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New framework for enhanced the image visibility which is degraded due to fog and Weather Condition

Niranjan Kumar[1], Ravishankar Sharma[2]
Research Scholar, Associate Professor
Suresh Gyan Vihar University

Abstract:- Now-a-days digital camera is the most usually used devices to capture images. They are used all over the place, including mobile phone, personal digital assistant (PDAs), robots, watch and home security system. Few years back, the value of the images obtain from digital camera was not good. But in early days, there is no doubt that the value of the images has improved significantly. Part of this improvement is suitable to the higher dispensation capability of the system they are fixed and memory ease of use. The quality of image usually suffers from poor image quality, mainly lack of contrast and occurrence of shading and artifact, due to lack in focusing, lighting, specimen staining and other factor. Among these, contrast is one of factor. The research work aims at improving the contrast of images. They are many methods available for image enhancement but we have concentrated on contrast enhancement techniques in my work. We find that the need for contrast enhancement increases. Histogram Equalization is one of the method, this method is simple and comparative better than other. The contrast of an image is a feature which determines how image looks better visually. The Contrast enhancement is considered as one of the mainly important issue in image processing.

1. Image Enhancement

The main purpose of image enhancement is to method a certain image so that the effect is more proper than the original image for an exact application. The enhancement doesn't raise the inherent information import of the data, but it increases the active range of the select feature so that they can be detecting easily. The greatest complexity in image enhancement quantifying the principle for enhancement and so a large number of image enhancement technique are observed and require interactive procedures to obtain suitable results.

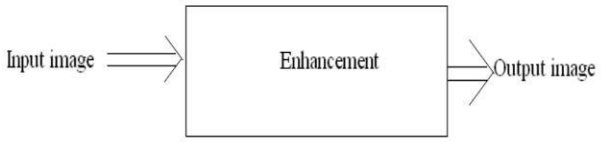

Fig 1.1 Image Enhancement

There is no common assumption of image enhancement. When an image is processed for visual version, the viewer is the ultimate evaluator of how well a particular method work. Visual evaluation of Image quality is a highly subjective process, thus making the meaning of a “good image” an elusive model by which to balance algorithm routine. Figure

1.1 shows the simple process of enhancement. Image enhancement refer to individuals image processing operations that progress the value of enter image in order to beat the weak point of human visual system.

Image enhancement technique can be divided into two broad categories:-

Spatial domain method, which operate straight on pixel, and

Frequency domain method, which work on the Fourier transform of an image.

Application area of image enhancement

In this section, Applications of image enhancement are given below:-

Health sciences, Enhance biomedical/medical image qualities (dental, chromosome images, magnetic resonance images, chest radiography and mammography images and others)

Diagnostic imaging

capability Robotic surgery.

Low vision reading with electronic display.

Satellite Imaging.

Digital photography and LCD display processing.

1.2 Contrast Enhancement

Contrast enhancement of an image is a main challenge in the area of digital picture processing which is well-defined as the part between the bright and the dark pixel intensities of images. High contrast images contain much colour and gray scale information as compare low contrast images. Contrast enhancement play an main function in image processing application, such like medical image processing, digital photography, satellite imaging, and LCD display processing. There are several descriptions for an image to have poor contrast: due to the poor quality of the used imaging device. As a result, such images and videos may not expose all the details in the captured scene.

Contrast enhancement method can be divided into two main classes:

1) intensity-based technique

2) feature-based technique.

1.3 Histogram Equalization

Histogram manipulation mostly modify the histogram of input image so as to recover the visual value of the image, in order to understand histogram manipulation, it is necessary

Histogram procedure whichconsists of generates an output image by an even histogram (*i.e.*, consistent sharing). In image processing, the plan of equalize a histogram is to make longer or reallocate the unique histogram by the complete range of separate level of the image, in a method to an enhancement of image difference is achieve. This technique is normally working used for image enhancement because of its simplicity and comparatively.

Normally, Histogram Equalization is able to be characterized two main processes: global histogram equalization (GHE) and local histogram equalization (LHE). In GHE, the histogram of the full input image is use to compute a histogram transformation function. Since a result, the active range of the image histogram is compress and stretch, by which the largely contrast is better. The computational difficulty of GHE is relatively less. The major drawback of GHE is that it cannot adjust the limited in order of the images and protect the clarity of the unique image. Where LHE use a downhill window method, in this local histogram are intended from the window area to produce a local intensities remapping for each pixels. The strength of the pixel at the middle of the area is enhanced according to the local strength remapping that pixel.

