Efficient fog Removal in Digital Pictures using Contrast Enhancement Turbulence Mitigation

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***Abstract:-*A common drawback for imaging within the atmosphere is fog and region turbulence. Over the years, many researchers have provided insight into the physics of either the fog or turbulence however not each.Recently, researchers have proposed strategies to get rid of fog in pictures quick enough for real-time process. This project has planned a replacement of fog removal technique IDCP which can integrate dark channel prior with CLAHE and reconciling gamma correction to get rid of the fog from digital pictures. Fog in image reduces the visibility of the digital images. Poor visibility not solely degrades the sensory activity image quality however it additionally affects the performance of laptop vision algorithms like object detection, tracking, police work and segmentation. Numerous factors like fog, mist and haze caused by the water droplets gift within the air throughout inclementness results in poor visibility. The planned algorithmic program is designed and enforced in MATLAB exploitation image process tool case. The comparison amongCLAHE (contrast restricted adaptive bar chart equalization) and therefore the planned algorithmic program is additionally drawn primarily based upon sure performance variable. The correlation analysis has shown that the planned algorithmic program has shown quite effective results.**

I. INTRODUCTION

System positioned near the ocean often suffer in performance, perceptually and objectively, because of atmospheric turbulence, fog, sun-glare, camera motion from wind buffeting and many other adverse weather conditions. For long distance imaging, the most prominent are camera motion, fog, atmospheric turbulence and blur (from optics and atmosphere). The environment itself will have fog or haze, wind and heat that cause eddy currents which is observed as turbulence in an imaging system.

The image quality of outdoor screen in the fog and haze weather condition is usually degraded by the scattering of a light before reaching the camera due to these large quantities of suspended particles (e.g. fog, haze, smoke,impurities) in the sphere. This phenomenon influences the normal work of automatic monitoring system, outdoor recognition system and intelligent transportation system.

Our main goal is to develop a joint turbulence mitigation and fog removal method that can recover the object image fast enough for near real-time achievement. To execute this object, we propose a method based on our analysis in turbulence mitigation that includes the fog model. This method performs well for most atmospheric conditions and is efficient for near-real time processing.

1.1 Objective and Scope

The main objective is the probability to handle both color images and gray level images.

The main extent of theproposed algorithm is to improve the accuracy of theIntelligent Transportation System (ITS) especiallywhen lane detection kinds of application come inaction in VANETs.

II. PROBLEM STATEMENT

A common problem for imaging in the atmosphere is fog and atmospheric turbulence. Over the years, many researchers have provided insight into the physics of either the fog or turbulence but not both. It fail to fully address important design challenges, including depth discontinuities, frame averaging ,image alignment and image averaging.

.III. THE PROPOSED ALGORITHM

A. CLAHE on L*a*b color space: Contrast limited adaptive histogram equalization short form isCLAHE. This method does not need any predicted weather information for the processing of hazed image. Firstly, the image apprehend by the camera in foggy condition is converted from RGB (red, green and blue) color space is converted to LAB colour space. A Lab color space is a color-opponent space with dimension L for lightness and (a, b) for the color opponent dimensions, based on nonlinearly compressed CIE XYZ color space coordinates.

B. Dark channel prior: Dark channel prior is used for the estimation of atmospheric light in the dehazed image to get the more proper result. This approach is generally used for non-sky patches, as at least one color channel has very low intensity at some pixels. The low intensity in the dark channel is mainly due to three factors:-

i. Shadows (shadows of car, buildings etc)

ii. Colorful objects or surfaces (green grass, tree, Flowers etc)

iii. Dark objects or surfaces (dark tree trunk, stone etc) as the outdoor images are usually full of shadows and colorful, the dark channels of these images will be really dark. Due to fog (air-light), a haze image is brighter than its image without haze. So we can say dark channel of haze image will have higher intensity in region with higher haze. So, visually the intensity of dark channel is a rough approximation of the thickness of haze.

C. Adaptive gamma correction: A nonlinear operation used to code and decode luminance or tristimulus values in video or still image systems. Gamma correction defined by the following power law expression.

IV. METHODOLOGY

Step I. Read the Input image
StepII. Now CLAHE on L*a*b color spaceoperation will be applied to balance the effect of the light and colors.
StepIII. Now Dark channel prior will come inaction to reduce the effect of fog from digital Image.
Step IV. Now adaptive gamma correction will beapplied as a post processing operation to enhance the brightness of the system.
Step V. Now we will get the final image which hasbeen visibly restored.

Figure 1: Foggy image

Figure 2: Fog removed image

V. CONCLUSION

Fog removal algorithms become more useful formany vision applications. It is found that most of theexisting researchers have neglected many issues; i.e.no technique is better for different kind ofcircumstances. The existing methods have neglectedthe use of gamma correction and histogram stretchingto reduce the noise problem which will be presentedin the output image of the existing fog removalalgorithms. To reduce the problems of existingliterature a new integrated algorithm has beenproposed that has integrated the dark channel priorwith CLAHE to enhance the results further.Theproposed algorithm is designed and implemented inMATLAB using image processing toolbox. Thecomparison among CLAHE and the proposedalgorithm is also drawn based upon certainperformance parameters. The comparison analysishas shown that the proposed algorithm has shownquite effective results. The main scope of theproposed algorithm is to improve the accuracy of theIntelligent Transportation System (ITS) especiallywhen lane detection kinds of application come inaction in VANETs. Therefore the proposed algorithmwill become more useful in to preventing the roadaccidents as accidents rate is growing day by day dueto poor driving and more traffic.

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