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Depth Sensing Imaging System Autonomous Restored Fog

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Abstract*: Edge-preserving smoothing is an image processing technique that smooths away textures while retaining sharp edges. Image de-noising is the technique to reduce noises from corrupted images. The aim of the image denoising is to improve the contrast of the image or perception of information in images for human viewers or to provide better output for other automated image processing techniques. Outdoor images taken in hazy climate often get degraded due to the effect of haze. There are several methods to remove haze from hazy images. Most of them over saturates the dehazed images. This degrades the quality of images. The color attenuation prior technique is one of the best algorithm to remove haze from images. Based on this technique and by making use of MATLAB software, this paper suggests a simple method to remove haze from Images. The core of DSIS lies in its fusion of depth information with traditional imaging data. By leveraging depth maps obtained from sensors such as LiDAR or structured light cameras, DSIS accurately delineates objects in the scene and their respective depths. This enables selective fog removal, prioritizing objects closer to the camera for clearer representation while preserving depth cues for improved scene understanding. Our project aims to implement and evaluate DSIS in real-world scenarios, such as outdoor surveillance and automotive vision systems. Through comprehensive testing and performance analysis, we seek to demonstrate the effectiveness of DSIS in restoring visibility under varying fog densities and lighting conditions. Additionally, we will explore optimization techniques to enhance DSIS's computational efficiency, ensuring its practical feasibility for deployment in resource-constrained environments.*

Keywords: Deep Learning, delection fog,Python3.9.x,vs code, Pycharm

I. INTRODUCTION

An adaptive filter is implemented based on a spatial generalised AR (SGAR) model. The new filter is an edge-preserving filter especially when images are polluted by mixed noise containing Gaussian noise, Poisson noise, and impulse noise. The structural features are obtained from multi resolution analyses which are used to discriminate the structures as borders, dots and streaks. On the other side, the textural features computed by LBP operators are used to discriminate the local variation of colours, the pigment network etc. Later, these features are fused in multiple combinations to investigate the influence of each combination in the performance of detection. To restore fog in a depth sensing imaging system, you might need to recalibrate the depth sensing algorithms to interpret the presence of fog and adjust image processing accordingly. Additionally, enhancing contrast and sharpness can help to mitigate the impact of fog on captured images. Implementing techniques such as dehazing algorithms or using specialized hardware like LiDAR can also improve performance in foggy conditions.

II. PROPOSED SYSTEM

We using of GUI method, first of all create GUI. To browse the car foggy image data's. The algorithms used were converting to grey scale image, sharpening filter, median filter, smooth filter, binary mask, RGB extraction, and histogram and Sobel operator. The RGB values of the images are extracted before converting it into a gray scale image. we using Image fog removal based on machine learning. To Fog remove image based on mdhaze method based on sensitivity specificity etc

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- **Data Acquisition:** Utilize a depth sensing camera (such as LiDAR or Time-of-Flight camera) to capture both RGB and depth information of the scene.
- **Preprocessing:** Preprocess the captured data to align the RGB and depth images properly. This might involve calibration and synchronization of the camera and depth sensor.
- **Fog Removal Algorithm:** Implement a fog removal algorithm to enhance the visibility of the captured scene. This could involve techniques like dark channel prior, dehazing algorithms, or deep learning-based methods.
- **Depth-aware Restoration**: Integrate depth information into the fog removal process to ensure accurate restoration, considering the varying depth of objects in the scene. Depth-aware techniques can help preserve scene structure and details.
- **Post-processing:** Apply additional filtering or enhancement techniques to further refine the restored images, improving clarity and reducing artifacts.
- **Evaluation:** Evaluate the performance of the proposed system using quantitative metrics (such as PSNR, SSIM) and qualitative assessment (visual comparison with ground truth images).
- **Documentation and Reporting**: Document the system design, implementation details, and experimental results. Provide a comprehensive report outlining the effectiveness and limitations of the proposed system.By following these steps, you can develop a depth sensing imaging system for restoring foggy images, providing clearer and more useful visual information for various applications..