LHE is able of produce good contrast result but is from time to time held to over-enhance image. It as well requires more addition than other method since a local histogram have to be made and deal with each image pixels.

Motivation

This research is extension of Image of outside scene capture in bad climate go through from reduced gap. Below bad climate condition, the brightness success a camera is cruelly spread by the environment. So the image is getting highly degraded due to additive light. Bad weather reduces impressive visibility. Reduced visibility degrade perceptual images value and presentation of the computer algorithm such when observation, track, and steering. so, it is especially essential towards build these vision algorithm strong to climate change. From the atmospheric point of view, weather condition change mostly into the type and size of the particle present in the gap. A large attempt has left into measure the size of these particles. Based schedule the form of the optical effect, bad climate condition broadly classify two categories, fixed and forceful. In fixed bad climate, essential droplet is extremely small and gradually floating into the atmosphere. Fog, mist, and haze are examples of steady weather. In forceful bad climate, element droplet are 1000 period tubby than individuals of the stable climate. Rain and snow represent dynamic weather conditions. Around have been several famous efforts to return image ruined with fog. The mainly ordinary scheme identified to improve sullied image histogram equalization. Though, still although global histogram equalization be easy and quick, it be not appropriate since the fog's result going on an image be a purpose of the reserve among the camera and purpose. Another effective method is to restore degraded images is scene depth method but here required two images which are taken under different whether condition for comparing the image quality. When using the wavelet method also required several images to accomplish the enhancement. In all previous work consider the air light is uniformly distributed in the image. But originally the air light is not equally distributed. Another method is atmospheric model. This method use substantial Model to calculate the model of picture degradation with after that return image difference by suitable compensation. They give superior picture version except typically need added in order a propos the image scheme and the image situation. It is known that under fog climate condition, the gap and colour character of the image are severely despoiled. Clear day image have more distinction than foggy images. Hence, a fog removal algorithm should enhance the scene contrast. Enhancement of foggy image is a challenge due to the complexity in recovering luminance and chrominance while maintaining the colour fidelity. During enhancement of foggy images, it should be kept in mind that over enhancement leads to saturation of pixel value. Thus, enhancement should be bounded by some constraints to avoid saturation of image and preserve appropriate colour fidelity. The resultant moulder inside contrast vary crosswise the sight and exponential inside the depth of sight point. So usual break invariant image processing technique is not enough towards take away climate effect from image. Here recommended an easy alteration method of fog beating in hazy image, in command towards estimation the air light since a colour image, a charge purpose use for the RGB path. But, it assume to air light be consistent more the entire images. Within this existing method is improved to create it valid still as the air light sharing is not even over the picture. In direct towards estimation the air light; a charge purpose to be base resting on the creature optical model is used into the luminance reflection.

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2. LITERATURE SURVEY

A great deal of study on Image enhancement has been done. It is useful to analyze the existing methods on the Contrast Enhancement which help to do further research. A lot of image such when foggy image, rainy image, satellite image, isolated sense image, electron-microscopy image level actual time graphic picture experience as of reduced contrast. So it is essential to improve the difference. Some of them available in literature are discussed here. **"Fog-degraded Image Enhancement Using Two Images of Same Scene with Time Difference" by ChangwonJeon, Dubok Park, HanseokKo "**In this paper, we obtain Images degraded by fog adversely affect the quality of vision-based physical security system. The resulting distortions from fog obscure contrast in image frames. We propose a contrast enhancement procedure for fog degraded images using relative depth estimation by incorporating time difference. Representative experimental result proves that the future algorithm is effective for contrast enhancement of fog-degraded images. Fog is physical incident cause by small dusts or droplet of water inside the atmosphere. Such environment causes poorer performance on vision based surveillance system than normal condition. Also, a dark channel prior is used for single image. This particular work has shown a good performance for de-haze effect. However, the details by using multiple images can provide more information than using single. We obtain more detailed information with using two-image of similar picture with unlike climate (or time) and propose a simple relative depth estimation model, without the use of exact parameters. We proposed and demonstrated an effective model for depth estimation and used it for contrast enhancement. The experimental results indicate that the proposed depth estimation model produced satisfying defogging performance. **"BLIND CONTRAST ENHANCEMENT ASSESSMENT" BY GRADIENT RATIOING AT VISIBLE EDGES" by NICOLAS HAUTIÈRE1, JEAN-PHILIPPE TAREL1 *et al.* (2008)** The difference of outside image obtain below poor climate condition, particularly hazy climate, be changed with the spreading of daytime by imposing particle. When a result, altered method contain intended near repair the difference of these image. But, around be short of method towards measure the presentation of the method and to charge them. Different images value appraisal otherwise images re-establishment area, close by no simple method towards contain a position image, which make the difficulty not straight forward towards explain. In this document, move toward is future which consist inside compute the virtual among the incline of the evident limits among the images by and behind difference return. Inside this mode, a pointer of visibility improvement be provide based going on the idea of visibility rank, generally use in light industrial. At last, the methods are sensible toward contrast enhancement estimation and towards the difference of tone-mapping operative. **"Adaptive Contrast Enhancement Involving CNN-based Processing for Foggy Weather Conditions & Non-Uniform Lighting Conditions" by Christopher Schwarzlmüller, Fadi Al Machot, AlirezaFasih**In this paper adaptive image processing inside the framework of Advanced Driver help System (ADAS) be a important matter since bad climate condition direct towards reduced idea. inside a hazy climate, images difference with visibility be short suitable towards the occurrence of air light to is generate with spreading beam, which inside twist because with fog

