

一种改进的组稀疏表示图像去噪方法

马杰^{1,2}, 武利涛¹, 张晓严¹

(1 河北工业大学 电子信息工程学院, 天津 300401; 2 天津市电子材料与器件重点实验室, 天津 300401)

摘要: 研究了一种匹配梯度分布的组稀疏表示图像去噪模型, 将相似图像块构成的结构组作为稀疏表示单元并加入梯度直方图保持正则项匹配梯度分布, 基于非精确增广拉格朗日乘法进行求解得到恢复图像. 仿真实验结果表明, 该方法不仅可以减少图像处理的时间并可在有效去除噪声的同时保持图像精细纹理结构, 获得了较高的峰值信噪比和结构相似性索引测度. 在需要得到图像丰富细节的情况下, 该方法具有实用价值和现实意义.

关键词: 图像去噪; 稀疏表示; 相似性; 纹理

An Improved GSR Image Denoising Method

MA Jie^{1,2}, WU Li-tao¹, ZHANG Xiao-yan¹

(1 School of Electronics and Information Engineering, Hebei University of Technology, Tianjin 300401, China; 2 Key Laboratory of Electronic Materials and Devices in Tianjin, Tianjin 300401, China)

Abstract: A matching gradient distribution group based sparse representation model is researched, in which the basic unit of sparse representation is the group composed by nonlocal patches with similar structures, simultaneously the gradient histogram preserving regularization is added to match gradient distribution, and imprecise Augmented Lagrange multiplier method is used to solve the model. It is well shown by the results that this method can not only shorten the time of image processing, but also retain the fine or small-scale texture structure as well as denoising effectively, and obtain higher output PSNR and SSIM than some current state-of-the-art schemes. In case of the rich details of the image is needed, this method has practical value and realistic significance.

Key words: image denoising; sparse representation; similarity; texture

作者简介:

马杰 男, (1978-), 博士, 教授, 硕士生导师. 研究方向为图像处理、分析和信息处理.

E-mail: jma@hebut.edu.cn.

武利涛 女, (1989-), 硕士研究生. 研究方向为数字图像处理.

张晓严 女, (1990-), 硕士研究生. 研究方向为图像处理与分析.