III. ARCHITECTURE

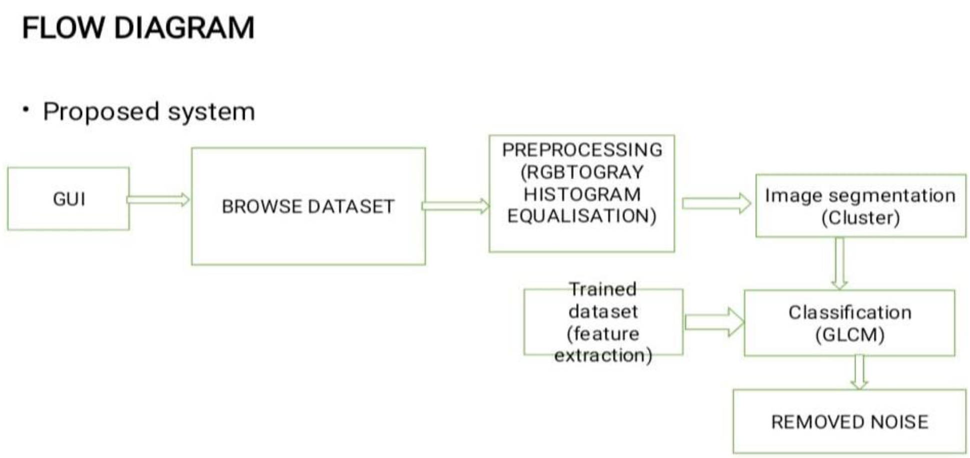

FIGURE 3.1 ARCHIETECTURE DIAGRAM

The above figure4.1.A depth sensing imaging system for restoring fog typically involves several components:

- **Depth Sensing Technology**: This could be achieved through techniques like stereo vision, structured light, time-of-flight, or depth from focus.
- **Image Capture:** Utilizing cameras or sensors to capture images of the scene affected by fog.
- **Depth Estimation**: Processing captured images to estimate depth information of the scene, crucial for understanding the spatial layout and distances.
- **Fog Removal Algorithm**: Developing algorithms to analyze the captured images and depth information to remove or reduce the effects of fog.
- **Image Enhancement**: Enhancing the clarity and quality of the processed images for better visibility.
- **User Interface**: Providing a user-friendly interface for users to interact with the system, adjust parameters, and view the restored images.
- **Hardware Implementation**: Integrating the system into hardware components, such as cameras, processing units, and display devices.

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- **Testing and Optimization**: Iteratively testing the system in various foggy conditions and optimizing the algorithms and parameters for better performance.
- **Deployment**: Deploying the system for practical use, whether in surveillance, autonomous vehicles, or other applications where visibility in foggy conditions .

IV. METHODOLOGY

- **Data Collection:** Gather foggy images along with corresponding depth maps obtained from the depth-sensing system**.**
- **Pre-processing:** Apply basic pre-processing steps such as noise reduction, color correction, and resizing to the images and depth maps to ensure uniformity and compatibility**.**
- **Fog Estimation:** Develop or employ algorithms to estimate the fog density or depth from the depth maps. This step is crucial for understanding the extent of fog in the scene.
- **Fog Removal:** Implement fog removal techniques such as the dark channel prior, guided filter, or deep learning-based methods to restore visibility in the foggy images**.**

V. EXPERIMENTAL RESULT

To assist you effectively, could you please provide more specific details about the depth sensing imaging system and the experimental results you're referring. to What kind of restoration or analysis are you looking to perform on the foggy images. training is a method to measure the efficiency of model. It is called training because you split in the data set a training set 80% for training. It sounds like you're interested in a project involving an autonomous depth-sensing imaging system for restoring images in foggy conditions. Could you please clarify what specific outputs or information you're looking for regarding this project. This section discusses the results of the fog removal stageimplemented in the proposed algorithm. The input of a natural image shown in has undergone the DCP extraction algorithm and itsresults are shown. It can be depicted from that, the region in the hazy image which is less affected byfog appeared black in the corresponding dark channel image because at least one, color channel intensity is nearly equal to zero.In the region where the fog intensity is larger, it appears white in the corresponding dark channel. Hence, the fog thickness andfoggy regions can be estimated from the dark channel. shows the region where some fog is present in the hazyimage,it appeared dark and the remaining region looked white. This effect is due to the transmission coefficient, which givesthe amount of light that directly reaches the observer or the cam-era. The white region in the image is the region from which lightdirectly reached the camera without scattering from drop.

