Novelty Journals

ISSN 2394-7314

International Journal of Novel Research in Computer Science and Software Engineering
Vol. 3, Issue 1, pp: (101-106), Month: January-April 2016, Available at: www.noveltyjournals.com

An Improved Adaptive Frame Reconstruction of Hazy Taken From Nature

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Abstract: **Haze is otherwise called as fog or snow. Outdoor images captured during inclement weather conditions exhibit visibility degradation (ex: presence of haze, sandstorms, camera on motion, blur streetlights and headlights).While removing the haze, the visibility of the scene get increased and with the correct color shift caused by the atmospheric light. In general the haze free image is more visually pleasuring the scene. Haze removal can provide depth information and benefit many vision algorithms and advanced image editing. The bad haze image can be transformed to good use. In that we propose a new CLAHE de-haze algorithm for removing the fog or de-hazing the image by removing the dark channel prior & atmospheric light. To enhance the de-haze image by smoothing the image using CLAHE based histogram equalization method is applied to it. Good and enhanced image with better scene radiance is obtained as the final output.**

Keywords: **De-hazing, Dark Channel Prior, Contrast Limited Adaptive Histogram Equalization, PSNR(Peak Signal to Noise Ratio).**

1. INTRODUCTION

There have been many attempts to improve the visibility of outdoor images captured during inclement weather conditions such as presence of haze, fog, camera on motion. The visibility degradation is due to the absorption and scattering of light by atmospheric particles. Haze removal requires scene depth information for recovering the scene radiance in hazy environments [1]-[12].The main aim is to remove the haze and provide better scene radiance with the correct color shift caused by the atmospheric light .Depth information cannot be determined by the user in certain situations, many techniques fail because they rely on the assumption that the depth is given [10]-[12].

Therefore, haze removal techniques changes the given depth into an unknown depth. Many techniques have proposed the estimation of unknown depth to recover the scene luminance into two categories in multiple[9] or single image[1]-[3]. Due to the cost and expenses only the single image restoration is been focused[1]-[5]. In single image restoration, Dark channel prior technique is used for haze removal based upon the intensity values [6] but it fails because of the artifacts created along the edges.

To avoid the artifacts HDCP module is introduced where it works well on all the weather conditions to remove haze from single image which can effectively conceal localized light sources and restrain the colors [1].But the de-hazed image is low in quality so we propose an approach of adaptive histogram equalization technique to improve the de-hazed image. It presents different approach in obtaining the input which is in the form of frame extraction.

2. LITERATURE SURVEY

This section reviews important properties of several systems which this paper combines and certain features to be added for improvement.

2.1 Traditional technique:

Traditional state of single image art restoration techniques are unable to effectively cope up with these hazy road images that feature localized light sources or color shift problems. It provides less transmission map.

2.2 HDCP:

Poor visibility is caused due to the atmospheric phenomena. In order to solve this problem the visibility restoration method is used that incorporates the combination of three modules.

1. Depth estimation module
2. Color analysis module
3. Visibility restoration module

Depth estimation involves the median filter technique and adopts adaptive gamma correction technique. Color analysis module is based on gray world assumption and analyzes the color characteristics of the input hazy image. VR module repairs the color distortion and recovers the haze free image.

- Block artifacts affects the visibility restoration.

2.3 Fusion approach:

The immunities in the ambience such as fog and haze can significantly put down the visibility of the captured images. It presents a new single image strategy for the betterment of the visibleness of degraded images through de-hazing the affected images. The method is based on fusion-based approach. Through the use of a white-balance along with a contrast enhancing procedure it derives two images from original hazy input image. To maintain greater visibility three weight maps are calculated: luminance, chromaticity, and saliency. The strategic scheme performs a per-pixel manipulation.

i. Pixel contribution for image fusion may degrade the quality of the image.

ii. Lowest PSNR values is obtained.

3. EXISTING SYSTEM

- Haze image as input.
- Applies to the dark channel prior.

In order to restore image visibility degraded by haze provide a dark channel prior method to estimate scene depth in single image. The output will be the minimum values of intensity. Then it finds the degradation due to the absorption and scattering of light by atmospheric particles.

The image is completely de-hazed using the HDCP which can effectively conceal localized light sources and restrain the correct color shifts by using color analysis and visibility recovery module.

- By using the standard reconstructed image quality, de-hazed image obtained has the lowest PSNR values.
- It cannot be implemented in frames, where the input will be the image.

4. PROPOSED SYSTEM

Haze free image is more visually pleasuring the scene. The bad haze image can be transformed into good use. Haze removal can provide depth information and benefit many vision algorithm and advanced image editing. It promotes to entire video de-hazing. The scene radiance and visibility of the scene get increased and with the correct color shift caused by the atmospheric light.

Take one hazy video, that video has poor visibility. Fog removal algorithm is applied to remove the haze. By which poor de-hazed image is obtained as output. To improve the quality CLAHE algorithm is applied after de-hazing the image.

