College of Engineering Chengannur
Department of Computer Engineering
M. Tech. Computer Science (Image Processing)
03CS6901 Seminar I
Abstract of Proposed Seminar Topic

Day and Night-Time Dehazing by Local Airlight Estimation

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Abstract

Outdoor images often suffer from poor visibility introduced by weather conditions, such as haze or fog. Haze is a common atmospheric phenomena produced by small floating particles that absorb and scatter the light from its propagation direction. Due to attenuation and scattering, hazy scenes are characterized by poor contrast of distant objects, color shifting, and additional noise. Outdoor applications such as video surveillance and automatic driving assistance require good restoration of such distorted images.In this seminar paper we introduce an effective fusion-based technique to enhance both day-time and night-time hazy scenes. When inverting the Koschmieder light transmission model, and by contrast with the common implementation of the popular darkchannel , we estimate the airlight on image patches and not on the entire image. Local airlight estimation is adopted because, under night-time conditions, the lighting generally arises from multiple localized artificial sources, and is thus intrinsically non-uniform. Selecting the sizes of the patches is, however, non-trivial. Small patches are desirable to achieve fine spatial adaptation to the atmospheric light, but large patches help improve the airlight estimation accuracy by increasing the possibility of capturing pixels with airlight appearance (due to severe haze). For this reason, multiple patch sizes are considered to generate several images, that are then merged together. The discrete Laplacian of the original image is provided as an additional input to the fusion process to reduce the glowing effect and to emphasize the finest image details. Similarly, for day-time scenes we apply the same principle but use a larger patch size. For each input, a set of weight maps are derived so as to assign higher weights to regions of high contrast, high saliency and small saturation. Finally the derived inputs and the normalized weight maps are blended in a multi-scale fashion using a Laplacian pyramid decomposition. Extensive experimental results demonstrate the effectiveness of our approach as compared with recent techniques, both in terms of computational efficiency and the quality of the outputs.

References

[1] Cosmin Ancuti Codruta.O.Ancuti, Christophe De Vleeschouwer and Alan C.Bovik. Day and night-time dehazing by local airlight estimation. *IEEE TRANSACTIONS ON IMAGE PROCESSING*, 29: 6264–6275, Apr 2020.