基于分数阶与 NCTGV 的图像放大新模型

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摘 要： 针对传统全变分在图像放大时容易产生"阶梯效应"与边缘模糊等问题，在此基础上考虑到非凸二阶总广义变分在抑制"阶梯效应"以及分数阶在保护图像细节信息的特性，提出了基于纹理分解的分数阶非凸二阶总广义变分图像放大模型.新模型将低分辨率图像分解为卡通与纹理两个部分，卡通部分为原始图像的平坦区域，使用传统全变分易产生"阶梯效应"，因此对卡通部分采用非凸二阶总广义变分模型处理.针对图像细节信息较多的纹理部分，采用分数阶变分模型处理，可更好的完善图像细节信息.对所提出的新模型，采用原始对偶与 Chambolle 投影算法进行数值求解.数值数值实验结果表明文中所提的新模型在峰值信噪比与均方误差均等指标有明显的提升.

关键词： 全变分；图像放大；非凸总广义变分；分数阶；纹理分解

A New Image Zooming Model Based on Fractional Order and NCTGV

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Abstract： Prone tothe staircase effect and the blurring of the traditional variational image magnification, on the basis of considering the non convex order two total generalized variation in the suppression of the staircase effect and the fractional order in preserving the image details the characteristics of non convex total two order generalized variational model of fractional texture image magnification based on decomposition is proposed. The new model decomposes the low resolution image into two parts: cartoon and texture, because for a flat area, easy to produce the staircase effect, so the cartoon part uses the two order non convex total generalized variational model. In this paper, the fractional variational model is used to deal with the texture of the image with more details. In this paper, the primal dual and Chambolle projection algorithm are used to solve the new fractional non convex model. The results of numerical experiments show that the new model has a significant improvement in peak signal to noise ratio and mean square error.

Key words： total variation; image zooming; non convex order generalized variational; fractional order; texture decomposition

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