

AN EFFECTIVE DEMOSAICING ALGORITHM FOR CFA IMAGE

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ABSTRACT. *Color filter array (CFA) interpolation or demosaicing is essential to single-sensor imagery. This study develops an edge-sensitive demosaicing (ESD) algorithm for reconstructing a full-color image from a CFA image and to improve the reconstructed image quality. Based on the Bayer pattern, a CFA image contains twice as much information about green samples than red and blue samples. Hence, the green samples have strongly affected the quality of the final demosaiced color image. Consequently, the ESD algorithm demosaics green plane first. In reconstructing the green plane, the algorithm analyzes neighboring samples to estimate the value of missing green pixel. Moreover, according to the high spectral-spatial correlation between two of color different planes, R-G or B-G, the ESD algorithm interpolates the missing value of R-G and B-G color different planes by combining neighboring samples using appropriate weights, as determined by the spectral correction among samples to improve the quality of demosaiced R and B planes. The demosaiced G, R and B planes are used to complete the interpolation of the image. The simulation results demonstrate that the ESD algorithm achieves better visual perception with fewer false colors or zipper effects. Furthermore, the average CPSNR measurement of the proposed ESD algorithm exceeds those of previous demosaicing algorithms.*

Keywords: Interpolation, Demosaicing, Color filter array

1. **Introduction.** With the rapid development of computer technology and increases in the population of the Internet-users, users have more opportunities to store digital images and transmit them to other users. Various applications, such as image watermarking [3,9,11] and image retrieval [16], involve digital imaging. However, digital electronic devices have become very popular devices for creating digital images. A pixel in a full-color image generally has three primary color components (red, green and blue) as displayed in Figure 1. Hence, a digital device requires three sensors to record each color component in the digital format. Sensors are expensive. To reduce cost, most digital electronic devices, such as PDAs, mobile phones and digital cameras, use only a single sensor which is called a color filter array (CFA) [14]. A CFA that is based on the Bayer pattern [2] is composed