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Contrast Stretching and Improved Dark Channel Prior Method Based Image Defogging

Neelam Dadhich, Mrs. Manju Mathur

***Abstract*— Digital images are used by most computer applications. Digital picture processing (DIP) plays a major role in the digital process of data analysis and interpretation. Outdoor scenes images and videos are mostly pretentious by bad endure conditions like haze, fog, mist, etc. It will lead to poor scene visibility due to lack of quality. This document presents a survey of different picture defogging methods to expel the haze from the pictures of fog trapped in the real globe to recover a quick and improved nature of pictures free of fog. We have proposed a new approach in this work that will efficiently resolve insufficient approximation of haze thickness as well as color cast difficulties. It is possible to generate a high-quality image through strong visibility as well as vivid color. In this paper, the contrast enhancement techniques are a charity to enlarge the range of brightness standards in a copy so that image may be shown professionally in the manner preferred by the analyst. Owing to bad light or improper location in obtaining the device, the quantity of difference in a picture may change. Consequently, to compensate for difficulties in image achievement, it is needed to operate the contrast of an image. The knowledge behind extending contrast is to recover an energetic range of gray levels in an administered picture. In our proposed work, we enhance our image by applying new Technique contrast stretching (CS) which provide us better results as compared to base techniques. The output image is much clear than the base paper image and follow effect is also reduced. Calculate the SSIM and MSE.**

***Index Terms*— image Defog; DCP; IDCP;contrast stretching (CS); RGB; YcbCr.**

I. INTRODUCTION

Highlight The image processing technology enhances the quality of an image with a sad image. Dore-scene images taken in bad weather are often humiliated by the attendance of fog, fog or other media. The bad weather conditions like fog, fog, rain, and snow are the main reasons for the fall of the film. During fog, when we take a picture with the camera, due to some pollutants in the atmosphere, light is scattered before the camera arrives. Consequently, the automatic monitoring system, do-it-own detection system, and intelligent transportation system are very impressed. The light is scattered by two basic events: attenuation and aerobics. Using the fog removal algorithm, we may increase constancy as well as the strength of the graphics scheme. It can be very difficult to remove the fog because the fog depends on the important information about the unknown scene. The effect of fog is defined as the coldness amongst camera as well as object.. [1] The degradation can be explained as the combined result of atmospheric attenuation and the ceiling effect of the Fairlight. Atmospheric attenuation is the process in which light energy decreases due to absorption or scattering by the atmosphere with an increasing distance from the light source. The ceiling effect of Fairlight is the phenomenon that light is scattered in line of sight via distinctive elements. Haze removal algorithms are employed in order to improve the visibility of haze-degraded images which have color shift and poor contrast. The enhanced visibility not only makes the images more visually pleasing and easier to read but also can recover presentation of process visualization applications like feature detection and object recognition which requires accurate outline/edge information.[2]

Ways to remove fogs may be separated into 2 groups: image enhancement as well as image renovation. Image enhancement does not include image superiority. This technique is used to restore the size of the physical procedure of fog imaging in image processing. Afterward looking at the humiliating style of fog and fog, there is no doubt that the image will be kept. Finally, the degradation process is used to stabilize the image. Image viability is problematic for many operating systems in many climates, including Intelligent Transportation System such as Theodore Object Recognition System, Remote Sensing System, Travel Vehicle Data Recorder and Traffic Monitoring System. Hayes produces small particles suspended in the atmosphere, which are known as aerosols, which are able to absorb and disperse light rays. Recently, image decoding has become an important and important research problem on computer vision. Blurry or foggy image processing is very difficult. Unfortunately, the nature of fog or fog is unpredictable, that is, the effect of fog differs from scene to scene. It simply means that the model is not always suitable. Early researchers used a single image. Though, the dehumanizing consequence is incomplete since one blurred image may not deliver more data. Later, the researchers tried to recover Narasimhan et al. Different weather conditions in the same scene with different images of sugar fog removal. Tan's work is based on two comments. One is that bad weather gets worse due to bad weather; There is a variation of other airlines, which is essentially the distance of objects for the viewer and is smooth. Recently, many studies have come out in the future. These are based on either strong beliefs or strong priests, in which the thickness of the fog is calculated. Using a foggy image with a foggy image, and using visual contrast changes, an image restores its visibility by increasing its local contrast.[1]

