EFFECTIVE IMAGE ENHANCEMENT TECHNIQUES FOR FOG AFFECTED INDOOR AND OUTDOOR IMAGES

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Abstract - *Haze in the environment will hinder the accurate recognition of objects captured in an image. To overcome this problem, image de-hazing processes have been an active technique applied in much research work. It is an effective technique to enhance the images captured and degraded due to the medium scattering and absorption. It builds on the blending of two images that are directly derived from a color compensated and white-balanced version of the original degraded image. The two images to fusion, as well as their associated weight maps, are defined to promote the transfer of edges and color contrast to the output image. To avoid sharp weight map transitions that create artifacts in the low frequency components of the reconstructed image, it adapt a multiscale fusion strategy. In this dehazing technique consists in three main steps: inputs derivation from the white balanced image, weight maps definition, and multi-scale fusion of the inputs and weight maps. Our Experiments are Implemented and Simulated using MATLAB.*

Key Words*: *Fog removal, image enhancement, defogging algorithm

1. INTRODUCTION

Nowadays, Computer Vision technology plays a very significant role in modern life in most countries. The performance and reliability of the Computer Vision devices are directly affected by the quality of the images which can be influenced by a number of different factors. Fog is a factor which can considerably decrease the resolution of the images. As a result, removing the fog from images can be perceived as one of the most important topics in image restoration.

Many methods have been proposed in an attempt to remove the fog from images. These methods can be divided into two main categories. The first type of approaches uses multiple images captured by a camera of a foggy scene in order to remove the fog from the images. Despite the fact that these methods can effectively remove the fog from images, they are not widely used in practical 94.61 percent applications. It is mainly because the speed of these algorithms are constrained by the rate of changes happening in the atmosphere. In the foggy images of a scene were explained by a physical model. Variation in intensities of the scene under different weather conditions imposes serious constraints on the detection of discontinuities in depth.
The second type of approaches uses a single image as the only source of information. The procedures of second type algorithms are sometimes significantly different from one another. In the hazy image was broken down into many regions with the assumption that each region has a constant reflectance.

Each region was expressed in terms of shading and transmission which are locally uncorrelated. The performance of this method is greatly affected by the statistics of the input data such as the color information and the significance variation. Moreover, heavy haze can significantly decrease the performance of the algorithm which is mainly because most of the fundamental assumptions are violated in this situation. Another method was introduced in which tried to calculate the depth map and the air light constant.

The proposed algorithm estimated the air light in the first step by searching the regions with the highest value of intensity. Then a robust optimization framework was introduced based on graphical Markov Random Field (MRF) to estimate the depth. When the intensity of air light was close to that of the objects in the scene, the reliability of the estimation of depth would reduce. He introduced an algorithm by using Dark Channel Prior. It is based on the idea that the thickness of haze can be estimated using a kind of statistics called Dark Channel Prior. Dark pixels are the pixels which have a very low intensity in at least one color channel (RGB). The transmission map can be created using these dark pixels. Then, the high quality fog- free image can be recovered by using the model proposed in this paper. Tarel used a modification of a common physical model. The issue of depth estimation is not considered in this model which can lead to decreasing the complexity of the proposed algorithm.

However, too many parameters should be adjusted which can lead to the limited application of this method. In two versions of the original image were used as the inputs weighted by specific maps. Three weight maps (luminance, chromatic and saliency) were used as weighting components. The basic idea in this fusion-based method was to combine these input images into a single one. The proposed method is very fast and easy to implement. As a consequence, it can be widely used in real-time applications. The basic assumption of the proposed algorithm in that each image is created by reference and characteristic intensity levels. The first one shows the background intensity level and can be calculated by applying a low pass filter while

2. EXISTING SYSTEM

With the fast development of digital image processing technology, video surveillance system had been used widely. The quality of video images is caused by the condition of weather, it will be better when weather is good, while it will be worse when weather is bad. Foggy is a main bad weather, the image obtained in foggy weather has low contrast and clarity, and some color information is also lost, which affects the following analysis and recognition. In our country, foggy is worse and worse with the economic development.

