International Journal of Innovative Technology and Exploring Engineering (IJITEE)
ISSN: 2278-3075 (Online), Volume-8 Issue-10, August 2019

Histogram Equalization Based Defogging of Fogged Image

Shafiya. Shaik, K. Sujatha, M. Kumaresan, V.Srividhya

Abstract— Foggy images causes contrast loss and color distortion and fog changes the visibility of scene. Fog removal algorithm used in tracking and navigation, consumer electronics, and entertainment industries. Many algorithms are proposed for efficient fog removal. Existing defogging methods cannot produce accurate scene transmission in removable of their unpleasing distortion and it is high complexity. In this paper, fog removal algorithms/techniques are represented for image processing. The overall objective of this paper is to explore images from fogged image by using histogram equalization. In the end, the proposed method is tested on several foggy images.

Keywords: Histogram equalization, colour distortion, defogging.

I. INTRODUCTION

Atmospheric visibility is reduced when Bad weather is present. Poor visibility reduces the perceptual image quality and performance of the computer vision algorithms. Thus, it is necessary to make these vision algorithms robust to weather changes. Bad weather conditions are mainly classified into two categories: Steady and Dynamic.

The steady bad weather examples are gives as fog, mist and haze. Coming to the dynamic fog weather examples are given as rain and snow. When we capture an image from camera in bad weather conditions, the line of sight is attenuated from that position. Here the air light is nothing but a light which is blended in all directions. Here the distance of camera is scattered from the position to degrade the variance in nature. The large particles are suspended by deteriorated from the haze weather conditions. The particles are named as fog haze, smoke and impurities.

Fog is nothing but a water droplet which is dropped in air at or near the earth surface. Various forms are obtained in fog to cool the condensation which is required. The stability of system is improved depend on the fog removal of images. To improve the colour details fog is mainly used.

Manuscript published on 30 August 2019.
***Correspondence Author(s)
Shafiya. Shaik, Research Scholar, ECE Dept., Dr. MGR Educational & Research Institute, Chennai, Tamil Nadu, India.
Dr. K. Sujatha, Professor, EEE Dept., Dr. MGR Educational & Research Institute, Chennai, Tamil Nadu, India.
Dr. M. Kumaresan, Professor, ECE Dept., Dr. MGR Educational & Research Institute, Chennai, Tamil Nadu, India.
V.Srividhya, Asst. Prof., Dept. of EEE, Meenakshi College of Engineering, Chennai, Tamil Nadu, India.

II. LITERATURE REVIEW

A novel fast defogging method is introduced by Yu, et al. (2011). In this method a single image is introduced by scattering model. To restore the visibility, white balancing technique is used. This method will smooth the edges by taking weighted least squares technique. Hence to recover the process inverse albedo technique is used and it doesn't requires any prior information.

The dark channel based color distribution is introduced by Shuai, et al. (2012). This system will determine the brightness of image by determining the color distortion problem. Median filtering is used depend on dark channel which will estimate the media function. Wiener filtering is used to get accurate result. Fog free image is obtained by minimising the restoration problem. Compared to dark channel, the hazed image will counter the smoothness. This provides an function and noise depend on the statistical characteristic. The noven foreground Decremental Preconditioned Conjugate Gradient (FDPCG) technique is introduced by the Yuk, et al. (2012). This technique will use mainly adaptive background defogging surveillance video. To determine the map position first all dark channels are used. After that background defogged frame is used to select the map. By using segmentation procedure the algorithm is processed. By using proposed fusion techniques the regions of foreground are transmitted. Hence the proposed method will improve the quality of visualization in effective way.

Contrast Limited Adaptive Histogram Equalization (CLAHE) method is introduced by the Hitam et al. (2013). This is mainly used in the application so finder water images. Depend on the CLAHE the color is divided into two forms. RGB and HSV. But a distinction by LU(2014) was kept to attenuate the channels. These channels are inspired from the transmitted output.

III. EXISTED SYSTEM

From the available techniques, dark channel of fog removal will provide exact outputs compared to others. Here Haze removal technique is an difficult method and it is depend on the unknown scene depth map. Basically, the Fog will determine the distance of camera and object. In this mainly we estimate the tight map and depth map. This technique is divided into two types they are image enhancement and image resolution. In this system there will be loss of information about image.

