

# 自适应分数阶 TV 修复算法与研究

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**摘要:** 针对传统 ROF 模型在修复图像时易产生阶梯效应, 提出了一种自适应分数阶 TV 修复算法. 该算法利用分数阶微分的全局性, 将 ROF 修复模型的正则项由一阶微分拓展到分数阶微分, 有效地解决了传统 ROF 模型在修复图像时所产生的阶梯效应. 另外, 为了更好地保持修复图像的边缘, 在分数阶微分正则项上设计了一个自适应边缘指示算子. 由于该模型与鞍点结构的优化模型上具有相似性, 所以在算法上采用基于预解式的原始对偶算法对新模型进行求解, 并且采用自适应卷积滤波函数来自由地控制新模型修复扩散的强弱. 实验结果表明: 相比于传统的 TV、TGV 修复算法, 文中提出的自适应分数阶 TV 修复算法有着更好的修复效果, 能够对诸如斑块、划痕、文字等类型的图像破损进行较好地修复.

**关键词:** 图像修复; 分数阶 TV; 自适应; 原始对偶

## Adaptive Fractional Order TV Repair Algorithm and Research

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**Abstract:** According to the traditional ROF model is prone to produce the staircase effect when repairing images, a new adaptive fractional TV repair algorithm is proposed. The algorithm uses the globality of fractional differential to extend the regular term of ROF repair model from first order differential to fractional differential, which effectively solves the staircase effect of traditional ROF model in repairing image. In addition, in order to maintain the edge of the repair image better, an adaptive edge instruction operator is designed on the fractional differential regular term. Because of the similarity between the model and the optimization model of the saddle point structure, the new model is solved by using the primitive dual algorithm based on the prerequisite, and the adaptive convolution filter function is used to control the diffusion of the new model repair. The experimental results show that compared with the traditional TV and TGV repair algorithm, the adaptive fractional TV repair algorithm proposed in this paper has better repair effect and can be better repaired for image damage such as patches, scratches and text.

**Key words:** image inpainting; fractional TV; adaptive; primitive duality

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