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A Comparative analysis on various Image Enhancement Techniques for Foggy images

Chirag Dhanani[1]
ME Computer Dept
G.S. Moze College
Pune – India

Ashish Saxena[2]
ME Computer Dept
G.S. Moze College
Pune – India

***Abstract:** Now, a Days Images play important role in real world, images is used for describes the changes in environment and also use for traffic analysis. But images are captured in open environment due to the bed whether or atmosphere images are not a clear. Therefore main aim of this paper is to focus on the problem of several blurred, foggy and noisy low-resolution image convert into a high-resolution image. This paper proposes an efficient and increasing the quality of images from different foggy or blurred images by using super-resolution technique.*

***Keywords:** Image processing, Fog removal, Super-resolution techniques, Quality enhancement, Fog removal method.*

I. INTRODUCTION

The quality of 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. Any image captured in open environment depends on atmospheric conditions if the weather is good image capture is clear and understandable, if the weather is bad then image quality decrease and objects are not identified. One most Universal weather environment is fog that has blur or dim effect on the landscape, fall the atmospheric visibility that Causes to the refuse of image contrast and generates vagueness to the image. There are reduced visibility records in awful weather condition due to the extensive occurrence of atmospheric particles that have a large volume and Distribution in the contributing medium. Light reflected by any object is absorbed and scattered by particles presents in Atmosphere, causes degradation in the visibility of the scene. 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 resolution, contrast and clarity, and information is also lost behind that image, 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.

Fig. 1. Effect of fog during bad weather condition on road traffic.

There are various reasons which influence visibility, including rain, fog, mist, haze, and smoke and in coastal regions sea spray, in these conditions light are usually composed of water droplets. The difference between fog, mist, and haze can be measured as the visibility distance. Fall in visibility is caused by a deflection and scattering of light by particles and gases in the environment. Visibility is mostly decreased by spreading particles between image capturing device and object. Particles scatter light coming from the sun and reflected by an object to capture device lens, and the rest of the sky during the line of sight of the spectator, thereby reducing the contrast between the object and the background.

The conventional schemes for images captured in awful conditions are enhanced by using many types of low filters to remove the effects of noise, but they are not appropriate for the foggy image. A foggy weather has plenty of vaporizer atoms in the environment, these atoms break the path of light, also influence the distribution of the light spread, and so it affects the feature of the image and the contrast of the image fall according to raise the distance of objects from camera. Many researchers till now are focused on the foggy removal image enhancement and proposed many methods for foggy degrading images.

II. Literature Review

The improved resolution idea was first proposed by Tsai and Huang. They used a frequency domain approach to demonstrate and analyzing the ability to reconstruct a single improved resolution image from several or different down-sampled, noise-free versions of it [1]. Kim, Bose and Valenzuela proposed a weighted recursive least squares algorithm based on sequential or linear estimation theory for filtering and interpolating in the Fourier transform or wavenumber domain [2]. Their objective is to reconstruct a high-resolution image from a registered sequence of frames related to noisy, foggy and blurred frames, rescaling and displaced horizontally and vertically from each other.

To remove weather effect using histogram equalization [3, 4], there are two main methods, first one is global histogram equalization and second is local histogram equalization. The global histogram equalization technique is very easy and fast, but the resultant image is also poor. On the other hand local histogram equalization scheme involves massive calculation costs. So lots of researchers have given several better algorithms extended version of histogram equalization, the method in paper [5] is using an area segmentation process to remove a flat area from the image ,the local histogram equalization method is used in the non-flat area.

The optical flow method [2]. Because background motion is different from that of moving objects, the motion flow vectors can be used to extract moving objects. However, the computational complexity of optical flow is very high, so real-time implementation is difficult or expensive. The second is the space-time continuity method [3], which extracts objects and collecting the information by detecting the surface generated by motion boundaries in the space-time domain. This method can immediately recognize and identified the objects through the sequence, but it is also computational complex and requires storage of many frames in memory. The third is temporal differencing [4]. A frame is pixel-by pixel compared to an adjacent frame, and then everything describe and exceeding a threshold value is considered to be a moving object. This method is a simple and less computational algorithm, but in the case of uniformly colored objects, only the edges of moving objects can be detected. The fourth is background subtraction [5], which detects objects by building a background model and then finding the difference between this model and each incoming frame. This is a very popular detection approach. An important disadvantage of this method is the trade-off conflict of background update speed: on the one hand updating should be performed fast to deal with changes in illumination and changes in the background; on the other hand, updating should be performed slow to avoid learning slowly moving objects as background. This makes algorithms using only one model sensitive to setting the update speed. The final perspective is the learning-based method such as [6], which detects objects through a feature classifier that is trained by the object's feature. Although this learning-based method can accurately detect objects, it requires a huge number of samples to enable a discriminative classifier, and manually labeling sufficient training samples also requires significant manpower. More exhaustive reviews for these object detection methods can be found in [8] [9]. All of these approaches can get satisfying results under clear weather conditions.