VI. OUTPUT

In this section, the results obtained in this experiment of theimage restoration process are presented. In the image restoration process, a dark channel, a transmission map, a refined transmissionmap, and image restoration results for different images are shownstep by step. In addition to this, different methods used for refiningtransmission maps, namely the Gaussian filter method, the Bilateral filter method, and the Laplacian method are compared in thissection.

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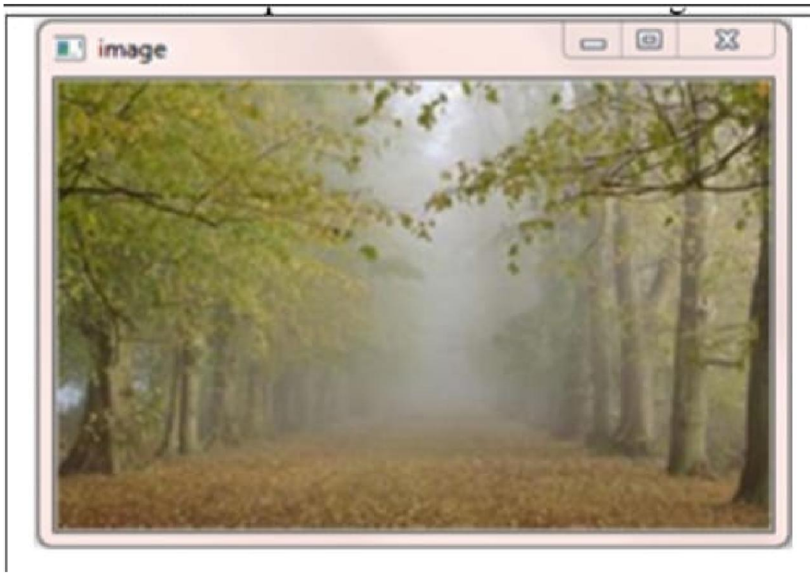
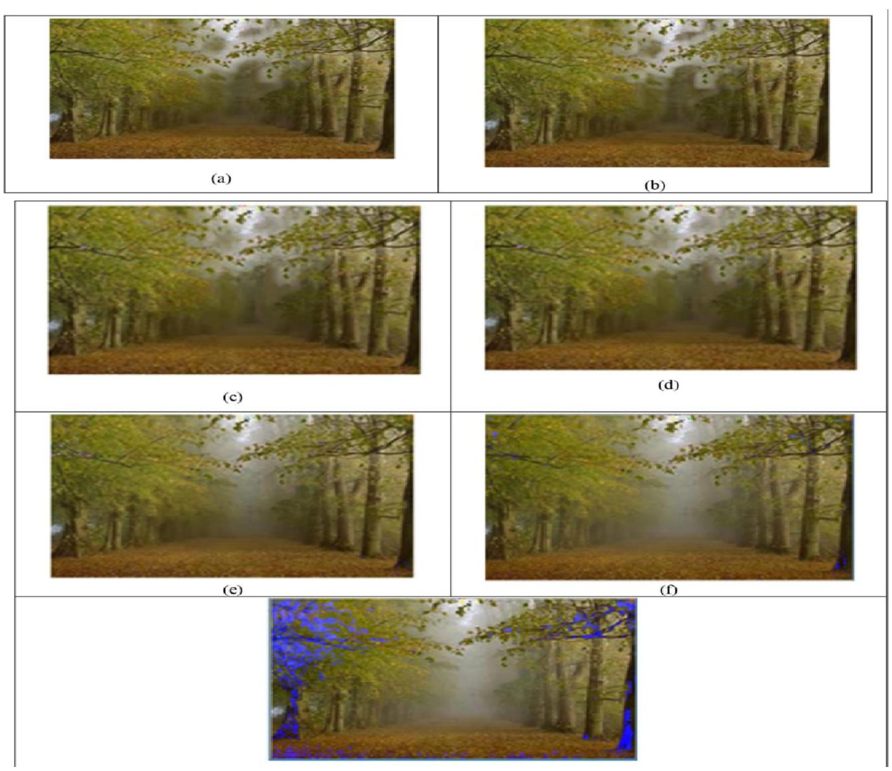
BEFORE IN IMAGING



