FOG ESTIMATION AND CLEARANCE

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Abstract: The problem caused by the fog while capturing an image. Since all the images have its own unique features. Whenever fog appears in the atmosphere it usually degrades the image than its original image.It is a challenging task to make all the surveillance cameras to work in all weather conditions. A system has been designed to remove the unwanted noise, fog effects or even it is being called as dehazing. Therefore a method has been proposed by using MATLABplatform. This method is implemented using Dark Channel Prior[DCP] of the dark pixel and filters. The filters used are second order filter and minimum filter. The results obtained by using this method retrieve the sharp details of image and enhance the visibility.
Keywords: Fog, Dark Channel Prior[DCP], Second Order Filter, Minimum Filter

I. INTRODUCTION

Image captured during unideal or during foggy weather condition it would often result in image quality degradation as well as loss of important image specifications and this can be even caused by some air pollutants. These are caused during certain circumstances such as outdoor, aerial photos, driving, satellite images and navigation. The degraded image also reflects various effects on image such as object recognition, motion estimation however some of the air pollutants exists in an image, even some of the fog are retained in the image so that the image originality is been retained. The image processing technique for removing the fog in image to improve the visibility is urgently needed in a lot of applications.

The image which is effected by fog is retrieved by using the airlight map from the dark channel prior method which has an early refinement of the image. A simple algorithm is proposed for fog removal i.e. CUDA architecture with the help of GPU and by using the kalman filter it reduces the processing time [1]. To retrieve image visibility the atmospheric airlight is estimated. To find the dark channel minimum of the three color channel is used. Further the transmission map is calculated which is the fraction of light that reaches observer. In post processing the weighted least square filter is used to convert the low dynamic range to high dynamic range tone mapping. The performance of the image is calculated by contrast gain and colorful index [2]. The airlight of the image is estimated for about 0.1 percent of brightest pixel of dark region are selected. The transmission estimation is achieved by increasing visibility of patch size. For the recovery of scene radiance the haze imaging model is used. Results obtained for different values of constant parametering different mean, Gaussian, bilateral and guided filters while estimating the transmission.If the constant parameter value is neither close to 0.9 nor close to 1 to identify objects clearly [3].As visibility of objects decreases due to fog and it is very difficult to recognize any object in fog atmosphere. The depth estimation and fuzzy contrast enhancement based model to remove the effect of haze from image. To get rid of fog from foggy image and generate a picture of high contrast than the first image by applying more weights on input grey. This experiment result ensure that the technique is good [4]. Haze removal aims to recover the image by image degradation model. The global atmospheric airlight estimation is as essential step for haze removal. The assumption that the airlight exists in the infinite distance a novel learning based framework for airlight estimation. The framework consists of two steps. Initially determined by distant region segmentation. Next the final airlight can be obtained by weighted sum of the pixel [5]. Defogging algorithms based on prior assumptions on constraints have captured much attention. To develop a novel image defogging algorithm by directly predicting for density of recovered image rather than adopting prior assumptions. In the first step a simple fog density evaluator which can effectively perceive the fog density. In second step a physics based mathematical relationship which poses image defogging as a minimization problem. Compared to OTSFDE, SOTSFDE has low computational complexity. The result state that proposed algorithm state that the fog can be effectively removed [6].

II. PROBLEM STATEMENT

Fog is one of the top causes of automobile accidents depending on season and location. Foggy conditions in the atmosphere pose major threat to motorists which causes road accidents by poor visibility. Fog reduces the obstacle visibility in vehicle driving applications this image becomes more white with an increasing depth. As a consequence the entropy of intensity distribution that is without fog is very small. On the contrary the entropy of same region with presence of fog is larger if the region of span with a large range of depth.

EXISTING SYSTEM

The majority of sensors used to measure the visibility distanceare quite expensive to operate and often complicated to install. Those type of equipment are not easy to be placed on a vehicle. One of the most approaches employ a camera to the road structure instead aimed at identifying a contrast threshold in the image and even the contrast of image get degraded due to fog. The simulation in real time is usually limited depicting a homogeneous constant density distribution.

PROPOSED SYSTEM

To enhance the quality of images under low visibility due to fog various methods were being proposed using image processing technique .We like to propose a fog removal technique to restore the visibility image by refining airlight. To get exact estimation of airlight medium transmission in bright areas color shift in sky regions is important. Estimation of the amount of fog in the scene image allows to greatly improve the image processing.

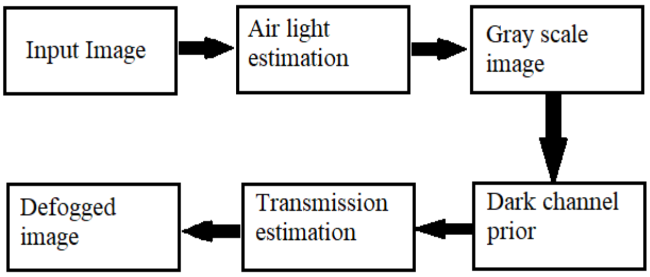


Fig1: Block diagram of fog clearance

III. METHODOLOGY

We propose a fog removal technique to restore the visibility of the image by using dark channel prior method. The platform used for the implementation is Matrix Laboratory. The proposed scheme contains four steps namely air-light estimation, boundary constraints, transmission estimation and defogging process

AIRLIGHT ESTIMATION:

In this process we need to find the highest pixel of RGB, this will be able to know where more concentration of the fog is present in the image. Firstly, the image is converted to HSV format. It is actually a type of color plane representation eg: RGB which helps for color representation. Then the HSV image is converted to gray-scale image. In which only the third layer of HSV format is extracted and then we are applying second order filter. After that all the pixels will be sorted from high pixel value to low pixel value. Then the highest pixel value is evaluated in dark channel, this helps to find the location of brightest pixel where fog present is more.

