Multiscale texture orientation analysis using spectral total-variation decomposition.

Summary: Multi-level texture separation can considerably improve texture analysis, a significant component in many computer vision tasks. This paper aims at obtaining precise local texture orientations of images in a multiscale manner, characterizing the main obvious ones as well as the very subtle ones. We use the total variation spectral framework to decompose the image into its different textural scales. Gabor filter banks are then employed to detect prominent orientations within the multiscale representation. A necessary condition for perfect texture separation is given, based on the spectral total-variation theory. We show that using this method we can detect and differentiate a mixture of overlapping textures and obtain with high fidelity a multi-valued orientation representation of the image.

MSC:
94A08 Image processing (compression, reconstruction, etc.) in information and communication theory
65D18 Numerical aspects of computer graphics, image analysis, and computational geometry
68U10 Computing methodologies for image processing
35K59 Quasilinear parabolic equations
35P30 Nonlinear eigenvalue problems and nonlinear spectral theory for PDEs

Keywords:
total variation; spectral total variation; image decomposition; image enhancement; nonlinear eigenfunction analysis

References:


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