Neelam Dadhich, Research Scholar, Digital communication, Rajasthan College of Engineering for women, Jaipur, India
Mrs. Manju Mathur, Department of Electronics and Communication, Rajasthan College of Engineering for women, Jaipur, India

(a) Hazy image (b) Haze free image

Fig. 1. Original Image and Fog Removal Image

II. VARIOUS USING DEFOGGING TECHNIQUES

A. *Dark Channel prior*

This method is really valuable aimed at single image dehumidification. It is recycled to quantity outdoor fog data. Imagine that any color station has certain pixels through very little intensity. These pixels are called dark pixels. [3] These dark pixels are used to compute the transmission map. Transmission map is used to remove the certain blocked effect. Since a single image is used to set fog image reconstruction, the transmission map is accurate. Basically, the intensity of the minimum channel in this type of patch is intended via the Dark Channel,

dark(x)=min{min{Jc(y}},

y∈Ω(x) c∈{r,g,b}

Where J' is a color channel of J and Q(x) is a local

B. *Improved dark channel prior (IDCP):*

Proposed by IDCP Yan Wang and Bo Woo in 2010, DCP is used and it uses the same concept while 31SMM 31 timing algorithm reduces the complexity by increasing the patch size to improve air-brightness estimation This is soft mat technique.[4].

C. *Color Spaces*

Color space is a mathematical model that represents 3 or four 4 color elements. Dissimilar colors were usage aimed at dissimilar usages, for example, computer graphics, image processing, TV transmission, and computer vision. Different color space is RGB based color space (RGB, normalized RGB), Hua created color space (HSI, HSV, besides HSL), luminance-based color space (YCBCR, WYQ, UUV) [5]. These models are later illuminated in the next sections. The primary process in color space selection skin color demonstrating is also aimed at classification. Unique or additional color space may deliver optimal threshold values The color of the screen is frequently resolute via the method of skin detection as well as application. To identify skin pixels, we use the following color space.

Red, Green, and Blue (RGB) Color Model

RGB color space is extensively used for printing as well as representing digital images. We may become some color space from RGB linear or non-linear changes [15]. Computers, graphics cards, monitors, or LCDs use RGB color space. As displayed in fig 1, there are 3 primary components: red, green as well as blue. You can get some color by mixing three basic colors. Any color can be made depending on how much you take with each base color. When changing this method, a particular color may be divided in red, blue as well as green elements, displayed in calculation 1 from calculation 3. These standards may use to get an image from pixels of the same color. RGB Color space describes skin color discovery created on.

A striking property of this representation is that normal RGB is unchanged (under some assumptions) when ambient light is ignored on matte surfaces.

$$r = \frac{R}{R+G+B} \quad (1)$$

$$g = \frac{G}{R+G+B} \quad (2)$$

$$b = \frac{B}{R+G+B} \quad (3)$$

YCbCr (Luminance, Chrominance) Color Model

YCbCr is an encoded non-linear RGB signal usually used for European television workspaces as well as picture density jobs. Displayed in symbol 2, color 2 represents the amount of light (calculated by nonlinear RGB) and expressed as the quantity of RGB standards. YCbCr is greatest use color space in the digital video domain. It uses JPEG, MPEG1, MPEG2, and MPEG4 in the image as well as video compression values. YCbCr explains the simplicity of transition, the color of brightness and chrominance elements. This presentation, luminance data is kept as an element (Y), as well as chrominance data is stowed in 2 color-difference elements (Cb as well as Cr). CB represents modification amongst blue factor as well as a reference value. Cr is the modification amongst red factor in addition to a reference value. According to the YQbCr value eq, RGB is attained after color space. From 4 to eq 6. YCbCr usages interplanetary to find casing.

$Y = 0.299R + 0.287G + 0.11B$ ----------eq. 4

$Cr = R - Y$ ----------eq. 5

$Cb = B - Y$ ----------eq. 6

D. *Contrast Stretching*

Contrast stretching method is used to develop an image via the intensity values may be used by potential values in the expanding range. Contrast method is widely used for health image processing & is a preprocessing step in language credit, construction texture as well as many other video or image applications. Difference extending method is unique of most widely researched image enhancement methods to eliminate bad contrast in serious leukemia slide images, uncertainty camera is sensitive to light. Partial contrast stretching is an image improvement method that usages linear mapping function. [6]

