High Efficiency Haze Removal Using Contextual Regularization Algorithm

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Abstract - *The dark channel prior is one of the most efficient de-hazing techniques in recent years. However, it produces annoying halo effects and reduces image quality level. To overcome this drawback, many filter concepts have been proposed and combined with the dark channel prior operation. However, these filters induce enormous computational burden while the de-hazing effect of the dark channel prior still has room for improvement. To get filtered image as well as no changes can be occurred in image; a good efficient refinement method based on the gain intervention is proposed and mixed with the dark channel prior to solve the above mentioned drawbacks present in it. As demonstrated in our proposed concept, the proposed filter integrated into the dark channel prior yields not only execution speeds but also superior recovery effects than can existing state of the-art imaging filters. More importantly, the dark channel prior combined with the filter technique possesses the highest potential for practical application due to its superior haze removal effect and time complexity. Our main aim of fog removal implementation is to estimate the air light estimation for the given image and then perform the necessary operations on the image in order to overcome the fog/ haze in the image and without reducing the quality of the image.*

Key Words: Dehazing, Dark Channel, Filtering,

1. INTRODUCTION

Visibility restoration can be defines as different ways that makes to reduce and limit the degradation which occurs when a digital image is taken. The image suffers from distortion and degradation due to reasonable disadvantages such as object-camera motion, blur image occur due to camera missing focus, relative atmospheric turbulence etc. The main reason of image degradation occurs due to bad weather conditions, low vision camera such as haze, fog, snow and rain. During Fog, when we capture an image using a normal or digital vision based camera then the light gets scattered before entering the camera due to some impurities or unwanted content present in the atmosphere. Due to this, automatic camera monitoring system, indoor/ outdoor recognition system and intelligent transportation system are badly affected due to fog or haze. Scattering of light is caused by two fundamental phenomena such as attenuation and air light. By using fog/haze removal algorithms, we can enhance/ increase the stability, efficiency and robustness of the visual system. Haze removal is a difficult task because fog depends upon the unknown scene depth information may be. Fog/Haze effect is defined as event of distance between camera and object. Hence removal of fog needs the estimation of air light map or depth map. The haze removal techniques can be classified into two technologies: image enhancement and image restoration techniques. Image enhancement excludes the reason why fog destroys image quality. This technique improves or enhances the contrast of haze image but it leads to loss of wanted information presented in image. Image restoration can be defined as studies the physical procedure of imaging in fog included image.

After observing degradation style of fog, image will surely be established. Finally, the aim of the degradation process is used to produce the fog free image.

2. LITERATURE SURVEY

Shriya Sharma and Sakshi Bhalla[1] proposed a method that dark channel prior of input image is evaluated. To get the haze free image, restoration value is implemented. This experimental results that haze free image are processed efficiently fog presented image. Qingsong Zhu Jiaming Mai and Ling Shao [2] proposed a method with the depth map of the hazy image, we estimate the transmission and restore the scene by atmospheric scattering model, and thus remove the fog from input image. Experimental results show that the proposed approach gives state of the haze removal algorithms in terms of efficiency and also dehazing effect. Apurva S. Bhutad& R.R.Deshmukh [3] proposed method that the overall objective of their paper is to implement the various methods for reducing haze functioning removal algorithm.

3. EXISTING SYSTEM

A number of methods are reported for reducing the effect of fog from image by using single or multiple frames. Hue preserving method is used to enhance foggy image and local contrast enhancement fog removal. Both the above methods do not use any physical model of degradation in many cases produce over saturated outputs.
A colour Attenuation Prior has been used to get haze-free image possesses more evident degrees of contrast than does a hazy image. The restoration results produced by the approach usually appear unnatural or unrealistic.

3.1 DISADVANTAGES

- Original Scene will be removed while removing haze.

- Saturated images are produced while removing the haze

4. PROPOSED SYSTEM:

We propose an enhanced image refinement technique which is based on air light calculation. The method uses multi level transmission maps using different block sizes followed by cross bilateral filtering for better noise removal and edge enhancement. The proposed method is faster as compared to other existing techniques, real time fog and haze removal is a challenge.

A Contextual Regularization de-hazing algorithm is proposed by which to dynamically repair the transmission map and thereby achieve satisfactory visibility restoration. These techniques restore the hazy images based on the estimated transmission (depth) map. Our contribution is a new contextual regularization that enables us to incorporate a filter bank into image de-hazing.

4.1 ADVANTAGES:

- Fog is removed without any change in original scene

- Our method can recover rich details of images with colour information in the haze regions.

- Hazes in the images are not homogeneous. Our method de-hazes successfully in these types of images.

