

论文

基于多小波分解的多光谱图像矢量融合

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摘要

在实数域中, 对称、正交的紧支集非平凡单小波基不存在, 而多小波把紧支性、对称性、正交性完美地结合在一起, 使小波理论从标量扩展到矢量范畴。考虑到图像多小波变换系数具有矢量特性, 该文将基于像素点和基于区域的标量融合策略推广到矢量情形, 提出一种新的、在多小波域中基于矢量融合的图像融合算法, 充分利用多小波变换域系数矢量内部各个分量的相关性来提高融合质量。两波段真实多光谱图像融合实验结果表明, 与单小波标量融合方法相比, 多小波矢量融合算法获得的图像具有较优的视觉效果和客观评价指标, 从而证明了用于图像融合时, 多小波较之单小波更适合于人类视觉系统, 具有广泛的应用前景。

关键词 [矢量融合](#) [图像融合](#) [多小波](#) [多光谱图像](#)

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Vector Fusion of Multispectral Images Based on Multiwavelet Decomposition

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Abstract

In the real domain, the finitely supported, orthogonal, symmetric nontrivial scalar wavelet bases do not exist, while the multiwavelet offers the finite support, symmetry, orthogonality simultaneously. As a result, the wavelet theory is extended to vector field. Considering vector characteristics provided by the coefficients of the multiwavelet transformed image, pixel-based and region-based scalar fusion schemes are extended to vector case and a novel fusion algorithm is also proposed in this paper. The new algorithm is based on vector fusion scheme in multiwavelet domain, which makes sufficient use of the correlation among the components of multiwavelet transform coefficient vectors to improve fusion quality. The original algorithm is carried out with emphases on the novelty of the fusion algorithm and the demonstration by using real multispectral image compared with algorithms employing wavelet scalar fusion scheme. The experimental results demonstrate that the proposed multiwavelet vector fusion algorithm can obtain both better subjective vision characteristics and better objective evaluation indices and outperform the wavelet scalar fusion scheme. Accordingly it is testified that when applied in image fusion, multiwavelet is more suitable than wavelet to human vision system and it is of great potential to wide applications.

Key words [Vector fusion](#) [Image fusion](#) [Multiwavelet](#) [Multispectral image](#)

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