IFERP
connecting engineers... developing research

ISSN (Online) 2394-2320

International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)
Vol 5, Issue 3, March 2018

Video Dehazing and Defogging Method Using Multiscale Guided Filter

[1] R.Thendral,[2] Jijosolomon, [3]Devanand,[4]kavin
[1][2] Department of Computer Science Engineering, VSB Engineering College, Karur, Tamil Nadu,India

***Abstract* – Fog is a type of cloud, which touches the ground, fog may be dense (thick) or light (thin) based on dense and light fog the visibility of human.Fog can be so dense, that it makes the passing vehicles and huge monuments almost impossible to see. Fog leads to reduced visibility and it limits our ability to view other objects on the road side in foggy weather. It just creates an illusion leading to misjudging the distance between objects causing road accidents. Hence during night time when light is intended on the water droplet, it scatters the light in all the direction, and some of the light is even scattered towards the driver's eyes, hence making the visibility weaker, this process is called back scattering of light or backscattered veil. Fog distorts our perception of speed, it makes difficult to distinguish between moving objects and stationary objects, hence leading to loss of life. And we have proposed the dark channel prior technique which is helpful to clear the hazy images. By using these two methods we detect the presence or absence of fog. Once we notice the fog in the image, by smearing dark channel prior, we are going eliminate fog from the images and we can easily restore the fog free images.**

1. INTRODUCTION

Image Processing:

Image processing is processing of images using mathematical operations and other operation consuming by any form of signal processing. input is an image, a series of images, or a video, such as a photograph or video frame; the output may be either an image or a set of characteristics or parameters related to the image. Utmost image-processing techniques involve giving the image as a two-dimensional signal and applying standard signal-processing techniques to it. Images are also treated as three-dimensional signals with the third-dimension being time or the z-axis. Image processing typically refers to digital image processing, but visual and analog image processing also are likely. This article is about general techniques that apply to all of them. The attainment of images (making the input image in the first place) is raised to as imaging.

In computergraphics, images are physically made from carnal models of objects, environments, and lighting, instead of being acquired (via imaging devices such as cameras) from natural scenes, as in most animated movies. Computer vision, on the other hand, is often considered high-level image processing out of which a machine/computer/software intends to decipher the physical contents of an image or a sequence of images (e.g., videos or 3D full-body attractive resonance scans). In modern sciences and technologies, images also gain much broader scopes due to the evergrowingimportance of scientific visualization (of often large-scale compound scientific/experimental data). Examples include microarray data in genetic research, or real-time multi-asset portfolio trading in economics. Image study is the removal of expressive information from images; typically from digital images by means of digital image processing techniques. Image analysis responsibilities can be as simple as reading bar coded tags or as classy as assembling a person from their face.

Imageediting encompasses the processes of changing images, whether they are digital photographs, traditional photochemicalphotographs, or illustrations. Traditional analog image editing is known as photo retouching, using tools such as an airbrush to modify photographs. These pixels encompass the image's color and brightness information. Image editors can change the pixels to enhance the image in many ways. The pixels can be changed as a group, or individually, by the sophisticated algorithms within the image editors. This article mostly refers to bitmap graphics editors, which are often used to alter photographs and other raster graphics. However, vector graphics software,suchas Adobe Illustrator, CorelDRAW, Xara Designer Pro, Pixel Style Photo Editor, Inkscape or Vector, are used to create and modify vector images, which are stored as descriptions of lines, Beziers curves, and text instead of pixels. It is easier to rasterize a track image than to vectorize a raster image; how to go about vectorizing a raster image is the effort of much research in the arena of computer vision. Trajectory images can be altered more simply, because they contain descriptions of the shapes for easy reordering. They are also scalable, being rasterizable at any resolution.
Object recognition: Recognition is the process that assigns a label, such as, "vehicle" to an object based on its descriptors.

Knowledge Base: Knowledge may be as simple as detailing regions of an 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 a materials inspection problem or an image database containing high-resolution satellite images of a region in connection with change-detection applications.

Feature Extraction

In pattern recognition and in image processing, feature extraction is a special form of dimensional reduction. Transforming the input data into the set of features is called feature extraction. If the features extracted are carefully chosen it is expected that the features set will extract the relevant information from the input data to perform the desired task using this reduced representation instead of the full-size input.