particle. Because image base ADAS be artificial with insufficient difference, a real-time able result be necessary. Towards advance such sullied image, a way be necessary which process every images area alone. Thus, immediate doling out be necessary, the way is realize by the CNN concept which claim the attribute of real-time image processing.

3. Research Methodology

We analyse with evaluate the new result within optical effect, and idea estimate criteria. Although compare the result, we show the benefit and difficulty of these method. We contain planned easy but commanding algorithms base on average filter using low-rank techniques for visibility improvement as of a single foggy images. While the computational difficulty of the low-rank techniques is small, it is exposed to the planned advance used for fog deletion is hasty, also can even attain improved result than the high-tech method into an only image debasing. Though, the planned advance may be not works fine for the distant scenes with heavy fog and great depth jump. The restore images have the halo or lasting mist at strength discontinuities to tin is practical in this experimental result. With one more inadequacy is not capable to get the real values of universal tone beam. To conquer this constraint of our present methods, we mean to slot in improved edge-preserving images filtering methods by small difficulty and other technique. We propose a contrast enhancement procedure for fog degraded images using relative depth estimation by incorporating time difference. Representative experimental results show to the future algorithms is useful for gap improvement of fog-degraded image.

Based on the physical properties there are two kinds of weather conditions: steady and dynamic. Fig 3.1 and 3.2 show the steady and dynamic weather conditions respectively. The steady weather conditions are fog, mist and haze etc. The size of those particles is about 1-10μm. The dynamic weather conditions are rain, snow and hail etc. Its size is 1000 times larger than that of steady conditions i.e., about 0.1-10mm. The intensity of a particular pixel will be the aggregate effect of a large number of particles in case of steady weather conditions. In dynamic weather conditions, since the droplets have larger size, the objects will get motion blurred. These noises will degrade the presentation of a variety of computer idea algorithm which utilize attribute in order such as entity recognition, track, segmentation and gratitude. Even if a small part of the object is occluded, the object cannot be tracked well. Rainfall picture have assets to a picture pixels be never forever cover by rain during the total cassette. Meant for the reason of return, the active bad climate mould is investigated. Rainfall is the main part of the active bad climate.

4. IMPLEMENTATION WORK

My work intends towards to remove fog and rain in bad images. in this process is depends on dark channel estimation . Dark Channel Estimation is usefor the view of impressive radiance into the dehazedimage to get the more proper result. Thistechnique is used for non-sky patch, as onslightest single shade channels have extremely small strength at a fewpixels. The low intensity inside the dark channel ismainly due to two factors:-

1. Colourful objects or surfaces (green grass, tree, flowers etc)

2. Dark objects or surfaces (stone etc)

Conventionally, we proposed the fog and rain removable algorithm to detect the fog and rain in the

images and we can use same algorithm to remove fog and rain in the videos.

4.1 Proposed Methodology

Main foundation of complications when processing outside images is the existence of the noise, haze, fog or rain which reduces the quality of image by decreasing the contrast of the captured objects. This dissertation proposes a new improved algorithm and alternatives used in favour of visibility restoration from a foggy or low density images. The proposed algorithm will mix dark path former, CLAHE and adaptive gamma modification towards achieve the objective of this research work.

