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Coherence-enhancing diffusion with the source term. (English) Zbl 1437.94016

Summary: Many texture images require the enhancement of coherent structures in various applications. Traditional coherence-enhancing diffusion filtering (CED) completes the interrupted lines and gaps but at the cost of reducing the contrast between coherent structures and the background. In this study, we introduce a source term into CED filtering to restore the initial image and the contrast lost by pure diffusion filters. Moreover, this new model combines contrast enhancement and diffusion processes, so it may be more suitable for dealing with white noise than the original CED. We assessed our method in terms of the theoretical and numerical properties changed by the source term. In our numerical assessment, we implemented our approach using an explicit scheme, which was accelerated by fast explicit diffusion. We compared the performance of our proposed approach with CED filtering based on fingerprint images.

MSC:
94A08 Image processing (compression, reconstruction, etc.) in information and communication theory
65M06 Finite difference methods for initial value and initial-boundary value problems involving PDEs

Keywords:
anisotropic diffusion filtering; texture enhancement; source term

Full Text: DOI

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