3.1 Dark Channel Prior

To estimate the atmospheric light in de-hazed images dark channel prior is used. This technique will give the exact output compared to others. This technique is widely used in the applications of non sky patches. By using three components the intensity will be low in dark channel. The components are given as:

1. Colourful items or surfaces
2. Shadows(shadows of car, buildings etc)
3. Dark items or surfaces(dark tree trunk, stone)

Here in the dull channels, the pictures are typically brimmed. But this is done only in open air. When we look in air tight condition the foggy picture will be splendid compared to haze. Hence high power and high haze is obtained in the dull channel of foggy picture. This technique will estimate the thickness of haze. To get greater outcomes we use pre and post processing ventures.

3.2 CLAHE

CLAHE is nothing but an constant limited adaptive histogram equalization. The main intent is to produce the low constant images. Here there is no necessary to process the fogged images in weather information. First an input foggy image is converted into RGB color space and then after converting into RGB again it will be converted into HSV color space. Here the RGB color space is known as red, green and blue and in the same way HSV is kown as hue, saturation and value.

3.3 Bilateral Filtering

The main intent of the bilateral filtering is to smooth the images by combining the nearest values of images. The bi lateral filtering technique produce simple outputs and it is non iterative. Depend on the geometric closeness of image, the both gray levels and colours are combined together. This filtering procedure is taken from both domain and range. This technique gives outputs as piecewise contact solutions but there will be no noise reduction.

3.4 MIX – CLAHE

To determine the underwater images Hitam introduced a technique which is known as contrast limited adaptive histogram equalization. This technique will increase the PSNR value to highest level and the value of MSE should be at lowest level. Hence the visual clues will be seen clearly by classifying the mix-CLACHE.

The images which are taken from algorithm of dense fog consist of density independently.

IV RESULTS DISCUSSION

Histogram equalization is one of the most representative methods in the image enhancement field, but the original one is limited, since a mean brightness constraint is not considered. With an attached constraint, the mean brightness of the output is approximately equal to that of the input, resulting in realistic color restoration. Nevertheless, it may fail to enhance the contrast because of neglecting the differences among the local transformations at the nearby pixel locations.

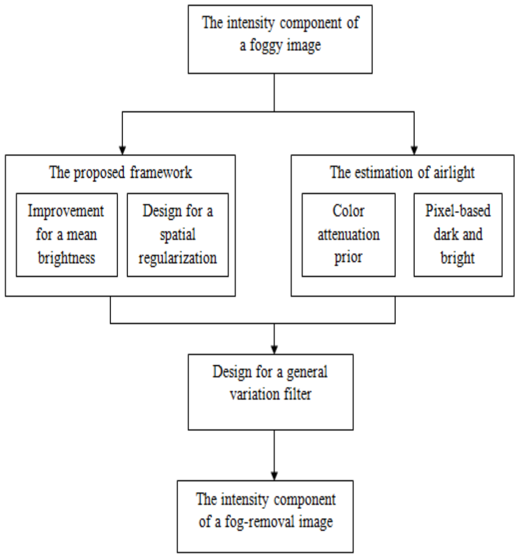

Figure 1: The flowchart of our proposed algorithm.

4.1. Improvement for a Mean Brightness Constraint:

As is well known, a foggy image possesses a high mean brightness, so the mean brightness constraint in the framework should be improved through the physical degradation model.

4.2. Design for a Spatial Regularization Term:

First emerging in image restoration field, TV and $H1$ norms perform well and have their own merits. On the one hand, TV norm allows discontinuity of images and preserves more edges in textual regions. On the other hand, $H1$ norm is able to keep the structural consistency in flat regions and costs fewer computer sources when the minimization of its regularization is processed. Given that we seek for a spatial regularization term that can imitate both of the two norms, to be specific, the expected regularization term should get close to TV norm in textual regions and behave like $H1$ norm in flat areas.

4.3. Construction and Calculation of the Proposed Framework:

Combined with a mean brightness constraint) and a spatial regularization term, our variation framework of histogram equalization for image defogging is finally built up.

4.4. The Estimation of Airlight:

To recover the fog-free scene without yielding color shifting, the air light is another important factor which is often neglected. It is simply inferred by selecting the brightest pixel of the entire image.

To recover the local air light, the first step aims at measuring the fog density. We introduce a color attenuation prior to measure the density for each pixel. The prior finds that the difference between the brightness and saturation is directly proportional to the depth. Moreover, it is well known that when the depth increases gradually, the fog density goes higher and higher.