RELATED WORKS

Author: Romain Gallen

[24]The presented method is open and can be extended to specific situations such as nighttime driving. It is also adaptable to the country, network, population of drivers and vehicles, by using the relevant statistics. Finally, it is improvable by adding or modifying models of the car dynamics, of the driver behavior or the interaction between environment, infrastructure, car and driver. The novelty of this approach also comes from the use of a reference speed considered safe in ideal driving conditions. This speed is modulated in adverse conditions using potential accident severity criteria. Our advisory speed lies between the reference speed and the speed computed using previous works with a very cautious strategy based on the stopping distance

Author: Nicolas Hautière

[9]They propose a scheme to restore automatically the contrast of any image grabbed by an in-vehicle camera which enables a real-time use of the proposed principle. Weather conditions are first estimated and then used to restore the contrast using a flat world assumption on the segmented free space in front of the equipped vehicle.

Author: Jean-Philippe Tarel

[2]They propose an evaluation scheme and we build up a set of synthetic and camera images with and without homogeneous and heterogeneous fog. The algorithms are applied on foggy images and results are compared with the images without fog. For FVES in which the image after visibility enhancement is displayed to the driver, they also propose an accident scenario and a model of the probability of fatal injury as a function of the setting of the visibility enhancement algorithm.

Author: Laurent Caraffa

[7] They propose a new MRF model for Bayesian defogging and derive the defogging algorithm from this model by α-expansion optimization. The algorithm is in two steps: first, the atmospheric veil (or equivalently the depth-map) is inferred using a dedicated MRF model. In this MRF model, the flat road assumption can be introduced easily to achieve better results on road images. Once the atmospheric veil is inferred, the restored image is estimated by minimizing another MRF energy which models the image defogging in presence of noisy inputs. Evaluation on both synthetic images and real-world images shows that the proposed method outperforms the state of the art in single image defogging, when a homogeneous fog is present.

Author: Romain Gallen

[6]They have developed two algorithms, each of them is dedicated to anenvironment. The challenge here was to provide a method allowing for fog detection using a standard camera with automatic exposure settings. No adjustment for the specific purpose of detecting fog at night has been done. This choice was made to preserve the usual working state of another camera based ADAS. This strategy implied the development of a dual algorithm that stands for situations when the vehicle is only lit by his headlights and for situations when the environment is lit by multiple light sources. Detecting fog is thus an unavoidable tool that could be used to negate or to mitigate the results of other algorithms.

Author: Yi-Shuan Lai

[5]The dehazing performance then highly depends on the accuracy of the given depth map. In this paper, They propose to first derive an optimal transmission map under a locally constant assumption. To improve the estimation for white/black areas in a scene, we further include a transmission heuristic and formulate the image dehazing as solving the optimal transmission map under the transmission heuristic constraint. Our experiments and comparison showthat the proposed method effectively restore hazy image with excellent quality.

Author: Lei Zhang

[4]They proposed LPG-PCA, they model a pixel and its nearest neighbors as a vector variable. The training samples of this variable are selected by grouping the

ISSN (Online) 2394-2320

International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)
Vol 5, Issue 3, March 2018

pixels with similar local spatial structures to the underlying one in the local window.Compared with that uses a fixed basis function to decompose the image, the proposed LPG-PCA method is a spatially adaptive image representation so that it can better characterize the image local structures. First, the dimensionality of the color variable vector is three times that of the gray level image, and this will increase significantly the computational cost in the PCA denoising process. Second, the high dimensionality of the color variable vector requires much more training samples to be found in the LPG processing.

Author: Jean-Philippe Tarel

[3]They interpret thealgorithm as the inference of the local atmospheric veilsubject to two constraints. From this interpretation, we proposean extended algorithm which better handles road images byconsidering that a large part of the image can beassumed to be a planar road. The advantages of the proposedlocal algorithm are its speed, the possibility to handle bothcolor images or gray-level images, and its small number ofparameters. A comparative study and quantitative evaluationwith other state-of-the-art algorithms is proposed on syntheticimages with several types of generated fog. This evaluationdemonstrates that the new algorithm produces similar qualityresults with homogeneous fog and that it can better dealwith the presence of heterogeneous fog. The important property of a road image is that a large part of the image corresponds to the road which can be reasonably assumed to be planar.

