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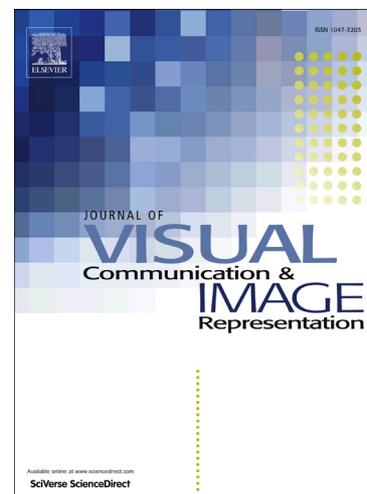
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A Splitting Method for Total Least Squares Color Image Restoration Problem

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Abstract

Color image restoration is an important problem in image processing. Using the structured total least squares (STLS) for fidelity term of the restoration process gives better results in comparison with the least squares (LS) approach. The main drawback of the STLS approach is its complexity. To overcome this issue, in this paper by an appropriate transformation the color image restoration is substituted with two smaller subproblems corresponding to smooth and oscillatory parts of the image. The first and second subproblems are modeled via STLS and LS approaches, respectively. We show that the proposed method is faster than STLS and gives competitive solutions with it. Also, we demonstrate that Haar wavelet perseveres the structure of the blurring operator, which causes a considerable reduction in computational and storage complexity of the proposed method.

Keywords: Structured total least squares(STLS), Color image restoration, Wavelet, Splitting

1. Introduction

Over the last two decades, we have witnessed a considerable growth in both the variety of techniques and the range of applications of image processing. With advances in imaging sensors, digital TV, image databases, video and multimedia systems, and with the proliferation of color printers, color image displays, and especially digital cameras, color image processing becomes important [1, 2, 3, 4]. Usually, color images are considered as a set of three channels corresponding to red, blue and green colors.

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