

A Single-Scale RETINEX Technique for Improving Low-Light Images

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Abstract. In this paper, we proposed the Low light image enhancement using a single scale retinex algorithm. The main aim is to improve the clarity of low light images. By considering the real scenes, the dynamic range of digital camera is small, hence contrast correction is required to reproduce the information of images in darker regions. The proposed method, by using single scale retinex algorithm RGB color components are extorted and modified by applying logarithm and converted into HSV. For enhancing this component, the gaussian surround function is convoluted to it and then scaled version of components and the convoluted one is added to the original image. Then contrast stretching is performed to increase quality of image. This is implemented with MATLAB.

INTRODUCTION

Low light image enhancement is an active area in research. The same images have different visibility in different areas. Mainly the images captured in low light conditions consist of a narrow dynamic range and are degraded by noise [1]. Low light image enhancement has demand in various applications such as underwater, fog images, military, medical applications etc. In the latest days, as digital cameras customized up portable digital terminals are popularized, humans had many chances to accumulate pictures in the open air [2]. However, any such state of affairs might also deliver a photo acquisition underneath abnormal illumination so that the picture can be degraded in any such manner of getting excessively dark areas in its components.

Image processing is confronted with several challenges ranging from unequal resolutions, layout versions, non-uniform illuminations, distortions, and noise [3]. Because of those demanding situations, maximum digital photo processing programs or devices appoint enhancement techniques previous to using the captured picture. Many researchers have different ideas and developed different image enhancement techniques such as Histogram equalization, Contrast-limited adaptive histogram equalization, Linear contrast adjustment, etc. [4-6]. These techniques are large supportive to work on the low light pictures by increasing their color contrast and by reducing their dynamic range. Histogram equalization is an image enhancement algorithm but, it is not suitable for low contrast images [7-9]. It fails when low background intensity is present and there will be an improvement in image but the appearance is not much good. This method helps to enhance the image but there is mainly one difficulty with using this, it is like a two-step approach and the output images are not much good.

The single-scale retinex is one of the best algorithms to enhance the image. As, the SSR is a pixel-by-pixel based algorithm it extracts every component in the image such as RGB, and chromatic components. we can differentiate noise and origin using the Single Scale Retinex principle.