Most image recognition systems are suitable for normal weather, so the restoration of foggy degradation image to improve the image quality has high application value. The tradition methods for image degradation are using all kinds of low filters to get rid of noise, but they are not suitable for foggy degradation image. In foggy weather, there are lots of aerosol molecules in the atmosphere, the diameter of these molecules is bigger than the length of light, which affects the strength distribution of the light scatter, so it affects the quality of the image, and the contrast of the image is dropped with the increase of the distance between the objects and the camera. Discrete wavelet transforms are one of the available method to increase contrast in an image. While using DWT there will be some quantization error occurs. To eliminate blur noise in an image the wavelet

3. PROPOSED SYSTEM

The Image Enhancement technique consists in three main steps: inputs derivation from the white balanced image, weight maps definition, and multi-scale fusion of the inputs and weight maps. Our image enhancement approach adopts a two-step strategy, combining white balancing and image fusion, to improve images without resorting to the explicit inversion of the optical model.

A. White Balancing

In white balancing approach, white balancing aims at compensating for the color cast caused by the selective absorption of colors with depth, while image fusion is considered to enhance the edges and details of the scene, to mitigate the loss of contrast resulting from backscattering. White-balancing aims at improving the image aspect, primarily by removing the undesired color castings due to various illumination or medium attenuation properties. The perception of color is highly correlated with the depth, and an important problem is the green-bluish appearance that needs to be rectified.

As the light penetrates the fog image, the attenuation process affects selectively the wavelength spectrum, thus affecting the intensity and the appearance of a colored surface. Since the scattering attenuates more the long wavelengths than the short ones, the color perception is affected. In practice, the attenuation and the loss of color also depends on the total distance between the observer and the scene.

In white-balancing approach reduces the quantization artifacts introduced by domain stretching (the red regions in the different outputs). The reddish appearance of high intensity regions is also well corrected since the red channel is better balanced

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B. Multi-Scale Fusion

It built multi-scale fusion principles to propose a single image Enhancement. In the framework builds on a set of inputs and weight maps derived from a single original image. In particular, as a pair of inputs is introduced to respectively enhance the color contrast and the edge sharpness of the white-balanced image, and the weight maps are defined to preserve the qualities and reject the defaults of those inputs, i.e. to overcome the artifacts induced by the light propagation limitation in medium. Inputs of the Fusion Process Since the color correction is critical in, first apply the white balancing technique to the original image.

The step aims at enhancing the image appearance by discarding unwanted color casts caused by various illuminants. In fog image, white balancing suffers from noticeable effects since the absorbed colors are difficult to be recovered. As a result, to obtain a first input that perform a gamma correction of the white balanced image version. Gamma correction aims at correcting the global contrast and is relevant since, in general, white balanced images tend to appear too bright. This correction increases the difference between darker/lighter regions at the cost of a loss of details in the under-/over-exposed regions. To compensate for the loss, derive a second input that corresponds to a sharpened version of the white balanced image.

The sharpening method defined is referred to as normalized unsharp masking process in the following. It has the advantage to not require any parameter tuning, and appears to be effective in terms of sharpening. The second input primarily helps in reducing the degradation caused by scattering. Since the difference between white balanced image and its Gaussian filtered version is a high pass signal that approximates the opposite of Laplacian, this operation has the inconvenient to magnify the high frequency noise, thereby generating undesired artifacts in the second input.

The multi-scale fusion strategy described in the next section will be in charge of minimizing the transfer of those artifacts to the final blended image. Weights of the Fusion Process the weight maps are used during blending in such a way that pixels with a high weight value are more represented in the final image. It is defined based on a number of local image quality or saliency metrics.