- Moreover, some significant halo artifacts usually appear around the recovered sharp edges (e.g., trees). In comparison, our method can improve the visuality of image structures in very dense haze regions while restoring the faithful colors. The halo artifacts in our results are also quite small.

- Used for the driver assistance.

5. BLOCK DIAGRAM:

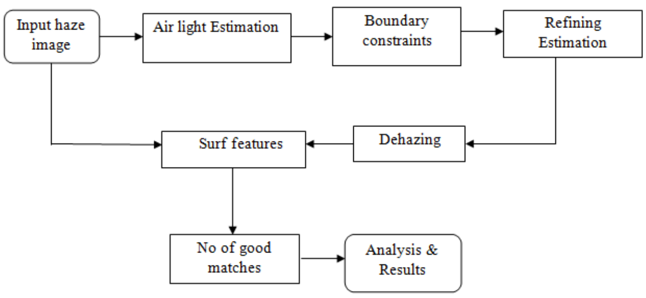

Fig -1: Block diagram of our proposed method

5.1 Air Light Estimation:

In this paper, we implement estimation the air light for each and every region and as well as modeling the air light for each region and the coordinates within the image to generate the air light map. In the case of an image with various depths, the air light execution can be varied according to the region. Estimating the air light can reflect the variation of depth within the particular image. Regions are segmented to estimate the regional contribution of air light.

5.2 Post- Processing:

The fog particles absorb light presented region in addition to scatter it. By changing the color space from YCbCr to RGB, can be obtained. Therefore, after the color conversion, histogram equalization is performed as a post processing step. So in this air light map that shapes the relationship between the co-ordinates of the image pixels and the air light. In this paper, since the content of scattering of a visible ray by large particles like fog, haze and smoke are almost identical, the luminance component is used alone to estimate the air light. In order to restore the good quality image blurred by fog, we need to estimate the air light estimation and subtract the air light from the foggy image to get dehaze image. Before restoration of luminance image, the estimated and processed airlight map is subtracted from the degraded image. To correct the blurring, due to edge enhancement is performed. By using Fourier transformation signal, it is filtered by a high pass filter is a constant that determines the strength of enhancement is the de-blurred luminance image.

6. RESULTS AND DISCUSSION:

FIG-2 original image

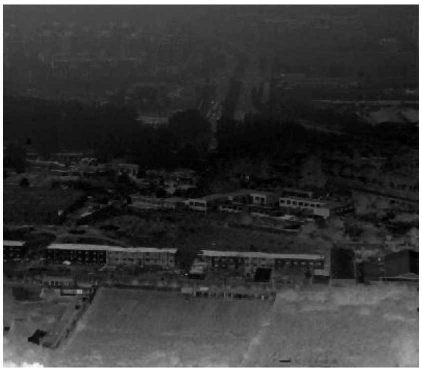

FIG-3 Air light estimation

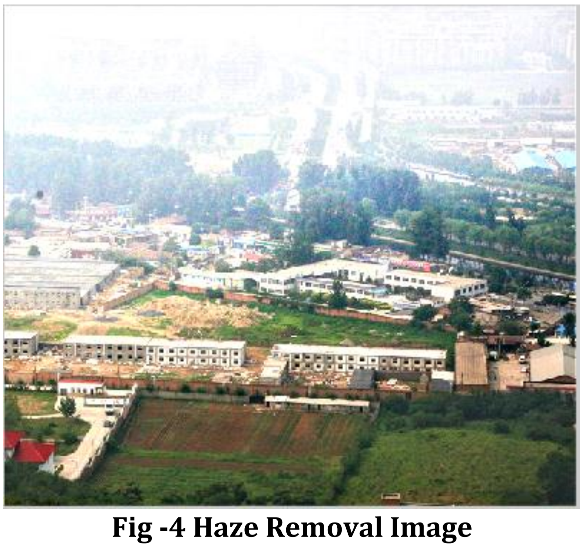

Fig -4 Haze Removal Image

Fig 2, Fig-3 and Fig -4 shows that original image, air light estimation and haze removal image after processing of iteration process to get efficient haze removal image.

7. CONCLUSIONS

In foggy conditions, images become distorted due to the presence of air light that is produced by scattering light by fog. In this paper, we propose fast and effective method to correct the degraded image by subtracting the estimated air light map from the degraded image. The air light map is produced by using multiple linear regressions, which models the relationship between regional air light and the coordinates of the image pixels. Air light can then be estimated but based on the human visual model, wherein a human is not more sensitive to variations of the luminance in bright regions than in dark regions. For this objective, the luminance image is employed for air light estimation.

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The authors can acknowledge any person/authorities in this section.

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