SINGLE IMAGE DEFOGGING USING DEPTH ESTIMATION

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Fog is a collection of water droplets or ice crystals drapped from the air at or near the earth surface. It significantly reduces the visibility of outdoor scenes and hence causes road accidents, and flight delays. The light coming from a scene towards the camera is attenuated by fog and is blended with the atmospheric light. Although, many single image fog removal approaches have been proposed in the past, their restoration performance is considerably low since they fail to consider the image-specific cues. To feed that information, we propose a simple and robust defogging framework by using image processing techniques. In the initial phase, rough depth map of a foggy image is estimated based on the density of the fog in local image regions. In the proposed depth map estimation technique, a 3 × 3 patch is used to obtain the dark channel of the foggy image and hence the intensity of obtained dark channel is considered as the density of the fog in that image. Then a super-pixel based image segmentation technique has been used to identify the local depth image regions based on the obtained dark channel. In the next step, scene-specific dark channel and transmission are computed based on the segmented local image regions. Thereafter, pixel with highest intensity is selected as atmospheric light and guided filter is used to get refined estimated transmission map. As the final step, a histogram normalization and white balancing post-processing technique is used to enhance the restoration and colour balancing. This study is evaluated on FRIDA benchmark dataset, which has four different types of road foggy images. The peak signal to noise ratio (PSNR), and the structural similarity index (SSIM) are used to measure the performance of the proposed approach. High PSNR gives better quality of reconstructed image and high SSIM index represents high similarity between ground truth and recovered image. The experimental results show that the proposed defogging framework outperforms state-of-the-art approaches.

Keywords: Defogging, Dark Channel Prior, Image Enhancement