C. Weights of the Fusion Process

The proposed system developed an image-driven method for the automatic segmentation of the images from CT scans. The methodology relies on image processing techniques such as, multi-thresholding, image filtering, but it also exploits the available of the kidney disease. The development of such a segmentation system has two major tasks initial step is, a pre-processing stage in which the region of interest (ROI) is delimited and the statistical parameters are computed and next step is, the segmentation procedure itself, which makes use of the data can get during the previous stage.

To introduce the step of feature extraction and find out the best features and optimize by using of cuckoo search algorithm and artificial neural networks for classification of kidney images as normal as well as the abnormal images and then results of the stone detection.

It improves on the state of both computation speed and implementation. The weight maps are used during blending in such a way that pixels with a high weight value are more represented in the final image. It is defined based on a number of local image quality or saliency metrics

1). Laplacian contrast weight (WL)

Laplacian contrast weight (WL) estimates the global contrast by computing the absolute value of a Laplacian filter applied on each input luminance channel. The straightforward indicator was used in different applications such as tone mapping and extending depth of field since it assigns high values to edges and texture.

For the dehazing task, however, this weight is not sufficient to recover the contrast, mainly because it cannot distinguish much between a ramp and flat regions. To handle this problem, an additional and complementary contrast assessment metric.

2). Saliency weight (WS)

Saliency weight (WS) aims at emphasizing the salient objects that lose their prominence in the scene. To measure the saliency level, it have employed the saliency estimator of Achantay et al. The computationally efficient algorithm has been inspired by the biological concept of center-surround contrast. However, the saliency map tends to favor highlighted areas (regions with high luminance values). To overcome this limitation, introduce an additional weight map based on the observation that saturation decreases in the highlighted regions.

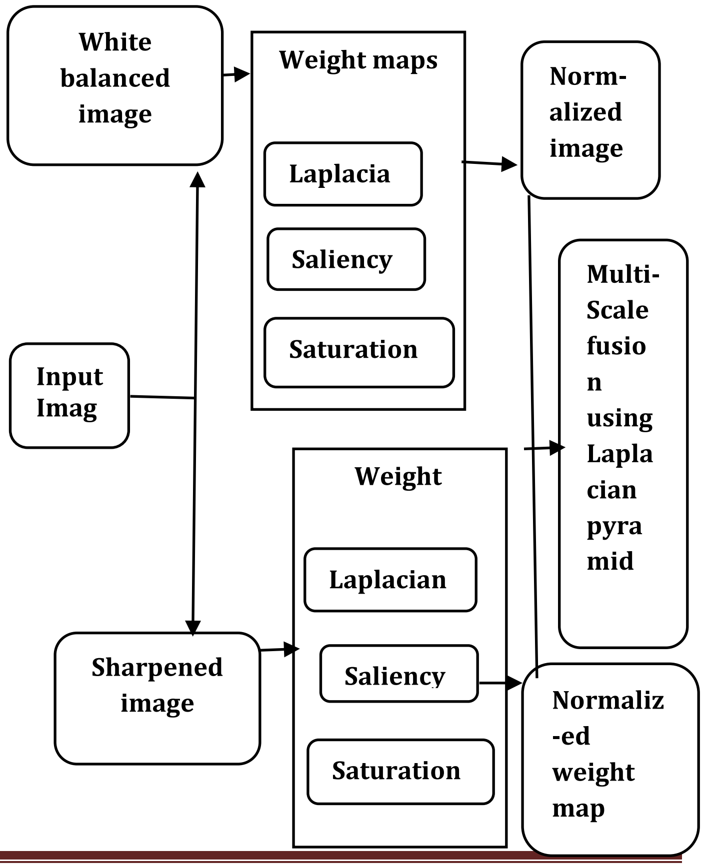
3). Saturation weight (WSat)

Saturation weight (WSat) enables the fusion algorithm to adapt to chromatic information by advantaging highly saturated regions. This weight map is simply computed (for each input Ik) as the deviation (for every pixel location) between the Rk, Gk and Bk color channels and the luminance Lk of the kth input.

