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Design a New Methodology for Removing Fog from the Image

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Abstract

In this paper, we propose a effective fog-free methodology for remove fog from input image. In our method, firstly, the original image is converted from RGB to YCbCr. Secondly, compute the intensity component of the YCbCr image and key observation of the all pixels of the image. Most local patches in fog-free outdoor images contain some pixels which have very low intensities in at least one color channel. Using this methodology with the fog image, we can directly estimate the local white balancing of the image, global white balancing of the image, median of the image and mean of the image. After getting all above details, we apply on original image and finally show the fog free image.

Keywords

Image Processing, Pixel Analysis, YCbCr model.

1. Introduction

Images of outdoor scenes are usually degraded by the turbid medium in the atmosphere. Haze, fog, and smoke are such phenomena due to atmospheric absorption and scattering. The irradiance received by the camera from the scene point is attenuated along the line of sight. Furthermore, the incoming light is blended with the *air light*. The degraded images lose the contrast and color fidelity. Since the amount of scattering depends on the distances of the scene points from the camera, the degradation is spatial-variant. Haze and fog removal is highly desired in both consumer/ computational photography and computer vision applications [1, 2]. First, removing fog can significantly increase the visibility of the scene and correct the color shift caused by the air light. In general, the fog-free image is more visually pleasuring [2]. Second, most computer vision algorithms, from low-level image analysis to high-level object recognition, usually assume that the input image is the scene radiance. The performance of vision algorithms like feature detection, filtering, and photometric analysis will inevitably suffers from the biased, low-contrast scene radiance. Last, the fog removal can produce depth information and benefit many vision algorithms and advanced [3] image editing. Haze or fog can be a useful depth clue for scene understanding. The bad fog image can be put to good use. However, fog removal is a challenging problem because the fog is dependent on the unknown depth information.

The problem is under-constrained if the input is only a single fog image. Therefore, many methods have been proposed by using multiple images or additional information. Polarization based methods remove the fog effect through two or more images taken with different degrees of polarization. In more constraints are obtained from multiple images of the same scene under different weather conditions [4,7]. Depth based methods require the rough depth information either from the user inputs or from known 3D models. Recently, single image fog removal has made significant progresses. The success of these methods lies in using a stronger prior or assumption. Tan observes that the fog-free image must have higher contrast compared with the input fog image and he removes the fog by maximizing the local contrast of the restored image. The results are visually compelling but may not be physically valid. Fattal estimates the scene and then infers the medium transmission, under the assumption.

2. What is FOG

In fog weather, Images captured by outdoor surveillance system degrade significantly and suffer from poor contrast. Under fog weather conditions, the contrast and color characters of the images captured by outdoor surveillance system are drastically degraded [5, 9], the degradation level increased with the distance from camera to the object. This is due to the following processes: 1) light reflected from the object surface is attenuated due to scattering by aerosol particle; 2) Some direct light flux is scattered toward to camera. In order to implement robust detection of image features in bad weather, considerable researches related to this topic have appeared in image processing and computer vision field recently [3].

Poor visibility in foggy weather stems from the fact

that particles in atmosphere scatter and absorb light from the environment and light reflected from the objects [7, 8].

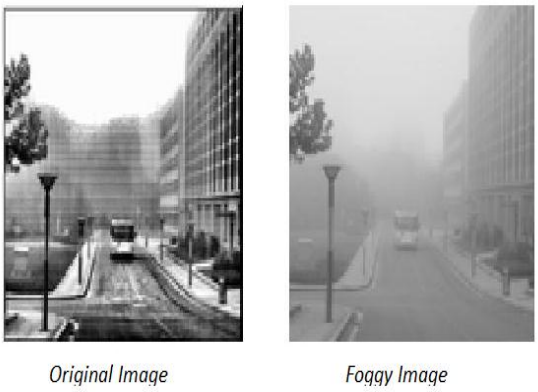

Fig. 1.1 (a): original image (b) foggy image

3. Proposed Work

The proposed hue preserving color image contrast Fog removing algorithm by taking care of the simple architectural principles of processors, the proposed algorithm has been made computationally very efficient and fast. The algorithm and fog image database are given below:

Fig. 1.2: Database Image

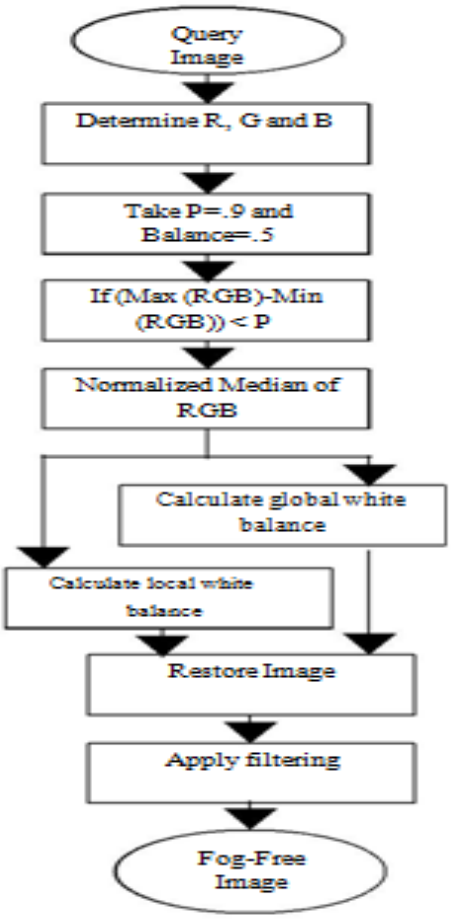

Fig 1.3: Data Flow Diagram

Input: - Take a fog image.

