Image Enhancement based on Nonsubsampled Contourlet Transform using Matrix Factorization Techniques

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Abstract

A unique method for image enhancement using the nonsubsampled Contourlet transform (NSCT) is presented here. Existing methods for image enhancement cannot capture the geometric information of images and tend to amplify noises when they are applied to noisy images since they cannot distinguish noises from weak edges. In contrast, the nonsubsampled Contourlet transform extracts the geometric information of images, which can be used to distinguish noises from weak edges. In this paper, we take the low pass subband of the image obtained after nonsubsampled Contourlet decomposition. QR decomposition is applied on the lowest frequency subband. SVD decomposition technique is applied on the QR decomposed coefficients to obtain singular values. Therefore, changing the singular values will directly affect the illumination of the image; hence, the other information in the image will not be changed. Experimental results show the proposed method achieves better enhancement results than a wavelet-based image enhancement method.

References


Index Terms

Computer Science  Image Processing

Keywords

Discrete Wavelet Transform, Non Subsampled Contourlet Transform, Singular Value Decomposition, QR Decomposition, Image Equalization.