Advances in Computer Vision and Pattern Recognition

Michal Haindl
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Visual Texture

Accurate Material Appearance Measurement, Representation and Modeling

Springer

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Contents

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Michal Haindl · Jiří Filip

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Although the field of texture processing is now well-established, research in this area remains predominantly restricted to texture analysis and simple and approximate static textures.

This comprehensive text/reference presents a survey of the state of the art in multidimensional, physically-correct visual texture modeling. Starting from basic principles and building upon the fundamentals to the latest advanced methods, the book brings together research from computer vision, pattern recognition, computer graphics, virtual and augmented reality. The text assumes a graduate-level understanding of statistics and probability theory, and a knowledge of basic computer graphics principles, but is accessible to newcomers to the field.

Topics and features:

- Reviews the entire process of texture synthesis, including material appearance representation, measurement, analysis, compression, modeling, editing, visualization, and perceptual evaluation
- Explains the derivation of the most common representations of visual texture, discussing their properties, advantages, and limitations
- Describes a range of techniques for the measurement of visual texture, including BRDF, SVBRDF, BTF and BSSRDF
- Investigates the visualization of textural information, from texture mapping and mip-mapping to illumination- and view-dependent data interpolation
- Examines techniques for perceptual validation and analysis, covering both standard pixel-wise similarity measures and also methods of visual psychophysics
- Reviews the applications of visual textures, from visual scene analysis in image processing and medical applications, to high-quality visualizations for cultural heritage and the automotive industry

Researchers, lecturers, students and practitioners involved in computer graphics and computer vision will all find this book an invaluable reference on the rapidly developing new field of texture modeling.

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