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AN IMPROVED IMAGE DEFOGGING ALGORITHM FOR SINGLE IMAGE RAIN STREAKS REMOVAL WITH EFFICIENT IMAGE RESTORATION

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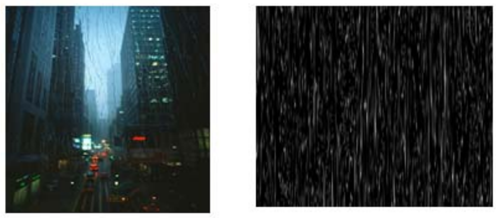
ABSTRACT: Foggy Images are challenging in Image processing because they are captured under various weather conditions which makes it to grasp more attention. Many Single Fogging algorithms have been brought together where it still does not have the enhanced enriched of the Image. Here, An Enriched Image Defogging Algorithm is proposed where it is designed with the efficient low and high frequency (HF) computation values of a bilateral filer by increasing the eminence of the Image. This method aims to provide an enhancement to the overall eminence of the image than the other methods used by increasing the relationship with the fogged images area with the mutation area of the edges. The values are represented in sparse matrix depiction. The image is categorised as the rain affected regions and non-affected regions with the enriched Image Defogging Algorithm. The affected rain regions are successfully separated without changing the original details of the Image. The experimental results validate the enactment of the proposed system and restore the original image.

Key words: Fogging Algorithms, bilateral filter, sparse representation, Image restoration

INTRODUCTION

Image processing is generally being used as a piece of various applications like restorative observations and climate applications. The pictures caught under various climate conditions experience the ill effects of haze clean smoke and water halfway drops which diminish the enriched and deceivability of the picture. These types of images are called as foggy images which need to separate the foggy components from the image and restoring the information of the original image. The foggy images are affected mainly by haze and fog which reduces the eminence of the image and the researches collect information about the impurities associated with fog with additional information parameters. The foggy images are considered with respect to the rain streaks single images where the image must be separated into the rain affected regions and non-affected regions and the image must be restored without losing information. The picture is isolated into and the regions affected with rain have a greater value intensity with which the area must be cropped and separated. The fundamental weakness of this issue is the nature of the first image and isolated picture. The image restored after the separation of the regions lacks the overall eminence of original image where the research is still focused on various algorithms and parameters which are used to enhance the eminence of the image.



(a) (b)

Fig 1 (a) and (b) illustrates the sample rain streaks accumulated in an image

The rain streaks image make it difficult to identify the affected regions more clearly where the image pre-processing meshes are smeared to enhance the vision of the image which makes it to clearly identify the regions .Then rain streaks tend to possess a dark intensity pixel value where its shape and characteristics feature can be determined to eliminate the affected regions. An enriched image defogging algorithm is proposed where it captures the additional information parameters of the rain streaks characteristics and restores the original image with enhanced enriched. The bilateral straining is smeared initially on the image where the pixels with darker intensity values are separate. The low and high recurrences computing (HF) is performed with parameters where the affected and non-affected regions are separated.

Rest of the paper is composed as area 1 portrays the related work of rain streaks procedures segment 2 clarifies the proposed technique. Area 3 outlines the working of the calculation segment 4 represents the test setup lastly the paper is finished up in segment 5.

1. RELATED WORK

Guilli et al [1] proposed a rain detection and removal method where the rain drop are considered as a component motion and is extracted by the FASTICA algorithm then the features of rain droplets are derived where the background pixels are eliminated. This method lacks the accurate enriched of the image and undefined parameters. Liang-Jian Deng et al [2] describes a global sparse model with the sparse parameters and background information it proposes to achieve a global optimal solution .This methods makes it more complex where there are too much parameters involved. Aimini Li et al [3] proposes a new filter algorithm along with dark channel statistics prior where the fog image is associated .The partial filters separate the objects and area around the fog images .This method lacks in the overall enriched of the image after the separation of the foggy areas. Zhigang Ling et al [4] proposed a novel image defogging algorithm where the relevant fog statistical features are extracted and passed on to a fog evaluator to defog the images this method lacks a clear depiction of the factors mined. Li-Wei Kang et al [5] explains a framework for the removal of rain streaks from an image hich proposes a new low and high rate of recurrence computing for the bilateral filter. This system grieves from the enriched of the unique image and information restored. To overcome the downsides in the enriched of the image, here an improved defogging algorithm is proposed which enhances the enriched of the image and restores the information of the original image.