III. LITERATURE SURVEY

ZAHID TUFAIL, et al. (2018)environmental Factors for example fogs as well as fogs affect the quality of the image as well as type them inappropriate aimed at automatic schemes, for example, intelligent vehicles, monitoring, and detection of the article itself, for which the process of visualization, as well as clear visual processing, is needed. In general, the fuzzy image reproduction of the former channel Dark Diffusion (DCP) presents this paper DCP-based image hugging method. Transmission maps are calculated aimed at RGB and YCbCr color interplanetary. For calculating average transmission map, 3broadcast maps are used for R, G as well as B channels. In YCbCr color space, the Y station is custom to compute broadcast map. By modifying the edge information to generate two intermediate images, modifies two transmission maps, which give different loads to get different defined outputs.. [7]

Fei Yuan, et al. (2018) The blurred vision usually experiences some contrast, which reduces the visibility of the scene. Single image display is incomplete via priests or limitations. In this letter, we current an effective way to remove the fog, which uses images of correlated fog recovered as external information. However, there is a difference between visual, scales and lighting conditions, scenes are added before the smile because they can offer visual structure as well as local high-frequency material for visual composition. For more efficient use of context, global geometry registration, and local block matching. Different types of external information are calculated based on registration. In addition, we syndicate that extra outside data through internal controls as well as regularization to calculate the visual broadcast map. Experiments prove our method of producing better visual quality abusive results than other cutting-edge methods. [8]

Akshay Dudhane, et al. (2018) DehazeNet, the current DehazeNet, has solved the deficiencies of handmade fog created by MSCNN owing to the occurrence of a very shared phenomenon. However, due to these approaches, problematic of color distortion arose in the dark (enlightened) environment. In the method, the use of basic (red, green as well as blue) color integration is used to create multi-channel depth map in the first stage, which combines color information in blurry images of the network. The second phase calculates the visual broadcast map as of dark channels produced by Multi-Channel Multi-Scale Conventional Neural Network (McMS-CNN) to repossess unique view. To train suggested network, we practice2 standard datasets: Imagination and D-HAZY demonstration approach suggested was done consuming Structural Equality Index (SSIM), Mean Class Error (MSE), as well as Peak Signal-To-Noise Ratio (PSNR). Presentation study demonstrations that suggested the approach is the most up-to-date method for single image decoding.[9]

Chunghun Kang, et al. (2018) we suggest to remove a solitary image fog, which is underlying problematic owing to transmission approximation, which relies deeply on the information. Pointwise Haze Density Estimation technique, by provisional random areas, is a unitary factor in which the possibility of fog density represents and is a pairing factor that encrypts spatial related relation amongst end-to-end coordinates. It is possible to eliminate the net process from the suggested project, which can be stopped. The results of experiments conducted on different images are both real and synthesized, compared with existing methods.[10]

Zhigang Ling et al. [2017]in this paper, or intention to build up a novel image defogging calculation by specifically anticipating the haze thickness of recovered images as opposed to receiving earlier assumptions or requirements. So as to accomplish this objective, two particular advances are presented. To start with, we embrace three fog significant measurable highlights got With fog images, evaluate a basic fog density (SFDE) with a linear mix of these fog-related characteristics. This suggested estimator can see fog density of solitary image deprived of orientation to a fog-free image, as well as there is less computational weight than the current method. Second, the physics-based connection between Fog Density Mark of Transmission as well as Recovery Image is made through SFDE, so image defacing fog density score can work as a minimization problem in the retrieved picture. As a result, simple optimum broadcast models are available in the decompression foot through optimal transmission exhibition by methods for SFDE (OTSFDE), and SFDE (SOSTFIDE), for two compatible transmission models. Compared to OTSFDE, SOTSFDE is less estimated with minor performance scandals. New consequences show that suggested algo can eliminate fog, which is not limited by the assumptions or limitations, but on the contrary, quantitatively besides individually, in contrast, and some of the current algorithms. [11].

Changli Lii et al. [2017]This article mainly focuses on image restoration. First of all, it studies He's defogging algo created on dark channel previous as well as make some improvement based on this theory. Aiming at solving the defects of inaccurate estimation of atmospheric light and longtime running of He's algorithm, the improvement of estimation of climatic light and transmittance are suggested in this paper. To improve the transmittance of estimation by introducing a gain coefficient instead of the soft matting algorithm for a long time. At the same time, four binary tree subdivision method is a charity to approximation atmospheric graceful, which is able to shorten the operation time, avoid the halo phenomenon and achieve a better defogging effect [12].