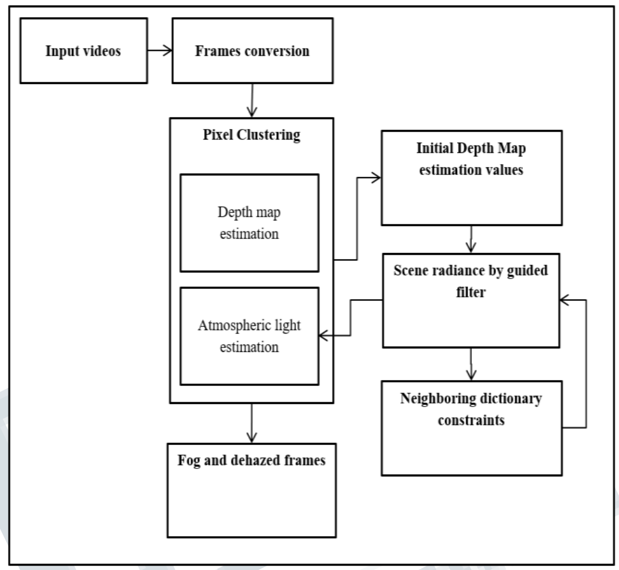
Author: Jean-Philippe Tarel

[8] They propose an evaluation scheme and we build up a set of synthetic and camera images with and without homogeneous and heterogeneous fog. The algorithms are applied on foggy images and results are compared with the images without fog. For FVES in which the image after visibility enhancement is displayed to the driver, we also propose an accident scenario and a model of the probability of fatal injury as a function of the setting of the visibility enhancement algorithm.

Author: Qingsong Zhu

[1]They propose a novel color attenuation prior for single image dehazing. This simple and powerful prior can help to create a linear model for the scene depth of the hazy image. By learning the parameters of the linear model with a supervised learning method, the bridge between the hazy image and its corresponding depth map is built effectively. With the recovered depth information, we can easily remove the haze from a single hazy image. To detect or remove the haze from a single image is a challenging task in computer vision, because little information about the scene structure is available.

Proposed System



Experimental Analysis:

Existing System:

Images play an important role in the real world, images are used for describing the changes in the environment and use of traffic analysis. Images are captured in open environment due to the bad weather or atmosphere images are not a clear. Images acquired in the bad weather, such as the fog and haze, are extremely degraded by scatting of the atmosphere and decrease the contrast and create the object features challenging to recognize. The bad weather not only lead to variant of the visual outcome of the image, but also to the difficulty of the post processing of the image, as well as the inconvenience of entirely types of the tools which rely on the optical imaging, such as satellite remote sensing method, aerial photo method, outdoor monitoring method and object identification method. Image captured in outdoor scene are highly despoiled due to poor lighting situation or due to turbid medium in poor weather, such as haze, water droplets, dust particles or due to submergence in water. Haze removal techniques are widely used in many applications such as outdoor surveillance, object detection, consumer electronics, etc. Images of outdoor scenes are usually degraded by atmospheric haze, a phenomenon due to the particles in the air that absorb and scatter light. Haze often occurs when dust and smoke particles accumulate in

ISSN (Online) 2394-2320

International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)
Vol 5, Issue 3, March 2018

relatively dry air. Here we propose indexing method to remove haze from a single input hazy image and contrast limited spectrum technique; it is based on adaptive histogram equalization

.

Disadvantage:
- Only remove haze in images
- Image quality may be degraded
- Provide rough estimate of the scene depth
- Can lead to severe reconstruction artifacts.

PROPOSED SYSTEM:

In our proposed method it can remove fog, haze, rain without blurring the background. This works in any rain conditions such as light rain, fog, haze etc. The method does not assume the size, shape and orientation of fog. The video frames are generated from the input video and which is applied with image pre-processing steps like color conversion, resizing and noise removal. Morphological operation is applied for fog detection. Two major effects should be accounted for when the only source of illumination is the front-lighting system of the observer's vehicle, i.e., attenuation and backscattering. We estimate the attenuation of light along its path from the headlamps to the target and back to the driver using classical models of light scattering in disperse media. The first system is since the light emitted from the headlamps of a vehicle is scattered backward toward the driver in the presence of fog. The idea that is investigated to detect it is to compare different reference images with the input images grabbed by the camera using a correlation index. The reference image represents the front of the vehicle with lighting on, as can be seen in fog on a dark road. It is either a real image taken with the same camera in real or artificial fog, or a synthetic image. We propose a dark channel prior, for single image fog, rain and haze removal. Dark channel prior method can produce a natural haze free image. Implement adaptive histogram equalization steps to find the transmission map. In transmission Map, the transmission map implies the amount of light transmitted through haze from the object point to the camera. For an object at a far distance from the camera, the transmission value will be lesser; while for a closer object, the transmission value will be closer to one. After detecting the potential source and connected component, the formed halos are segmented to find out the threshold value. The halo is segmented iteratively unless we get the same threshold values, i.e., we calculate the threshold value after each segmentation step, if the calculated values remains same then we stop iteration and we get the tree value.