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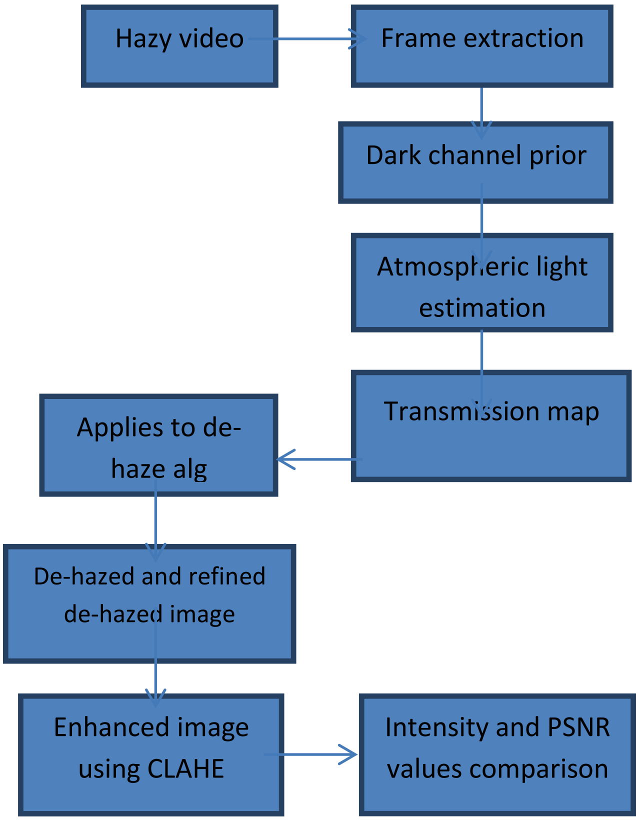


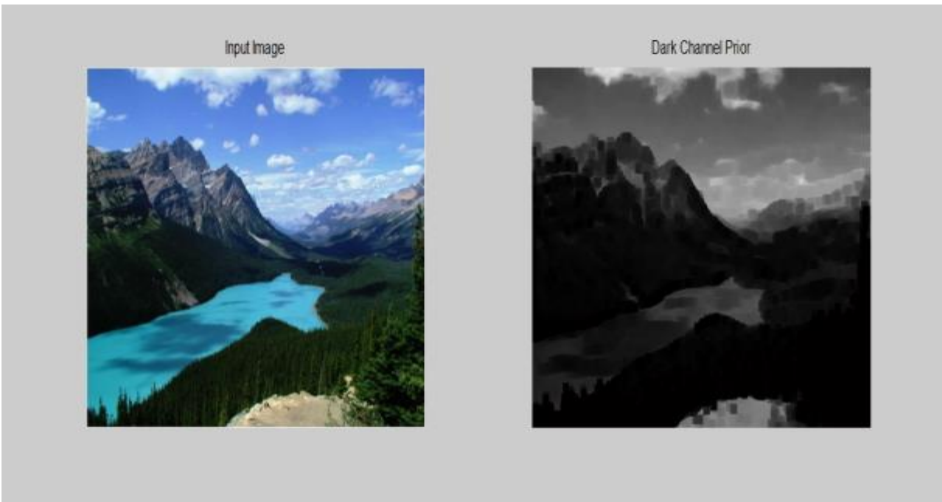
Fig 1. Framework of proposed algorithm

4.1 Frame Extraction:

First get the input hazy video. Extract "n" number of frames from the corresponding video. In "n" no of frames select a particular frame which is taken as the input image. Read the frame to find the dark channel prior.

4.2 Estimation of Intensity:

In order to restore the image visibility degraded by haze, provide a dark channel prior method to estimate the scene depth in a single image. The image is first converted into gray scale. The patch size for the image is initialized. It can be done by reducing the channel content in one form that is either R or B or G. At least one color channel has some pixels whose intensity values are very low and close to zero. Equivalently, the minimum intensity in such a patch is close to zero. The thicker haze is removed and thinner haze with minimum intensity values is obtained.



4.3 Reducing ATL:

Output of the dark channel prior applies as the input for the atmospheric light estimation. In the haziest regions of the image, transmission tends towards zero because of atmospheric particles. The haziest regions of image atmospheric light. It is estimating as the brightest intensities in each color channel chosen from 0.1% haziest pixels in image which correspond to the top 0.1%brightest pixels in the dark channel. It is not simply choosing the brightest pixels from the entire image. It estimates brighter object from the foreground which contain little atmospheric light.

4.3.1 Fine Transmission:

The main principle of the haze removal technique is predicated upon using the dark channel prior to estimate the transmission map, which in turn depends upon the minimum value of the RGB color channel in the input image.

4.4 CLAHE Image Restoration:

After the fine de-haze transmission, it applies to the refined de-hazed transmission. Output of refined de-haze transmission is less visibility we enhance with better visibility using CLAHE de-hazing. Adaptive histogram equalization technique is used to improve contrast in images. It is suitable for improving the local contrast in images.

It is not done for the entire image, rather splits the image into small regions known as "tiles" and applies the CLAHE algorithm. Then the several distinct images are combined using bilinear interpolation. By which it uses only the 4 nearest pixel which are located in the diagonal directions from a given pixel which finds the appropriate color intensity value of that pixel.