IV. PROPOSE WORK

Problem statement

It produces Halo effects in some regions.

Transmission map is not estimated accurately.

Computation time is required more.

The disadvantage of the IDCP method continues to persist from DCP.

it products halo effect in the area of non-uniform depth, estimation of the broadcast map is not done properly.

Propose Methodology

In this work, we have proposed a new approach that effectively solves inadequate fog thickness estimation as well as color casting difficulties. In doing so, you can create a high-quality image thru clear discernibility as well as clear color. In our proposed work, we enhance our image by applying new Technique Linear Contrast Stretch which provides us better results as compared to base techniques. In this paper, Contrast enhancement technology is used to increase the brightness value of an image so that an image may be shown effectively in the way the analyst wants. Unlike the illumination level of an image, the illumination or acquisition sensor may vary due to inappropriate adjustment of the device. Therefore, to overcome the difficulties of image achievement, it is essential to handle the intensity of the picture. The idea overdue difference stretching is to escalation energetic variety of gray level in the treated image. The indication is to modify the dynamic range of gray-level in the image. Linear Contrast Stretch Algorithm is a simple contrast stretch algo draws pixel standards of a small difference image or high contrast image by increasing energetic range since 0 - (L-1) into an entire content range.

The output image is much clear than the base paper image and the hollow effect is also reduced.

Propose an algorithm

STEP 1: First we browse an original image from the dataset.

STEP 2: Convert original RGB image into YcbCr.

STEP 3: Dark channel prior to this YcbCr image.

STEP 4: Calculateatmospheric light estimation.

STEP 5: Transmission estimation

STEP 6: Scene radiance by improving the radiance.

STEP 7: Improve Dark channel prior

STEP 8: Propose technique (Contrast stretching)

STEP 9: calculate SSIM and MSE.

1. Mean Square Error

If the comparison of images is based on their relative merits, then MSE.g(x,y), as well as f(x,y), is

$$e_{MSE} = 1/MN \sum_{n=1}^{M} \sum_{m=1}^{N} [f(n,m) - g(n,m)]^2$$

where M, as well as N, represent no. of rows as well as columns respectively.

2. SSIM (Structural Similarity Index)

SSIM Index 9 evaluates a test image. In this sense, it is an SKE function by calculating a local spatial index defined by the following: SSIM estimates the quality of X relative to Y.

$$\mathrm{SSIM}(x,y) = [l(x,y)]^{\alpha}.[c(x,y)]^{\beta}.[r(x,y)]^{\gamma},$$

Wherever α, β, and γ are parameters that describecomparativesignificanceSSIM Smax of every component; y 0 (completely different) to 1 (similar patch) In the end, an average SSIM index is calculated to assess global image equality

STEP 10: Exit.

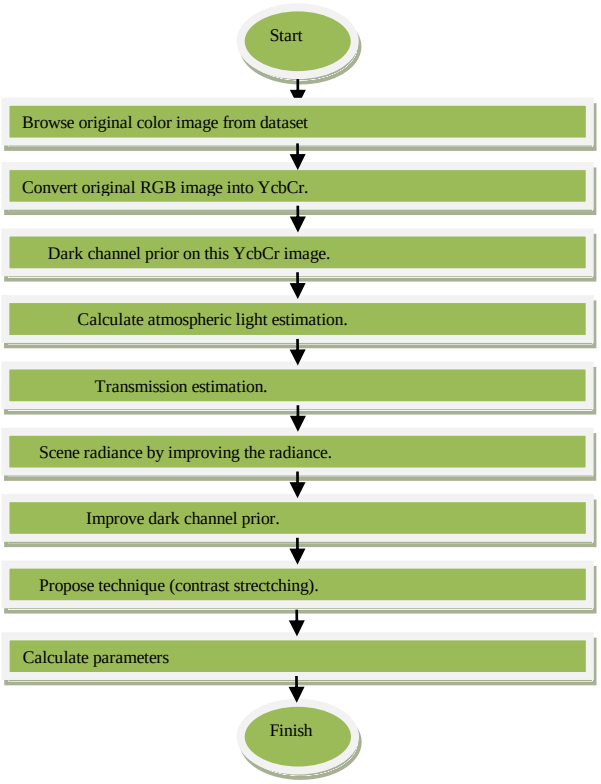

Fig. 2. Flowchart of proposed work

V. RESULT ANALYSIS

The menu bar of simulated code obtained by MATLAB toolbox in figure 4.1Result analysis based on the foggy image. The foggy image takes from the MATLAB code of dataset. On the basis of the output image of techniques represents result analysis of image and simulation value.

