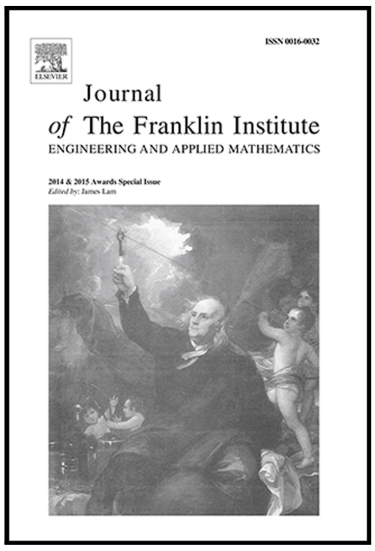

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Cartoon-Texture Image Decomposition via Non-convex Low-rank Texture Regularization[1]

Ya-Ru Fan[2a], Ting-Zhu Huang[3a], Tian-Hui Ma[4a], Xi-Le Zhao[5a]

[a] *School of Mathematical Sciences/Research Center for Image and Vision Computing, University of Electronic Science and Technology of China, Chengdu, Sichuan, 611731, P. R. China*

Abstract

Methods based on low-rank regularization have been successfully used to decompose an image into its cartoon and texture components. However, most of the existing low-rank regularized methods are formulated as a convex nuclear norm minimization, which is in practice suboptimal due to equally punishing each singular value. Recent works have shown that non-convex low-rank approximations adaptively treating the singular values at different scales yield better results than those convex ones. In this paper, we consider a non-convex *log det* function as the low-rank regularization to characterize the texture component in image decomposition, which treats singular values with varying degrees to facilitate a better characterization of the texture component. Then we obtain a non-convex cartoon-texture image decomposition model, where the cartoon and texture components are characterized simultaneously by minimizing the total variation norm and *log det* function. We integrate the self-similarity of texture component and the piecewise smooth of cartoon component into one model. The model can handle various types of image degradations, including blur, missing pixels and noise. Moreover, we develop an efficient alternating direction method of multiplier to solve the proposed model. The proposed method gives both a decomposition of cartoon and texture components and the restored image. Results of numerical experiments demonstrate the outstanding performance of the proposed method in image decomposition.

Keywords:
Cartoon-texture decomposition, low-rank approximation, non-convex optimization, alternating direction method of multipliers, total variation.

1. Introduction

In image processing, one of the most significant and meaningful issues is image decomposition, which also has been widely applied to pattern recognition [1], astronomical imaging [2] and

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[2]E-mail: yarufanfan@163.com

[3]Corresponding author. E-mail: tingzhuhuang@126.com. Tel: 86-28-61831016. Fax: 86-28-61831280

[4]E-mail: nkmth0307@126.com

[5]E-mail: xlzhao122003@163.com