Inverse Halftoning Algorithm Using Linear Estimation and Denoising

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ABSTRACT

This paper proposes the use of linear estimation to restore a halftone image into a grayscale image. The proposed method consists of the following steps: （1） Input a grayscale training image and its halftone image then classify the pixels of the halftone image into one of 18 categories. （2） Use the linear estimation method to estimate the best weight mask filter for each pixel. （3） Input the test halftone image and classify each pixel. （4） Process each pixel through the best weighting mask filter for their type to acquire the restored inverse halftone image. （5） Use the Wavelet-based Inverse Halftoning via Deconvolution （WInHD） method to acquire the final restored image. Classification is performed by applying the Gaussian smoothing filter to the halftone image to derive the grayscale image. Canny edge detection is then applied to the image to derive the binary edge image. Finally, the edges from the pixel ’ s 25 neighboring points are taken into account to classify it into one of 18 categories. The experimental results showed that the PSNR quality of the image restored using the proposed method was on average 0.55dB higher than WInHD and ELUT. With the Lena image for example, the proposed method generated an inverse halftone image with a PSNR or 32.80dB.

Keywords : Inverse halftoning ; Error diffusion ; Wavelet transform ; Wiener filter ; Gaussian filter ; Linear estimation

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