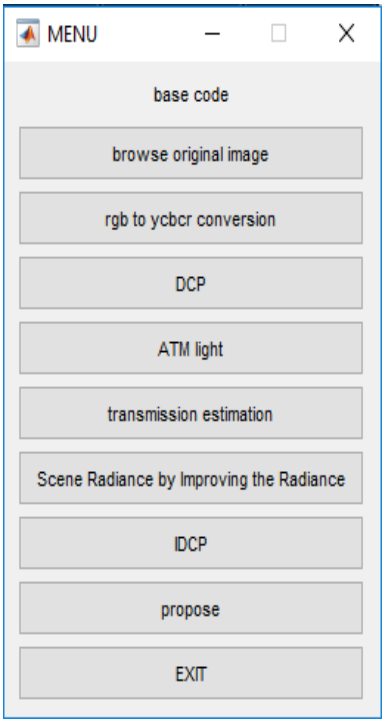

Fig.3. First, We 'Run' our code and then obtain this type of menu bar.

In this menu bar, there are 9 steps.

Fig. 4. First, we browse a hazy image from the dataset.

Fig. 5. Convert RGB to YcbCr.

Fig. 6. Apply dark channel prior on this YcbCr image.

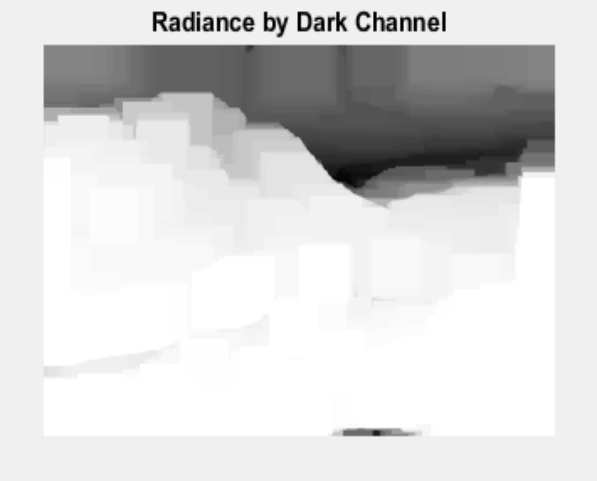

Fig. 7. Transmission estimation.

Fig. 8. Scene radiance by improving the radiance

Fig. 9. IDCP

Fig. 10. Propose technique

Table.1 Comparison Base MSE and Propose MSE

Image name	Base MSE	Propose MSE
5.jpg	1.4133	0.8489
Lake	1.4118	0.8193
ny_2	1.4139	0.8832

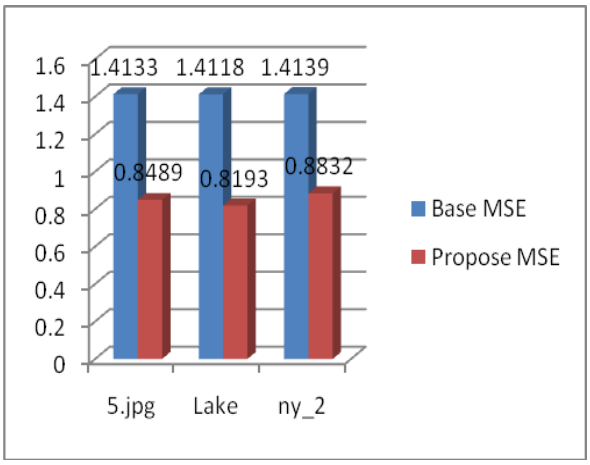

Fig. 11. Comparison graph on Base MSE and Propose MSE

Table. 2 Comparison Base SSIM and Propose SSIM

Image name	Base SSIM	Propose SSIM
5.jpg	0.0056	0.0023
Lake	0.0052	0.0034
ny_2	0.0160	0.0078

