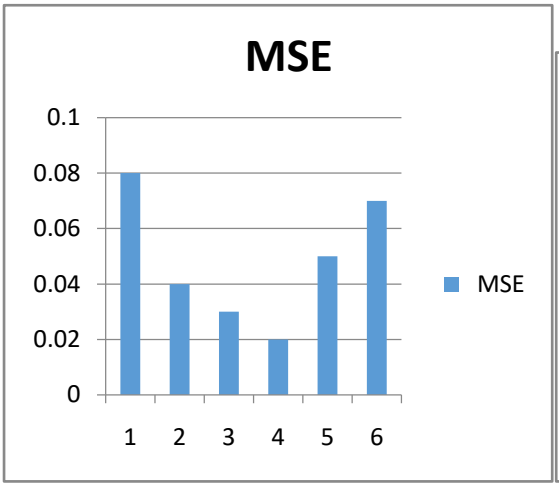
Experimental results:

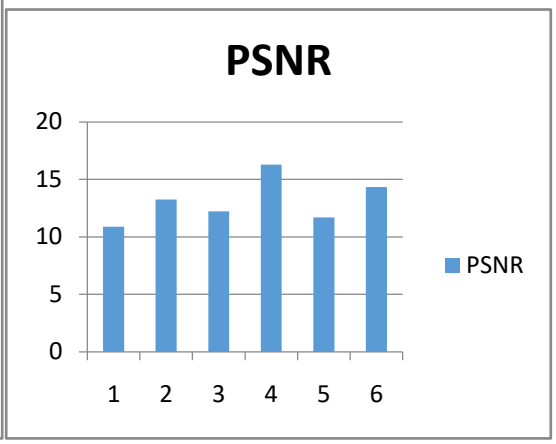
This visibility restoration algorithmusing bilateral filtering was implemented using MATLAB R2013a. The data base was built with large dataset of natural hazy images. the data set contained different kind of weather conditions were used for analyzing the performance of the proposed method. The value of Relative Mean Brightness Errors, Relative Structural Error, Peak Signal to Noise Ratio and Mean Square Error are calculated between the original image and the restored image for the test images.

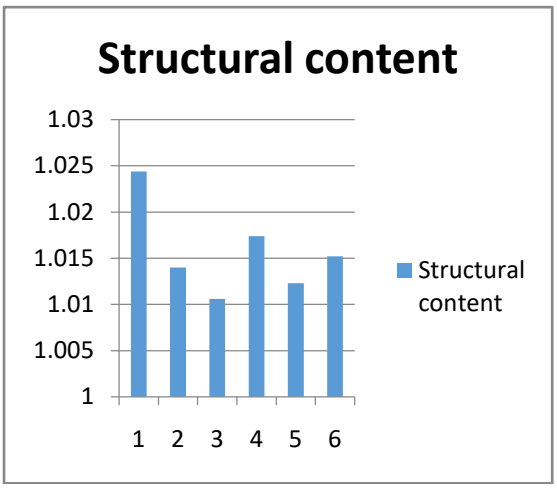
Fig: Test Images

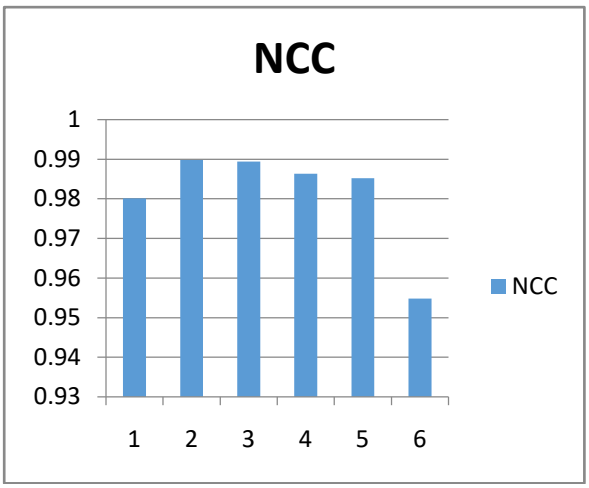
Table 2:

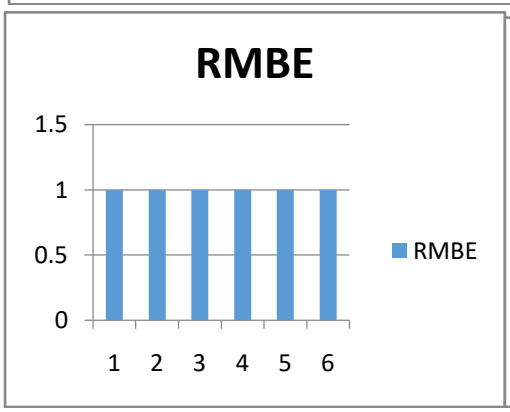
Parameters	Image 1	Image 2	Image 3	Image 4	Image 5	Image 6
MSE	0.08	0.04	0.03	0.02	0.05	0.07
PSNR	10.88	13.26	12.24	16.29	11.71	14.35
Structural content	1.0244	1.0140	1.0106	1.0174	1.0123	1.0152
NCC	0.9801	0.9898	0.9894	0.9863	0.9852	0.9548
RMBE	1.0	1.0	1.0	1.0	1.0	1.0
RSE	0.9694	0.9773	0.9778	0.9772	0.9655	0.9642

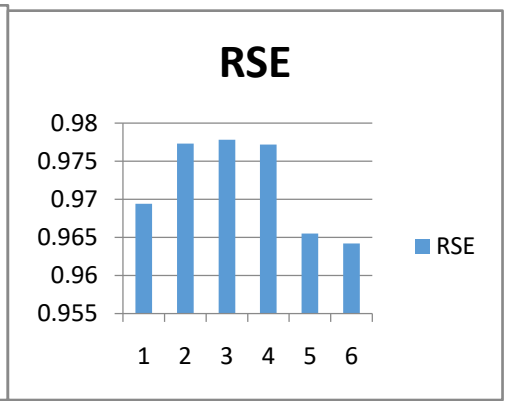












Academic Science

Conclusion:

In our existing method we done work on .jpg format images, for edge restoring using haar transform . In proposed work we are using bi orthogonal wavelet transform for noise decreaseIn this process we done an work on color images for preserving an information using depth estimation and the median and adaptive gamma correction are used for enhancing transmission to avoid halo effect problem finally visibility restoration is used to restore an image with better quality. Finally experimental results produced by this method were evaluated by qualitative and quantitative comparisons of images of several realistic images and the efficiency of this proposed visibility restoration approach regarding the color distortion and complex structure and produces high quality.

References:

[1] H. Xu, J. Guo, Q. Liu, and L. Ye, "Fast image dehazing using improved dark channel prior," in Proc. IEEE Int. Conf. Inf. Sci. Technol. ,Mar. 2012, pp. 663–667.

[2] K. He, J. Sun, and X. Tang. Single image haze removal using dark channel prior. In *CVPR*, pages 1956–1963.IEEE, 2009.

[3] S. Perreault and P. H´ebert. Median filtering in constant time. *IEEE Transactions on Image Processing*, 16(9):2389–2394, 2007.

[4] R. Tan. Visibility in bad weather from a single image. In *CVPR*, pages 1–8. IEEE, 2008.

[5] J. Tarel and N. Hautiere. Fast visibility restoration from a single color or gray level image. In *ICCV*, pages 2201–2208. IEEE, 2009.

[6] C. Tomasi and R. Manduchi. Bilateral filtering for gray and color images. In *ICCV*, pages 839–846. IEEE,1998.

[7] Q. Yang, K. Tan, and N. Ahuja. Real-time o (1) bilateral filtering. In *CVPR*, pages 557–564. IEEE, 2009.

[8] K. Tan and J. P. Oakley, "Enhancement of color images in poor visibility conditions," in Proc. IEEE ICIP, Sep. 2000, vol. 2, pp. 788–791.

[10] S. C. Huang, F. C. Cheng, and Y. S. Chiu.2013.Efficient contrast enhancement using adaptive gamma correction with weighting distribution, IEEE Trans. Image Process.

[11] Shih-Chia Huang ,Jian-Hui Ye ,Bo-HaoChen.An Advanced Single-Image Visibility Restoration Algorithm for Real-World Hazy Scenes. IEEE Transactions on Industrial Electronics.