Retrieval Number: J10070881019/19©BEIESP
DOI: 10.35940/ijitee.J1007.0881019
Journal Website: www.ijitee.org

Published By:
Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP)

Removal of fog is analyzed qualitatively, but for research work, it is required to quantitatively measure the performance of the algorithm. A fog-removed image has more contrast in comparison with the foggy image. Hence, contrast gain can be a good metric for the quantitative analysis of fog removal algorithms. Contrast gain for all fog removal algorithms should be positive. High contrast gain indicates better performance of the algorithm.

V. CONCLUSION

In the paper, proposed an image defogging method using histogram equalization method. Many algorithms are proposed for efficient fog removal. Existing defogging methods cannot produce accurate scene transmission in removable of their unpleasing distortion and it is high complexity. A fog removal algorithm has wide application in tracking and navigation, entertainment industries and consumer electronics.

REFERENCES

1. N. Hautiere, J.-P. Tarel, H. Halmaoui, R. Br ` emond, and D. ´ Aubert, "Enhanced fog detection and free-space segmentation for car navigation," Machine Vision and Applications, vol. 25, no. 3, pp. 667–679, 2014.
2. H. Liu, J. Yang, Z. Wu, and Q. Zhang, "Fast single image dehazing based on image fusion," Journal of Electronic Imaging, vol. 24, no. 1, Article ID 013020, 2015.
3. J.-G. Wang, S.-C. Tai, and C.-J. Lin, "Image haze removal using a hybrid of fuzzy inference system and weighted estimation," Journal of Electronic Imaging, vol. 24, no. 3, Article ID 033027, pp. 1–14, 2015.
4. Y. Y. Schechner, S. G. Narasimhan, and S. K. Nayar, "Instant dehazing of images using polarization," in Proceedings of the 2001 IEEE Computer Society Conference on Computer Vision and Pattern Recognition, pp. I325–I332, December 2001.
5. Y. Lee, K. B. Gibson, Z. Lee, and T. Q. Nguyen, "Stereo image defogging," in Proceedings of the IEEE International Conference on Image Processing (ICIP '14), pp. 5427–5431, Paris, France, October 2014.
6. S. Arigela and V. K. Asari, "Enhancement of hazy color images using a self-tunable transformation function," in Advances in Visual Computing, G. Bebis, R. Boyle, B. Parvin et al., Eds., vol. 8888 of Lecture Notes in Computer Science, pp. 578–587, Springer, New York, NY, USA, 2014.
7. Q. Liu, M. Y. Chen, and D. H. Zhou, "Single image haze removal via depth-based contrast stretching transform," Science China Information Sciences, vol. 58, no. 1, pp. 1–17, 2015.
8. H. K. Ranota and P. Kaur, "A new single image dehazing approach using modified dark channel prior," Advances in Intelligent Systems and Computing, vol. 320, pp. 77–85, 2015.
9. Yuk *et al.*, "Visibility imp rove in bad weather from a single image", I EEE Conference on Computer Vision and Pattern Recognition, pp. 18, 2013.
10. Tare *et al.*, "Vision enhancement in homo generous and heterogeneous fog Intelligent Transportation Systems", IEEE Transaction on Image Processing, vol.4, no.2, pp. 6-20, 2012.
11. Yeh, *et al.*, " Efficient image/video dehazing through haze density analysis based on pixel-based dark channel International Journal of Pure and Applied Mathematics Special Issue prior", IEEE International Conference on Information Security and Intelligence Control, 2012.
12. 12.Tripathi, *et al*.," Single image fog removal using trilateral filter", I EEE International Conference on Signal Processing, Computing and Control,2012.
13. Yu, Jing, and Qingmin Liao (2011) Fast single image fog removal using edge-preserving smoothing IEEE International Conference on Acoustics, Speech and Signal Processing. IEEE.
14. Shiau, Y-H., P-Y. Chen, H-Y. Yang, C-H. Chen, and S-S. Wang (2014)Weighted haze removal method with halo prevention Journal of Visual Communication and Image Representation 25, no. 2: 445-453
15. Yuk, Jacky Shun-Cho, and Kwan-Yee Kenneth Wong (2013) Adaptive background defogging with foreground decremental preconditioned conjugate gradient Computer Vision–ACCV 2012. Springer Berlin Heidelberg. 602-614.

Retrieval Number: J10070881019/19©BEIESP
DOI: 10.35940/ijitee.J1007.0881019
Journal Website: www.ijitee.org

Published By:
Blue Eyes Intelligence Engineering
and Sciences Publication (BEIESP)