BOUNDARY CONSTRAINTS:

Since we estimated the highest pixel value of the fog, we need to know the presence of fog in edges more accurately. It checks each part of the boundary whether the fog is present or not. Then RGB matrix will extract the transmission map and combined together to form a single image by applying square filter called minimum filter.

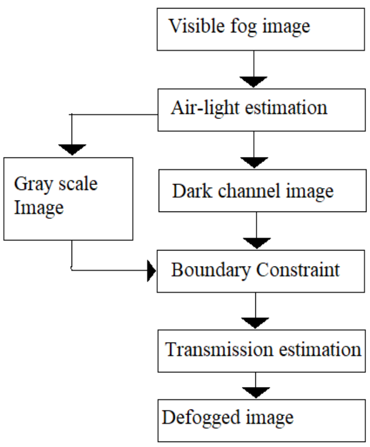


Fig2 : Data flow diagram of defogging

TRANSMISSION ESTIMATION:

It is an intermediate process called as transmission map matrix. There are eight filters which are defined in eight directions by taking mid-point as 0. Then the eight matrix is stored in variable d, this fetch fog in all eight directions. Then normalization is applied to keep the values in 0 to1 range. To calculate the actual fog in the image, we apply the weight function method. This method used gamma as a constant and defined as

Gamma = lambda / beta

Here, lambda variable is used as a parameter. Beta value is updated in every loop to check the threshold value. If beta variable is more than the beta max it exit from the loop, from this we find the maximum fog present in the image.After that we convert the normal domain to frequency domain. The frequency domain works with Fourier transform, this extract the foggy region from the image.

DEFOGGING PROCESS

Here the haze image of individual RGB matrix is subtracted from the maximum fog pixel values that are calculated from the earlier steps. Then value must be divided by transmission map value, thus a defogged image is obtained.

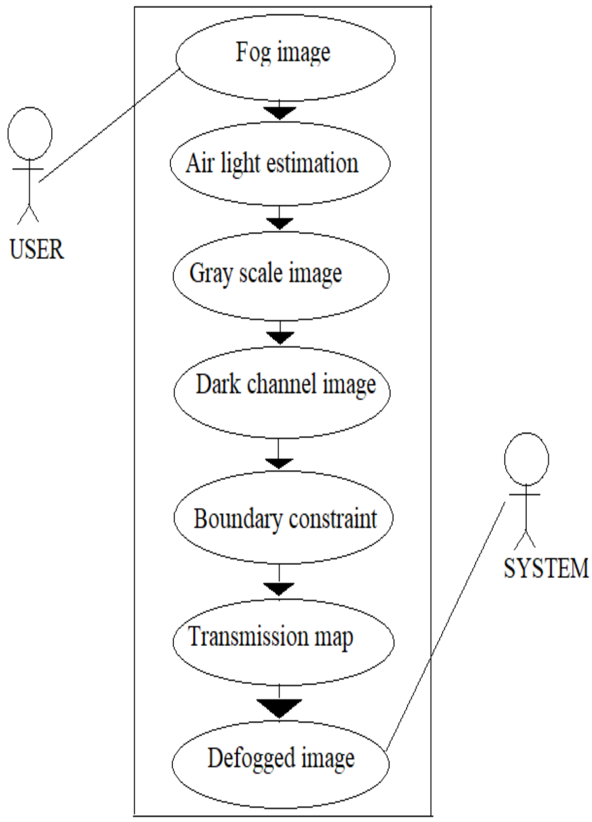


Fig 3: Use case diagram of defogging image

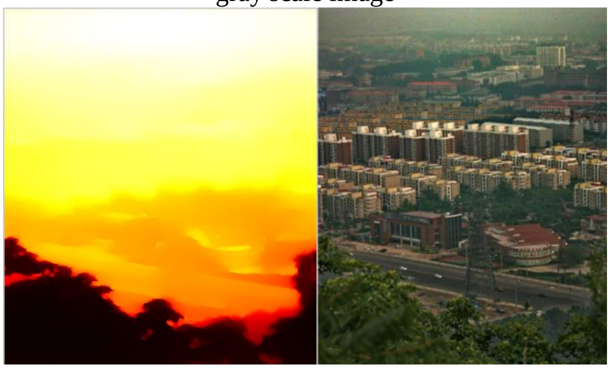
IV. APPLICATIONS

The proposed system can be applicable in many fields like Advance Driver Assistance System and Video Inspection

System. This method is also applicable in obstacle detection and outdoor substance recognition system. This methodology helps in the improvement of traffic surveillance application and also helps in vehicle classification, recognition, tracking.

a b

Fig 4: (a) The captured fog image for further airlight estimation. (b) Calculating the boundary constraint from the gray scale image



c d

Fig 5: (c) The representation of transmission map calculation (d)The final defogged image

V. ADVANTAGES

The proposed system keeps away from the halo effect and avoids intermediate transmission estimation issues. The turnaround time for processing is very low. As the time required for processing is low, it retrieves the prominent image quality under various weather condition changes. The image pre-processing technique suggested in this project can be recycled in any other image processing associated works to eliminate the amount of haze in the image.

VI. CONCLUSION

The suggested system appraises the dark channel prior based on average filtering and calculates the value of airlight. In the implemented system the outcomes were very pledge visibly and by using some quality mapping. One of the influential enhancement in this project is the removing of holes. The required for processing is very low.

VII. FUTUREWORK

More excellent models can be used to narrate complicated circumstance such as sun's influence on the sky region and the bluish hue near the horizon. Further one can aim to investigate haze removal based on these models in the future. Image dehazing technique can be added for live video application with great performance. It can be also done with inspection cameras both CCTV and IP Stream.

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