2. PROPOSED SYSTEM

The capture of an image deals with many constraints and parameter which is associated with the image like smoke, dust, fog, haze and water drops. These constraints reduce the enriched of the image and also the clear vision .In order to enhance the enriched and vision of the single rain streaks image ,an improved defogging algorithm is proposed in this paper for removal of rain droplets in the image, The affected image is separated into affected regions and non-affected regions. The proposed procedure is alienated into two parts where initially the dark channel characteristics of the image are extracted, the pixels where the affected regions are identified has a inordinate strength than the non-affected regions. Keeping in mind the end goal to make this underlying partition more efficient the boundary of the pixels are also marked to distinguish it from the original image. The dark channels occurs in an image due to three factors a) the shadow of any natural landscapes b) objects which are brightly coloured and c) the surfaces of objects that are dark in nature. These dark channel constraints must first be identified in the input image along with their boundary detection marker.

Another part of an algorithm utilizes a bilateral filtering where low recurrence and high recurrence value has to be computed for the separation of the affected and non-affected regions. In a bilateral filter the low frequency and high frequency value are computed where HF portion is divided into the differentiable regions. Here the defogging algorithm is improved by keeping the boundary of the dark channels which enables it to be more efficient and simple in extracting the regions constructed on the restrictions and the original image is renovated without trailing the information. The rain streaks removal is mainly focused in video rather than images which make it more complex. Here the single picture rain streaks evacuation is performed which can extricate the factual data effectively. Figure 2 explains the work of the improved defogging algorithm, the boundary markers are used to abstract the regions which can be a non-affected region also. The aim of this improved algorithm is making simpler and enhances the enriched of the image as such as the original image. The image restoration is enhanced in this method so that the system aims to produce enhanced enriched and vision of the image. The information of original copy must not be altered; the image restoration gives an overall enhanced enriched which gives a clear vision of the enhanced image. The foggy images and the rain streaks images are affected by water drop and Haze where it creates brightness and scatters along the medium. The boundaries must be marked and detected initially which will help to differentiate the affected and non-affected regions easily and clearly.

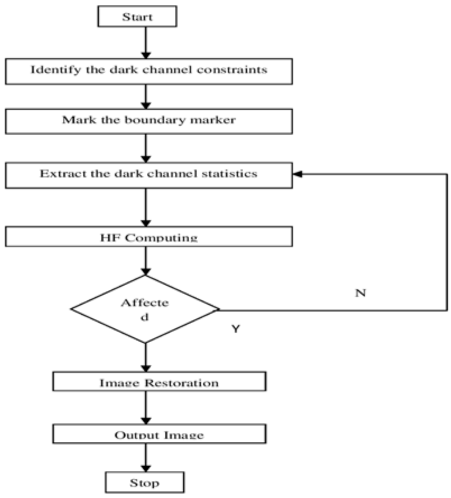


Fig 2 Proposed Algorithm Flow

The above flowchart in figure 2 explains the working of the improved defogging algorithm, Input image is captured and the dark channel characteristics are extracted in order to analyse the constraints under which the images are influenced. Then the next step is to mark the boundary of the constraints, fog and rain streaks so that the affected and non-affected regions can be easily separated and the image has to be restored. The process has to repeat till the original image is restored.

3. IMAGE RESTORATION

There are numerous models and techniques proposed for the picture rebuilding process, in view of the diffusing of light and water drops of the mist, Koschmieder proposed a model in light of an effect of the mist.

$H(x) = F(x)e-rd(x)+A(I-erd(x))$ (1)

$H(x)$ is the current murkiness picture, where $F(x)$ is the picture to be re-established and $d(x)$ is the profundity of the picture and x is the space facilitate. The model is partitioned into two sections where exactness model and light medium model r is utilized as the air coefficient and is the constriction of the dispersing medium. This model is employed as a portion of this paper to re-establish the first picture with upgraded improved and vision.

4. EXPERIMENTAL OUTCOMES

The enhanced defogging calculation is connected on the pictures where the dull channel limits are extricated and afterward the HF figuring is separated into the influenced and non-influenced districts. The images are captured under fog and rain where there is a presence of water droplets in the image. The sample images were run in mat lab 2013.

Figure 3(a, b, c): sample output of the images

Produce results of the enhanced image enriched with a clear vision. The images are restored with restoration technique model where the scattering of light and water is being removed. The method aims to produce an enhanced enriched of the image with the improved defogging algorithm.

