Image Enhancement using E-Spline Functions

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Abstract

Exponential spline polynomials (E-splines) represent the best smooth transition between continuous and discrete domains. As they are constructed from convolution of exponential segments, there are many degrees of freedom to optimally choose the most convenient E-spline, suitable for a specific application. In this paper, the parameters of these E-splines were optimally chosen, to enhance the performance of image de-noising as well as image zooming schemes. The proposed technique is based on minimizing the total variation function of the detail coefficients of the E-spline based wavelet decomposition. In image de-noising schemes, apart from E-spline parameter estimations, the thresholding levels of their detail coefficients, are also optimally chosen. In zooming applications, the quality of interpolated images are further improved and sharpened by applying ICA technique to them, in order to remove any dependency. Illustrative examples are given to verify image enhancement of the proposed e-spline scheme, when compared with the existing approaches.

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