Output: - get the fog-free image.

Process:-
Q_{image} = Query_image

[r, c] = Size (Q_{image}) P=.9
Balance=.5
For 1: r For 1: c

C_value_R=Impixel(Query_image,r,c)
C_value_G=Impixel(Query_image,r,c)
C_value_B=Impixel(Query_image,r,c)

R= Max (C_value_R)- Min (C_value_R) G= Max (C_value_G)- Min (C_value_G) B= Max (C_value_B)- Min (C_value_B)

If R,G,B<P
Normalized(R,G,B)
Else
Balance=0
End
End

Find_Median(Query Image)
FSI=Find_Single_Index(Query Image)
FFSI=Filtering(FSI) MF=Mean(FFSI)

Smoot(Query Image, FSI, FFSI, MF) Show(Fog- free Image)

4. Result and Analysis

Fig. 1.4 (a): foggy image (b) fog free image

Fig. 1.5 (a): Foggy Image (b) Fogfree Image

Fig. 1.6 (a): Foggy image (b) Fogfree Imgae

Fig. 1.7 (a): Foggy Image (b) Fogfree Image

Table 1.1 Comparative Study Of Our & Previous Work

Images	No. of Edge in fog image	No. of Edge in Previous Work	No. Edge in Proposed work
Image 1	59	236	271
Image 2	27	62	71
Image 3	14	44	46
Image 4	73	173	199

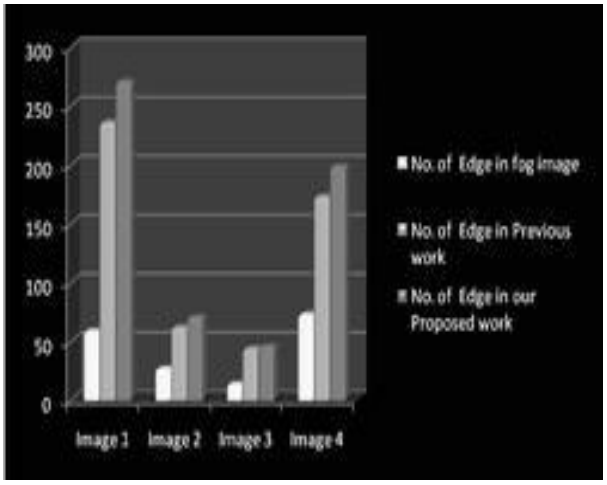

Fig. 1.8: Comparative Result Of Our & Previous Work

Above figure show the comparison of previous and proposed work in the term of edges preserving in the image. We know that, foggy image have less edge

because it is hold a lot of maximum whiteness in the image. But in the case of our proposed work, we removed the maximum whiteness compare than previous work. Above figure show the comparison result. So we can say that our work is showing 86% clarity, its compare than previous work.

5. Conclusion and Future Work

From the above discussion and experimental results, it can be concluded that simple techniques developed using the basic principles related to a problems domain can surpass highly complicated and mathematically elegant techniques with respect to the quality of the output produced. The simple efficient technique proposed in this article produces better results than the best of a number of earlier techniques implied for the solution of the same problem. And these better results are produced in spite of the fact that this proposed algorithm is much faster than the others addressing the same problem.

Hence, the proposed algorithm of this article is an efficient and reliable choice for fog removing from the color image and also useful in hue preserving contrast enhancement of colored images.

In future we apply some other technique like FFT, WAVELET TRANSFORMATION, DCT and GENETIIC ALGORITHM for getting the something 100% fog free image.

References

[1] Q. W. Jiang. Theory Based on Fuzzy Image Enhancement Technology Research and Implementation. Shanghai: East China Normal University, Software Engineering Institute, 2009.

[2] H.Y. Liu, W. Z. He and Y. F. Ma.Fog Image Enhancement Algorithm Based on Mathematical Morphology .Tianjin University of Technology and Education, vol. 19, no. 3, pp. 34-35, 2009.

[3] G. Li, Y. F. Gui and X. P. Xiao.An Improved Image Processing Method and its Application. Journal of Hubei University of Technology, vol. 23, no. 1, pp. 76-78, February 2008.

[4] Y. S. Zhai. Research of Fog-degraded Image Clearness techniques. Liaoning: Dalian Maritime University, Department of Communication and Information Systems, 2008.

[5] Shengjun Wang, Deiqun Liang, "an algorithmic adaptive enhancement algorithm of form image based on information measure", Journal of Image And Graphics, Vol.11, No.1, pp.60-65, Jan 2006.

[6] Li Peng, method of removing fog effect from images,[master degree paper], Nanjing University of Technology, 2005.

[7] Z. F. Ma, S. C. Yang, B. J. Zhao and P. k. He.Improved Fast Image Fuzzy Edge-detection Algorithm .Laser and infrared, vol. 35, no. 4, pp. 300-302, April 2005.

[8] Luo Yingxin, poor contrast foggy image enhancement algorithm research, [master degree paper], Tianjin University, 2003.

[9] R. S. Berns, F. W. Billmeyer, and M. Saltzman, Billmeyer and Saltzman's Principles of Color Technology, 3rd ed. New York: Wiley, 2000.