Advantages:
- Image defogging and dehazing can be implemented in simple manner
- Heterogeneous scenes are processed and improve the accuracy at dehazing

REFERENCES

1. A Fast-Single Image Haze Removal Algorithm Using Color Attenuation Prior:Author: Qingsong Zhu

2. Vision Enhancement in Homogeneous and Heterogeneous Fog Author: Jean-Philippe Tarel

3. Improved Visibility of Road Scene Images under Heterogeneous Fog :Author: Jean-Philippe Tarel
4. Two-stage image denoising by principal component analysis with local pixel grouping :Author: Lei Zhang
5. Single Image Dehazing With Optimal Transmission Map :Author: Yi-Shuan Lai
6. Towards Night Fog Detection through use of In-Vehicle Multipurpose CamerasAuthor: Romain Gallen
7. Markov Random Field Model for Single Image Defogging:Author: Laurent Caraffa
8. Vision Enhancement in Homogeneous and Heterogeneous Fog :Author: Jean-Philippe Tarel
9. Mitigation of Visibility Loss for Advanced Camera based Driver Assistances:Author: Nicolas Hautière
10. N. Hautière, J. P. Tarel, J. Lavenant, and D. Aubert, "Automatic fog detection and estimation of visibility distance through use of an onboard camera," Mach. Vis. Appl. J., vol. 17, no. 1, pp. 8–20, Apr. 2006
11. R. Gallen, A. Cord, N. Hautière, and D. Aubert, "Towards night fog detection through use of in-vehicle multipurpose cameras," in Proc. IEEE IV Symp., Baden-Baden, Germany, 2011, pp. 399–404.
12. Cord and D. Aubert, "Towards rain detection through use of in-vehicle multipurposecameras,"inProc.IEEEIVSymp.,Baden-Baden,Germany, 2011, pp. 833–838.
13. J. Halimeh and M. Roser, "Raindrop detection on car windshields using geometric-photometric environment construction and intensity-based correlation," in Proc. IEEE IV Symp., 2009, pp. 610–615.

14. "The major data on accidentology," Nat. Road Safety Observatory, ONISR, Cedex, France, Tech. Rep., 2007.
15. P. Foucher, P. Charbonnier, and H. Kebbous, "Evaluation of a road sign pre-detection system by image analysis," in Proc. Int. Conf. Compute. Vis. Theory Appl., 2009, pp. 362–367.
16. R. Tan, N. Pettersson, and L. Petersson, "Visibility enhancement for roads with foggy or hazy scenes," in Proc. IEEE Intelligent Vehicles Symp. (IV'07), Istanbul, Turkey, 2007, pp. 19–24.
17. R. Tan, "Visibility in bad weather from a single image," in Proc. IEEE Conf. Computer Vision and Pattern Recognition (CVPR'08), Anchorage, AK, 2008, pp. 1–8.
18. K. He, J. Sun, and X. Tang, "Guided image filtering," in Proc. European Conf. Computer Vision (ECCV'10), Hersonissos, Crete, Greece, 2010, pp. 1–14.
19. M. Gazzi, T. Georgiadis, and V. Vicentini, "Distant contrast measurements through fog and thick haze," Atmospher. Environ., vol. 35, pp. 5143–5149, 2001
20. Conference on Computer Vision and Pattern Recognition (CVPR'07), Minneapolis, Minnesota, USA, 2007, pp. 1–8.
21. S. G. Narashiman and S. K. Nayar, "Interactive deweathering of an image using physical model," in IEEE Workshop on Color and Photometric Methods in Computer Vision, Nice, France, 2003.
22. K. He, J. Sun, and X. Tang, "Single image haze removal using dark channel prior," IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 33, no. 12, pp. 2341–2353, December 2010.
23. -P. Tarel, N. Hauti`ere, A. Cord, D. Gruyer, and H. Halmaoui, "Improved visibility of road scene images under heterogeneous fog," in Proceedings of IEEE Intelligent Vehicle Symposium (IV'2010), San Diego, California, USA, 2010, pp. 478–485.
24. Supporting Drivers in Keeping Safe Speed inAdverse Weather Conditions by Mitigating the Risk Level: Author:Romain Gallen