Undecimated Balanced GHM Multiwavelet Transform based Contrast Enhancement Technique for Dark Images using Dynamic Stochastic Resonance

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Abstract

The main aim of this paper is to propose a technique for enhancing contrast of the dark images using Undecimated Balanced GHM multi wavelet transform (UMWT) and Dynamic Stochastic Resonance (DSR). The DSR based approach utilizes the inherent noise of an image for enhancement. Darkness due to inadequate illumination is treated as noise, and is used to yield a noise induced adjustment of the image from a state of low to high contrast. The stochastic resonance is stimulated in the approximation and detail coefficients of undecimated multiwavelet transformed dark image in an iterative manner. This results intensification in contrast of the coefficient distribution. The desired response is validated by the performance metrics such as Relative Contrast Enhancement Factor (F), Perceptual Quality Measures (PQM) and Color Enhancement Factor (CEF). The results shows that the proposed technique offers good performance in terms of above mentioned metrics, perceptual quality as well as colourfulness.

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Index Terms

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Keywords

Dynamic stochastic resonance, Undecimated Multi Wavelet Transform (UMWT), Relative
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