D. Multi-Scale Fusion Process

The multi-scale decomposition is based on Laplacian pyramid originally described in Burt and Adelson. The pyramid representation decomposes an image into a sum of band pass images.

4. PROCESS IN PROPOSED SYSTEM



5. CONCLUSION

The effective method has been introduced to remove the fog from the images. The method is mainly based on a new version of Laplacian model of atmospheric light. In the first step of this algorithm, an estimation of the atmospheric veil is calculated without considering any information about the depth of pixels. Some regions of the image have not degraded by the fog. So, it should consider a small value for the atmospheric veil in these regions. To serve this purpose, a weighted function is applied on this estimation which can greatly decrease the intensity of this layer in the fog-free regions of image. Finally, the fog-free image can be obtained using the proposed version of Laplacian model. In addition, a new indicator is proposed to increase the level of accuracy in our evaluations. The complexity of the proposed method can be expressed as a linear function of the number of input pixels. It can make this algorithm more suitable for real- time applications as our experimental results showed.

6. REFERENCES

[1] Ancuti, C. O., Ancuti, C., & Bekaert, P. (2011, January). Single image restoration of outdoor scenes. In Computer Analysis of Images and Patterns (pp. 245-252). [2] Ancuti, C. O., Ancuti, C., & Bekaert, P. (2010, September). Effective single image dehazing by fusion. IEEE International Conference on Image Processing (ICIP) (pp. 3541-3544).

[3] Caraffa, L., & Tarel, J. P. (2013). Stereo reconstruction and contrast restoration in daytime fog. In Computer Vision–ACCV (pp. 13-25).

[4] Fattal, R. (2008, August). Single image dehazing. In ACM Transactions on Graphics (TOG) (Vol. 27, No. 3, p. 72).

[5] Hautiere, N., Tarel, J. P., Lavenant, J., & Aubert, D. (2006). Automatic fog detection and estimation of visibility distance through use of an onboard camera. Machine Vision and Applications (Vol. 17, No. 1, pp. 8-20).

[6] He, K., Sun, J., & Tang, X. (2011). Single image haze removal using dark channel prior. IEEE Transactions on Pattern Analysis and Machine Intelligence (Vol. 33, No. 12, pp. 2341-2353).

[7] Kim, J. H., Jang, W. D., Sim, J. Y., & Kim, C. S. (2013). Optimized contrast enhancement for real-time image and video dehazing. Journal of Visual Communication and Image Representation (Vol. 24, No. 3, pp. 410-425).

[8] Liao, Y. Y., Tai, S. C., Lin, J. S., & Liu, P. J. (2012). Degradation of turbid images based on the adaptive logarithmic algorithm. Computers & Mathematics with Applications (Vol. 64, No. 5, pp. 1259-1269).

[9] Narasimhan, S. G., & Nayar, S. K. (2003). Contrast restoration of weather degraded images. IEEE Transactions on Pattern Analysis and Machine Intelligence (Vol. 25, No. 6, pp. 713-724).

[10] Narasimhan, S. G., & Nayar, S. K. (2002). Vision and the atmosphere. International Journal of Computer Vision (Vol. 48, No. 3, pp. 233-254). [11] Nayar, S. K., & Narasimhan, S. G. (1999). Vision in bad weather. The Proceedings of the Seventh IEEE International Conference on Computer Vision (Vol. 2, pp. 820-827).

[12] Tarel, J. P., & Hautiere, N. (2009, September). Fast visibility restoration from a single color or gray level image. IEEE International Conference on Computer Vision (pp. 2201-2208).

[13] Wang, Z., & Feng, Y. (2014). Fast single haze image enhancement. Computers & Electrical Engineering (Vol. 40, No. 3, pp. 785-795).