The main advantage is the probability to grip both colour images and gray point images since the mistiness among the occurrence of fog and the matter with short colour dispersion is resolve by arrogant only little substance can contain colours with low strength.

In order to performance comparison, different metrics of images and complexity theory will be considered. An appropriate comparison will be drawn among proposed technique and previous well known techniques.

4.2. Proposed Algorithm

Step I. Read all images in MTLAB.

Step II. Now CLAHE on L*a*b colour gap operation is calculate and it will be applied to equilibrium to the outcome of the brightness and colours of the image.

Step III. Now we calculated Dark channel and it will prior resolve come in action to decrease the consequence of fog from digital image .

Step IV. Now adaptive gamma improvement will be applied as a post dispensation operation to enhance the brightness of the system.

Step V. Here we will get the final image which has been visibly restored from the system.

A. CLAHE On L*A*B Colour Gap:-

Contrast partial adaptive histogram equalization short form is CLAHE. This method does not need any predicted weather information for the processing of hazed image. Firstly, the image capture in the camera inside misty condition is transformed as of RGB (red, green and blue) colour space be changed towards LAB colours gap. A Lab colours gap be a colour opponent gap by measurement L used for precision with (a , b) intended for the shade opponent size, base scheduled nonlinearly compacted CIE XYZ colour spaces coordinate.

B. Dark Channel Prior: -

Dark channel prior be used for estimation of impressive beam in the dehazed images towards find more proper result. This technique is mostly used for non-sky patches, as at smallest amount single colour path have extremely short strength at several pixels. Because the outside image be typically filled of bright, the sinister channel of these image will be actually shady. Suitable towards fog (air-light), fog images be brighter than its image without fog. so we can say dark channels of fog images resolve have high strength in region by higher haze. So, visually the amount of shady channels is a forceful estimate of the width of fog.

C. Adaptive Gamma Correction:-A nonlinear process used code and decode and tristimulus value in video or at rest image system. Gamma alteration defined by the following power law expression:

$$V_{OUT} = A\, V_{IN}^{\gamma}$$

Where A is a stable with the effort and production value be non-negative actual value; within the ordinary container of A = 1, input and output be classically into the series 0 – 1. A gamma values $\gamma < 1$ be at times call

an training gamma, with the method of training among this compressive power-law nonlinearity be called gamma density; equally a gamma values $\gamma > 1$ is called a decode gamma with the request of the friendly power-law nonlinearity be called gamma development.

4.3 Experimental Set-Up

In instruct to execute the prospect algorithms; plan with performance have been complete in MATLAB with image processing toolbox. Inside command towards act cross support we contain too implement the non linear enhancement technique. Table 4.1 is show the various images which be use inside this study effort. Image be known beside by their format. Every image are of changed kinds and every images have changed type of the beam i.e. extra or fewer inside a few image.

Table 4.1: Experimental images

NAME	FORMAT	SIZE(KB)
Fog	.jpg	172
Rain	.png	511

4.4 Simulation and Result

For the function of fractious support we contain occupied 2 changed image single of fog with second of rain with conceded towards the projected algorithms. Following part contain a effect of single of the image towards explain the improvisation of the projected algorithms more the previous techniques.

After applying our algorithm we found that the images are free from fog and rain. The same process is applied for videos and the results are obtained. The image containing the rain falling to the pool. The image is taken in static background.

After that applying proposed algorithm for foggy and rainy images and we got many restored images and each image size will be change. Show the table 4.2 and table 4.3 is define each restored image change size.

Table 4.3 Results

IMAGES	FORMAT	SIZE(KB)
Original image (a)	.png	511
Fimal result image (b)	.png	452

5. Conclusion

We analyze and evaluate the new result in optical property, with object estimate criterion. We contain projected easy except great algorithms base on median filtering using low-rank techniques used for visibility improvement since a single misty images. Though comparing results, we demonstrate the advantage and disadvantage of these methods. While the computational difficulty of the low rank techniques is small, it be exposed to the projected move to used for fog deletion be quick, with can constant reach superior result than the high-tech method inside a only image dehazing. The planned work does not assume size, shape and orientation of the rain drops. It works in any fog and rain conditions and also in case of reflected rain drop and scene containing text information

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