Irani and Peleg, who used a rigid model instead of a translational model in the image registration process and then applied the iterative back projection technique from computer-aided tomography. A summary of these and other research during the last decade is contained in a recent paper. Mann and Picard proposed the projective model in image recognition as well as registration because their images were acquired and assimilated with a video camera. The projective model was subsequently used by Lertrattanapanichand Bose for video mosaicing and high-resolution image reconstruction.

III. PROPOSED SYSTEM

Our proposed work analyzing and computes image enhancement in two phases. The first phase is used to remove blurred, fog from an image. Second phase enhance quality of image for improved visibility and clarity and noise reduction using super-resolution technique.

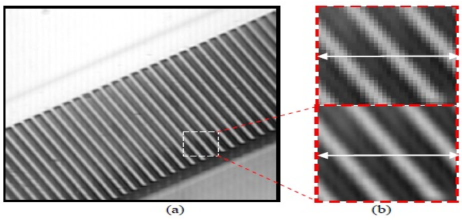

Fig. 2. Estimation of transmission Ratio.

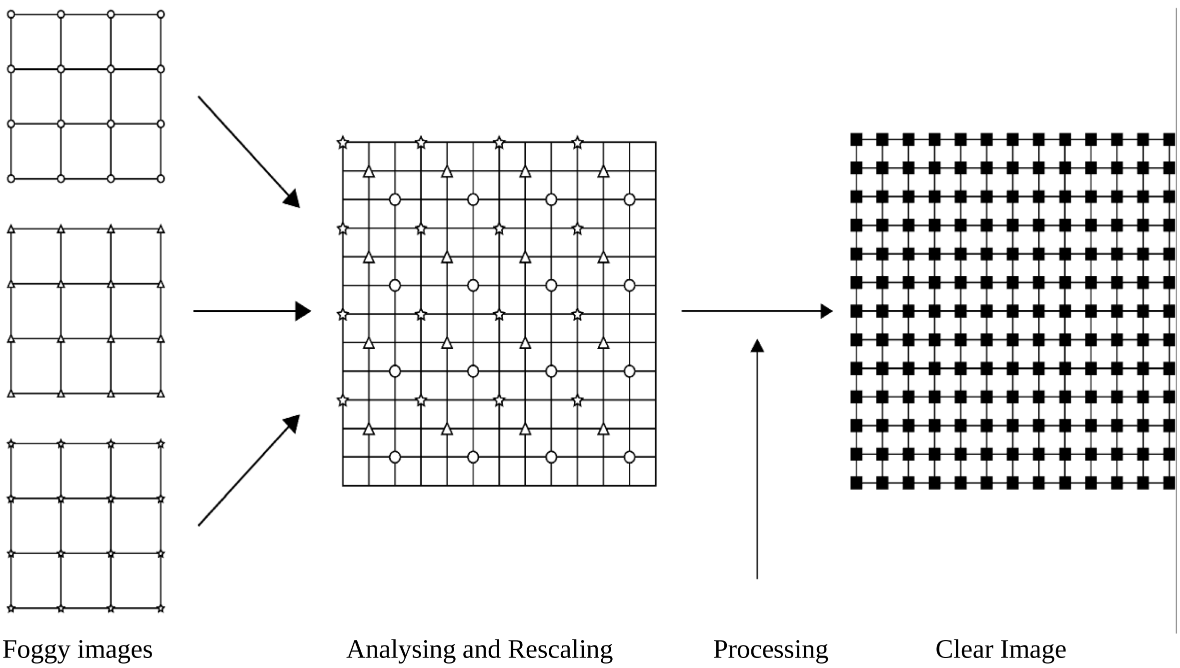

Fig. 3. Over view of super resolution technique.

Super resolution techniques work in two part first analysing, rescaling and resizing the foggy images. Second is improving the clarity and quality of the foggy images. In first part, super resolution techniques use the depth information of the foggy image is extracted according to the foggy image model and the transmission ratio of the atmosphere light is estimated. Try to collecting or extract information from images in a sequence to reconstruct image frames. After that it merge with super-resolution and processing. After processing the user get clear image.

The scheme of fog removal based on prior knowledge overall algorithm given in fig 2 in detail.

1. Estimation of transmission Ratio.
2. Adjustment of transmission Ratio.
3. Recovering source image.
4. Estimation atmosphere light and fog.
5. Apply Super resolution techniques processing on Fog removed image.
6. Image parameter enhancement for quality improvement.

IV. Conclusion

This paper gives an analysis and comparison of image enhancement techniques with proposed technique. This work also described the current progress of image enhancement. This paper is proposing a fast fog removal with a quality improvement technique which can be used for next generation traffic and railway image processing to remove the weather effect from image for better visibility and image processing. This proposed technique has been found more effective than other existing technique in the terms of quality and clarity. In this work we have compared the results of various image enhancement techniques on different grounds like on the images of a building, high trees and open area, which are very important aspects for traffic analysis during foggy weather. This work has given an effective and fast foggy image enhancement better visibility in image or video in real world images.

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AUTHOR(S) PROFILE

Chirag Dhanani, received the BE degree in Information Technology from D.Y. Patil College of Engg. in Pune University In 2013, And currently pursuing the ME Degree in Computer Engg. from G. S. Moze College of Engineering, Balewadi in Savitribai Phule Pune University. respectively.