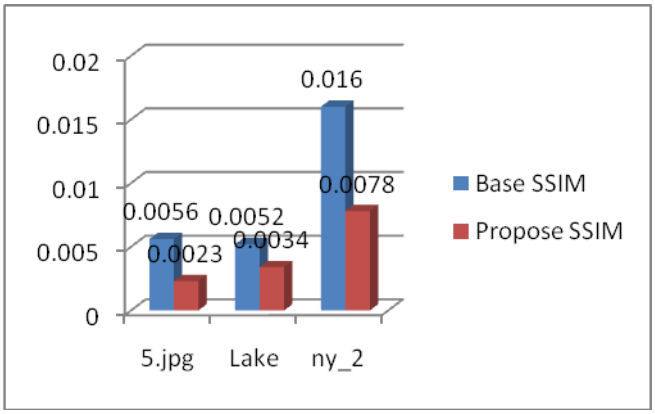

Fig. 12. Comparison graph on Base SSIM and Propose SSIM

VI. CONCLUSION

Images play a very important role every day in human life. The image quality is affected by environmental conditions including their capturing method, storing technique, and representing behavior. Dark Channel Prior (DCP) founded fog elimination and side-maintaining smoothing process has supplied a rather promising outcome over the offered processes. The method is utilized for eliminating image noise. The above discussion and the results of the test can be concluded that the opposite stretch technique has been developed using the basic principles of a problem domain which produces the quality of respecting the most complex and mathematically important techniques. Contrast stretching is an effective technique for the best solution. The output image is much clear than the base paper image and Follow effect is also reduced.

REFERENCES

[1] MISS. MAYURI V. BADHE1, PROF. PRABHAKAR L. RAMTEKE, "A Survey on Haze Removal using Image Visibility Restoration Technique". International Journal of Computer Science and Mobile Computing. IJCSMC, Vol. 5, Issue. 2, February 2016

[2] Zhu Dan, Jie Chen, Lap-Pui Chau, "Development of Defogging Algorithm for Image". http://ircset.org/anand/2016papers/IRC-SET_2016_paper_S5-2.pdf

[3] Poonam1 Dr.VK Banga2 Gurjit Singh, "A Review on Haze Removal Techniques". International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 04 Issue: 08 | Aug -2017 ISSN: 2395-007

[4] R. T. Tan, "Visibility in bad weather from a single image", in IEEE Conf. on Computer Vision and Pattern Recognition, (2008), pp. 1-81.

[5] S. Kolkur1, D. Kalbande2, P. Shimpi2, C. Bapat2, and J. Jatakia, "Human Skin Detection Using RGB, HSV, and YCbCr Color Models". ICCASP/ICMMD-2016. Advances in Intelligent Systems Research. Vol. 137, Pp. 324-332. © 2017

[6] Leow Bin Toh, M.Y. Mashor, P. Ehkan, H. Roseline, A.K. Junoh, and N.H. Harun, "Implementation of High Dynamic Range Rendering on Acute Leukemia Slide Images using Contrast Stretching", 978-1-5090-2160-4/16/$31.00 © IEEE 2016.

[7] ZAHID TUFAIL1, KHAWAR KHURSHID 2, AHMADSALMAN2, IMRAN FAREED NIZAMI 2, KHURRAM KHURSHID1, AND BYEUNGWOO JEON, "Improved Dark Channel Prior for Image Defogging Using RGB and YCbCr Color Space". Received May 11, 2018, accepted May 29, 2018, date of publication June 4, 2018, date of current version June 29, 2018.

[8] Fei Yuan, Hua Huang, "Image Haze Removal via Reference Retrieval and Scene Prior". 1057-7149 (c) 2018 IEEE.

[9] Akshay Dudhane, Subrahmanyam Mural, "A novel approach for single image haze removal". 978-1-5386-4886-5/18/$31.00 ©2018 IEEE.

[10] Changchun Kang, Gyeonghwan Kim, "Single Image Haze Removal Method Using Conditional Random Fields". 1070-9908 © 2018 IEEE.
[11] Jing-Ming Guo, Jin-yuSyue, Vincent Radzicki, and Hua Lee, Fellow," An Efficient Fusion-Based Defogging", IEEE IEEE Transactions on Image Processing, Vol: 26, Issue: 9, Sept. 2017.
[12] Changli Lii, Tanghuai Fan, Xiao Ma, Zhen Zhang Hongxin Wu, Lin Chen "An Improved Image Defogging Method Based on Dark Channel Prior" 2017 2nd International Conference on Image, Vision, and Computing.