It provides better standard quality image in reduced terms of cost and time.

CLAHE algorithm:

4.4.1 Steps:

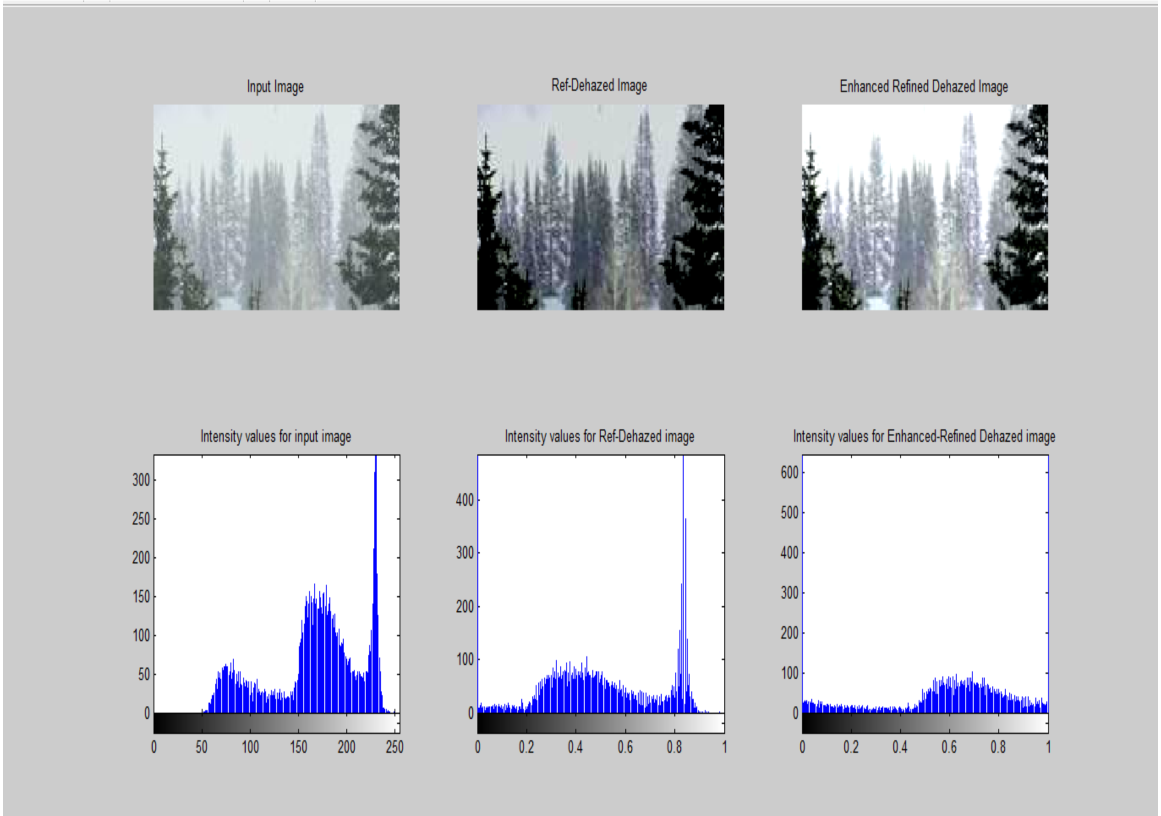
- Initialize the image to be enhanced.
- Calculate the size of the image and no of pixels.
- Initialize the PMF and CDF
- Initialize 'N' Bins(%positive integer scalar—sets the number of bins for the histogram used in a contrast enhancing transformation)
- Initializedistribution(distributionstrings:'uniform','rayleigh','expon')sets the histogram shape for the image tiles with specific distribution type.
- Calculate the PMF and CDF
- Finally get the enhanced image

(PMF- Probability Mass Function

CDF-Cumulative Density Function)

4.5 Experimental result:

Refined enhanced image is obtained when video is motion. It is been applied to quantitative and qualitative standards which is PSNR-peak signal to noise ratio. When the value of PSNR for a particular image is high then a better reconstructed image is obtained. Then by using adaptive histogram equalization technique it demands for less cost. Elapsed time calculated for this process is less.



The intensity values is uniform for the refined enhanced image.

5. CONCLUSION

In this paper, we have proposed a novel approach based upon adaptive histogram equalization for haze removal in frames, where the input is video in motion captured under wide area of weather conditions. The proposed model provides refined enhanced de-hazed image by which the visibility of the scene get increased and with the color shift caused by the atmospheric light. The enhanced image with increased PSNR values is obtained. First step is to extract the “N” no of frames from the corresponding hazy video. A particular frame is selected as the input image it applies to dark channel prior to estimate the intensity and to get the minimum values by which thicker haze is been removed. Next module is to provide the correct color shift caused by the atmospheric light. It is then applied to CLAHE for better refined enhanced image. The experimental results demonstrate that proposed technique produces a satisfactory restored image, as measured by the quantitative and qualitative evaluations of realistic scenes, while demanding less computational cost.

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