RESULTS OF IMAGING RESTORED



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VII.CONCLUSION

The present study is based on the removal of fog from naturalimages, which can be mainly applied to automation in selfdriving vehicles. Fog removal is a challenge faced in such applications. This paper addresses the issue based on the dark channel prior concept, which estimates the fog depth by transforming theimages in maps. The results are presented for the transmission map and the filtering methods. The comparison of filters based on the contrast gain and the color index is tabulated. The images of the lake, truck, and train have been used for this comparison.The dark channel and the transmission map help in estimating the thickness of fog in a hazy image. The foggy region gets converted into a whiter region after this transformation. The restoration after this transformation plays a key role in understanding the actual data without fog. The defogged image can be generatedafter the refinement of the transmission map and filtering. Three types of filters are compared in this study, namely Gaussian, Bilateral, and Laplacian filters.

REFERENCES

[1]. Alsuwailem, A.M., 2009. Real-time FPGA-based Image Enhancement UsingHistogram Projection Technique for Uncooled Infrared Imagers. J. King SaudUniv. – Eng. Sci. 21 (1), 15–21.

[2]. Anwar, M.I., Khosla, A., 2017. Vision enhancement through single image fogremoval. Eng. Sci. Technol. Int. J. 20 (3), 1075–1083.

[3]. He, K., Sun, J., Tang, X., 2010. Single image haze removal using dark channel prior.IEEE Trans. Pattern Anal. Mach. Intell. 33 (12), 2341–2353.

[4]. He, K., Sun, J., Tang, X., 2011. Single image haze removal using dark channel prior.IEEE Trans. Pattern Anal. Mach. Intell. 33 (12), 2341.

[5]. Iwaszenko, S., Smolin´ ski, A., 2021. Texture features for bulk rock material grainboundary segmentation. J. King Saud Univ. – Eng. Sci. 33 (2), 95–103.

[6]. Koschmieder, H., 1924. Theorie der horizontalenSichtweite. BeitragezurPhysikderfreienAtmosphare, 33–53.

[7]. Lee, S., Yun, S., Nam, J.H., Won, C.S., Jung, S.W., 2016. A review on dark channel priorbased image dehazing algorithms. EURASIP J. Image Video Process. 2016 (1), 1–23. https://doi.org/10.1186/s13640-016-0104-y.

[8]. Levin, A., Lischinski, D., Weiss, Y., 2008. A closed-form solution to natural imagematting. IEEE Trans. Pattern Anal. Mach. Intell. 30 (2), 228–242.

[9]. Liu, Q., Zhang, H., Lin, M. and Wu, Y. (2011, July). Research on image dehazingalgorithms based on physical model. In 2011 International Conference on

[10]. Multimedia Technology (pp. 467-470). IEEE.Long, J., Shi, Z., Tang, W., 2012. December). Fast haze removal for a single remotesensing image using dark channel prior. In: In 2012 International Conference on

[11]. Computer Vision in Remote Sensing, pp. 132–135.

[12]. Middleton, W.K., 1957. Vision through the atmosphere. In geophysik ii/geophysics

[13]. II .Narasimhan, S.G., Nayar, S.K., 2003. Contrast restoration of weather degradedimages. IEEE Trans. Pattern Anal. Mach. Intell. 25 (6), 713–724.

[14]. Nayar, S. K. and Narasimhan, S. G. (1999, September). Vision in bad weather. InProceedings of the Seventh IEEEInternational Conference on Computer Vision(Vol. 2, pp. 820-827). IEEE.

[15]. Saggu, M.K., Singh, S., 2015. A review on various haze removal techniques for imageprocessing. Int. J. Curr. Eng. Technol. 5 (3), 1500–1505.

[16]. Sandeep, M.S., 2014. Remote sensing image dehazing using guided filter. Int. J. Res.Stud. Comput. Sci. Eng 1 (3), 44–49.

[17]. Schechner, Y. Y., Narasimhan, S. G. and Nayar, S. K. (2001, December). Instantdehazing of images using polarization. In Proceedings of the 2001 IEEEComputer Society Conference on Computer Vision and Pattern Recognition.CVPR 2001 (Vol. 1, pp. I-I). IEEE