

论文与报告

双算子形态学滤波器

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摘要

传统的形态学滤波算子交替性差、耗时长且抑制噪声能力弱。基于中心互补结构元素与交替对偶算子, 提出了双算子形态学滤波器。该滤波器继承了经典形态学滤波器的递增性、对偶性和幂等性, 但不满足扩展性和非扩展性。双算子形态学滤波器具有离散的邻域运算特性, 采用交替小结构元素能去除较大结构元素大的噪声块, 且在抑制噪声的同时有效保留了图像细节。实验结果表明, 与基本的形态学滤波器及目前已改进的形态学滤波器相比, 双算子形态学滤波器具有更强的噪声抑制性能, 且在同等滤波效果下, 其计算量更小, 最终滤波后的图像具有较高的峰值信噪比和较小的均方根误差。

关键词 [形态学滤波器](#) [交替对偶算子](#) [噪声块](#) [峰值信噪比](#)

分类号

Double Operator Morphological Filters

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Abstract

The traditional morphological filtering operators are time consuming and have poor alternative ability to suppress noise. Based on the structure elements of central complementary and alternating dual operators, double operator morphological filters are proposed in this paper. The filters inherit the important properties of the classic morphological filters, such as increasingness, duality and idempotence, but they lack the extensibility and anti-extensibility. With discrete neighborhood property, the double operator morphological filters can remove the block noise whose size is bigger than the structure elements by using the alternating small structure elements. And also they can suppress the noise while preserving the image details. Experimental results show that the double operator morphological filters have better noise suppression performance than the basic and popular morphological filters. Moreover, having the same filtering effect, the computation of the double operator morphological filters is smaller than others, and the final filtered image has a higher peak signal to noise ratio and a smaller root mean square error.

Key words [Morphological filters](#) [alternating dual operators](#) [block noise](#) [peak signal to ratio \(PSNR\)](#)

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