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ENHANCED VISION OF HAZY IMAGES USING IMPROVED DEPTH ESTIMATION AND COLOR ANALYSIS

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Abstract –The project presents visibility restoration of single hazy images using color analysis and depth estimation with enhanced refined transmission technique. Visibility of outdoor images is often degraded by turbid mediums in poor weather,such as haze, fog, sandstorm and smoke.Optically ,poor visibility in digital images is due to the substantial presence of different atmospheric particle that absorb and scatter light between the digital camera and the captured object.The hazy removal technique divided into three categories such additional information approaches ,multiple images approaches,single image approaches .The first two methods are expense one and high computational complexity . Recently single image approach is used for this dehazing process because of its flexibility and low cost .The transmission map will be estimated through atmospheric light estimation. The median filter and adaptive gamma correction are used for enhanced transmission to restore an image with better quality.Finally the simulated result shows that obtained restored image has better contrast and hazy free scene objects under various weather conditions and the performance measure such as Gaussian distribution function and measure of enhancement are evaluated .

INTRODUCTION

FUNDAMENTAL STEPS IN DIGITAL IMAGE PROCESSING

Digital image processing encompasses a broad range of hardware,software,and theoretical underpinnings . The following are the fundamentals steps in image processing shows in digital image processing .

IMAGE ACQUISITION

The image acquisition is to acquire digital images. To do so require an image sensor and the capability to digitize the signal produced by the sensor. The sensor could be a monochrome camera that produces an entire image of the problem domain every 1/30 sec and the imaging sensor could be line-scan camera that produces a single image line at that time. In this case, the object's motion passed the line scanner produces a two dimensional image. If the output o f the camera or the other imaging sensor is not already in the digital form, an analog to digital convertor digitizes it.

PREPROCESSING

The key function of the preprocessing is to improve the image in ways that increase the chances for success of the other processes. Consequently, an objective comparison cannot provided for the

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proposed method and the DCP based method, when using three metrices. They are acquired by hiding the artifacts of the restored images. Note that e'and r' values indicates excellent restoration rates, whereas higher σ values indicates poor restoration rates. Fig 1 and Fig 2 represents the restoration results with corresponding transmission map and their respective statistical histogram. It remove hazy formation and recover vivid scene color in an image.

SEGMENTATION

Segmentation procedures partition an image into its constituent parts or objects. In general, autonomous segmentation is one of the most difficult tasks in digital image processing. A rugged segmentation procedure brings the process a long way toward successful solution of imaging problems that require object to be identified individually.

REPRESENTATION & DESCRIPTION

Representation and Description almost always follow the output of the segmentation stage, which usually raw pixel data, constituting either the boundary of the region or all the points in the region itself. The first decision that must be made is whether the data should be represented as a boundary or as a complete region. Boundary representation is appropriate when the focus is on external shape characteristics such as, corners and inflections. Regional representation is appropriate when the focus on internal properties, such as texture or skeleton shape.

RECOGNITION

Recognition is the process that assigns a label to an object based on its descriptors. We conclude coverage of the digital image processing with the development of methods for recognition of individual objects.

KNOWLEDGE BASE

Knowledge about the problem domain is coded into an image processing system in the form of a knowledge database. This knowledge may be as simple as detailing region of image where the information of interest is known to be located, thus limiting the search that has to be conducted in seeking that information. The knowledge base also can be quite complex, such as an interrelated list of all major possible defects in materials inspection problem or an image database containing high resolution satellite images of a region in connection with change – detection applications.

A.PROPOSED METHOD

Visibility restoration of single hazy images based on Color Analysis and Depth Estimation with Enhanced refined transmission, Depth Estimation, Adaptive Gamma Correction, Color Analysis and Visibility Restoration.

B. ADVANTAGES

It avoids the halo effect and insufficient transmission estimation problems, It recovers better image quality under various weather condition changes, Less algorithm complexity and its processing time is low.

C. DEPTH PERCEPTION

It is the visual ability to perceive the world in three dimensions (3D) and the distance of an object. Christo Ananth et al. [3] proposed a system in which OWT extracts wavelet features which give a good separation of different patterns. Moreover the proposed algorithm uses morphological operators for effective segmentation. From the qualitative and quantitative results, it is concluded that our proposed method has improved segmentation quality and it is reliable, fast and can be used with reduced computational complexity than direct applications of Histogram Clustering. The main advantage of this method is the use of single parameter and also very faster. While comparing with five color spaces, segmentation scheme produces results noticeably better in RGB color space compared to all other color spaces. Binocular cues include stereopsis, eye convergence, disparity and yielding depth from binocular vision through through exploitation of parallax. Monocular cues include size: distant objects subtend smaller visual angles than near objects, grain size and motion parallax.