5. CONCLUSION AND FUTURE WORK

The foggy images are very challenging to work among researchers because the way their caught with different elements that goes about as the parameters of the flight ends up complex for detachments. Factors that affect the images are smoke, water drops, fog and haze. The vital issue in the foggy pictures is the general enhanced of the first picture with reclamation of the first picture. The present method lacks in the enriched and needs to be enhanced. In this paper, an improved image defogging algorithm is proposed which enhances the enriched of the image with combination of darker channel statistics and high frequency computing in bilateral filtering. In future the defogging calculation can be connected to military applications where the picture can be isolated from smoke and fog and utilized for security purposes.

REFERENCES

[1] Xu, G., Xu, J., Wang, B., Tian, Y., Ye, Y., & Shah, S. G. (2014). Optik Removal of rain in video based on motion and shape characteristics of raindrops, 125, 3926–3930.

[2] Deng, L., Huang, T., Zhao, X., Jiang, T., Huang, T., Zhao, X., & Jiang, T. (2018). PT US CR.http://doi.org/10.1016/j.apm.2018.03.001.

[3] Lplq, L., Odp, H. P., Hgx, T. O. X., Ghirjjlqj, H. Z., Fkdqqho, G., Elodwhudo, S., & Frp, H. P. T. T. (2017). 326–331. http://doi.org/10.1109/ISCID.2017.126

[4] Ling, Z., Gong, J., Fan, G., Member, S., & Lu, X. (2017). Optimal Transmission Estimation via Fog Density Perception for Efficient Single Image Defogging, 14(8). http://doi.org/10.1109/TMM.2017.2778565.

[5] Lin, C., Kang, L., Lin, C., Member, S., & Fu, Y. (2014). Automatic Single-Image-Based Rain Streaks Removal via Image Decomposition Automatic Single-Image-Based Rain Streaks Removal via Image Decomposition, (February). http://doi.org/10.1109/TIP.2011.2179057.

[6] Kim, N., Pham, V. S., Hwan, J., Il, N., Kyung, H., Im, J., & Kim, Y. (2018). E ff ects of seasonal variations on sediment-plume streaks from dredging operations, 129(February), 26–34.

[7] Zhang, Z., Ma, H., Fu, H., & Zhang, C. (2016). Neurocomputing Scene-free multi-class weather classification on single images, 207, 365–373.

[8] Xu, G., Xu, J., Wang, B., Tian, Y., Ye, Y., & Shah, S. G. (2014). Optik Removal of rain in video based on motion and shape characteristics of raindrops, 125, 3926–3930.

[9] Wang, C., Shen, M., & Yao, C. (2019). Rain streak removal by multi-frame-based anisotropic filtering, (2017), 2019–2038. http://doi.org/10.1007/s11042-015-3195-z

[10] Yeh, C., Lin, C., Muchtar, K., & Liu, P. (2017). Rain streak removal based on non-negative matrix factorization.

[11] Zheng, X., Liao, Y., Guo, W., Fu, X., & Ding, X. (2013). Single-Image-Based Rain and Snow Removal Using Multi-guided Filter, 258–265.

[12] Bossu, J., & Hautière, N. (2011). Rain or Snow Detection in Image Sequences Through Use of a Histogram of Orientation of Streaks, 348–367.

[13] Ding, X., Chen, L., Zheng, X., Huang, Y., & Zeng, D. (2016). Single image rain and snow removal via guided L0 smoothing filter, 2697–2712. http://doi.org/10.1007/s11042-015-2657-7

[14] Chandra, S., & Shashikala, R. (2017). An improved linear depth model for single image fog removal.

[15] Fan, G. U. O., Jin, T., & Zi-xing, C. A. I. (2014). Objective measurement for image defogging algorithms, 272-286. http://doi.org/10.1007/s11771-014-1938-z

[16] Li, C., Lu, W., Xue, S., & Shi, Y. (2013). Research on Enriched Improvement of Polarization, 208–215.

[17] Choudhary, R. R. (n.d.). Inter-region linear smoothing function for Foggy and Hazy Images.

[18] Conference, I., & Kurukshetra, T. (2017). Study of Single Image Fog Removal Techniques in Low Visibility Foggy Images, 1114–1118.

[19] Khosla, A., & Singh, G. (2017). Visibility Enhancement with Single Image Fog Removal scheme using a Post processing Technique, 280–285.

[20] Improved Colour Attenuation Prior based Dehazing by Edge Attenuation Method Department of Computer Engineering. (2017), 425–429.

[21] Ling, Z., Gong, J., Fan, G., Member, S., & Lu, X. (2017). Optimal Transmission Estimation via Fog Density Perception for Efficient Single Image Defogging, 14(8). http://doi.org/10.1109/TMM.2017.2778565