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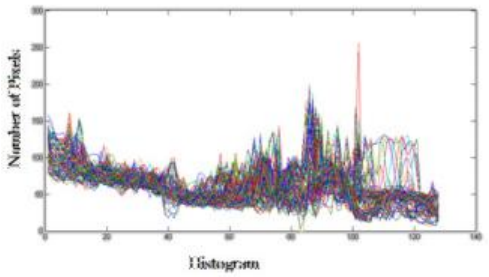


Fig.1- Matching points after dehazing

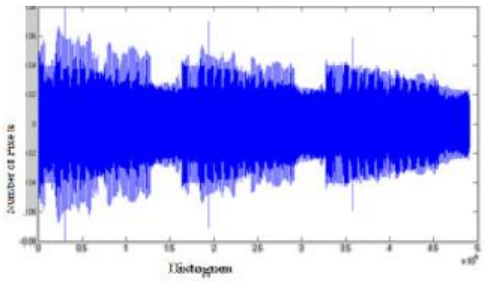
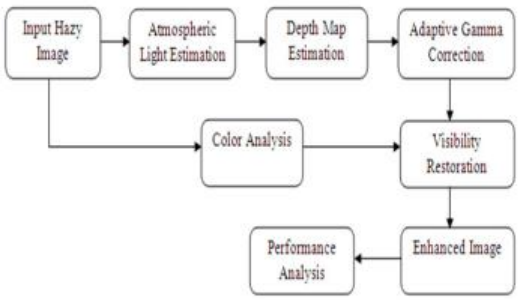


Fig.2-Matching points after dehazing

D. BLOCK DIAGRAM



Block diagrammatic representation

E. GAMMA CORRECTION

Gamma non-linearity, gamma encoding or often simply gamma, is the name of a nonlinear operation used to code and decode luminance of tristimulus values in video or still image systems. Gamma Correction is, in the simplest cases, defined by the following power-law expressions: where A is a constant and the input and output values are non-negative real values. A gamma value $\gamma<1$,is sometimes called an encoding gamma, and the process of encoding with this compressive power-law nonlinearity is called compression; conversely a gamma value $\gamma>1$ is decoding gamma and the applications of the expansive power-law nonlinearity is called which simplified the electronics in early television sets.

Gamma encoding of images is used to optimize the usage of bits when encoding an image, or bandwidth used to transport an image, by taking advantage of the non-linear manner in which humans perceive light and color. Human vision, under common illumination conditions (not pitch black nor blindingly bright), follows an approximate gamma or power function, with greater sensitivity to relative differences between darker tones than between lighter ones. If images are not gamma-encoded, they allocate too many bits or too much bandwidth to highlights that humans cannot differentiate, and too few bits/bandwidth to maintain the same visual quality. Gamma encoding of floating point images is not requires (and may be counterproductive), because the floating-point format already provides a piecewise linear approximation of a logarithmic curves. Although gamma encoding was developed originally to compensate for the input-output characteristic of cathode ray tube (CRT) displays, that is not its main purpose or advantage in modern systems. In CRT displays, the light intensities varies nonlinearity with the electron gun voltage. Altering the input signal by gamma compression can cancel this nonlinearity ,such that the output picture has the intended luminance .The similarity of CRT physics to the inverse of gamma encoding needed for video transmission was a combination of luck engineering.

Comparison of Average Restoration Rates Acquired by e, e', r, r',σ and σ' for all compared techniques.

The restoration rates produced by using objective metric

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Types	Evaluation	Proposed	Heetal	Xieetal	Xuetal	Jinetalpoly, which has been controversial since its beginning.
	e	1.945	1.60	0.26	1.26	1.58
	e`	1.945	1.60	0.26	0.78	1.58
Haze	r	1.98	1.74	1.20	1.12	1.69
	r`	1.98	1.71	1.20	1.95	1.69
	σ	0.95	0.00	0.00	0.00	0.00
	σ`	0.95	0.00	0.00	0.00	0.00

INPUT IMAGE

OUTPUT IMAGE

F.COLOR ANALYSIS

In the cosmetics and fashion industry, color analysis, also called as skin tone color matching, personal color or seasonal color, is the process of finding colors of clothing and makeup to match a person's skin completion, eye color, and hair color. The goal is to determine the colors that best suit an individual's natural coloring and the result is often used as an aid to wardrobe planning and style consulting. Color Analysis was most popular in the early 1980's. There are a wide variety of approaches to analyzing personal coloring. The most well-known is "seasonal" color analysis which places individual coloring into four general categories: Winter, Spring, Summer and Autumn. Most recent systems subdivide the seasons into 16 categories. Many different versions of seasonal analysis have been developed and promoted by image and color consultants worldwide. Some analysis systems classify an individual's personal combination of hair color, eye color and skin tone using labels that refer to a colors temperature and the degree to which the hair, skin and eye colours contrast. Color analysis demonstrates how colors are capable of being flattering or conversely, unflattering. Colors that are unsuitable for the individual can make a person look pale, for instance, or draw attention to such flaws as wrinkles or uneven skin tone. One problem is that there is no standard training or degree required to market oneself as a color analyst. Color Analysis is a marketing

CONCLUSION

Finally, the simulated results shows that obtained restored image has better contrast and hazy free scene objects under various weather conditions and the performance measures such as Gaussian distribution function and measure of enhancement are evaluated and spot out the matching point which is used to help the find out important place in the hazing image.

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