

## Review

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### **Handbook of texture analysis**

Mirmehdi M., Xie X., Suri J., IMPERIAL COLLEGE PRESS, London, UK, 2009. 413 pp.

Type: Book

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Texture is still not fully understood. Handbooks on both human and machine vision mention texture as an important characteristic of perceptual processes, for a range of applications. Moreover, a vast number of articles on texture, approached from either the human or machine side, have been published. However, it should be noted that direct links between, or even models of, both human and machine perception of texture are rare [1,2]. Even more surprisingly, books on texture analysis are rarely found [3,4]. So, what is texture? What makes it such an odd proposition in the world of science? What is the value of this handbook?

The abstract of the first chapter, "Introduction to Texture Analysis," starts with a dictionary-style definition of texture: "Textures are characteristic intensity (or color) variations that typically originate from roughness of object surfaces." Despite all of the work done on texture, the definitions of texture that are used are rather vague. This illustrates the complexity of the texture phenomenon and science's lack of understanding of it. This book respects and even illustrates the complexity of texture and, as an edited volume, aims to collect significant works on its various aspects. In this aim, the handbook succeeds. As such, it is, regrettably, not a groundbreaking work and it lacks truly new insights. It does provide various definitions of texture, all in a dictionary style.

Being an edited volume, its value as a handbook is limited. Although distinguished authors and their contributions were undoubtedly chosen with care, overlap between chapters could not be avoided. This is clearly illustrated by the reference lists, as provided for each chapter. Although the list of references is impressive when taken together, some references are missing--for example, from the *Journal of the Optical Society of America*. This illustrates the handbook's bias toward image processing and computer vision. Findings from other fields, such as psychology and optics, are addressed only to a limited extent.

Going through the handbook, one will notice that roughly half of the chapters are reprints of papers. This is not what one would hope when consulting a handbook. Nevertheless, this collection has value, as all of the papers and chapters are excellent. The handbook starts with a gentle introduction to texture analysis, followed by a concise overview of texture synthesis. The latter, in particular, is of general interest, as it discusses 18 milestone papers. Next, the book introduces methods for texture classification, representation, and analysis, followed by three chapters on three-dimensional (3D) texture analysis and one on dynamic textures. Before the closing chapter, the handbook presents three chapters on distinct topics: an alternative approach to texture synthesis, the Trace transform, and face recognition. The book ends with a compressed overview of texture features and a taxonomy of texture analysis, accompanied by an excellent reference list.

One aspect of texture that the handbook hardly touches, among the various aspects of texture discussed, is color-induced texture analysis. Indeed, a vast number of applications rely solely on intensity-based textures. However, a vast number of applications also rely on color-induced texture analysis. Moreover, human vision relies on both [1,2]. This makes it hard to understand why the topic is mentioned only briefly in the handbook.

Overall, the handbook is a good start for those who want to be introduced to texture analysis, but it has somewhat limited value for experts. Even for them, though, it will be convenient to be able to pick up this handbook from time to time, as it presents a collection of high-quality work in the field. It fills a gap in a niche market [3,4] and, despite the criticism I expressed, will undoubtedly be received with open arms by the community.

1)Beck, J.; Hope, B.; Rosenfeld, A. *Human and machine vision*. Academic Press, Inc., London, UK, 1983.

2)Levine, M. D. *Vision in man and machine*. McGraw-Hill, Inc., New York, NY, 1985.

3)Petrou, M.; Sevilla, P. G. *Image processing: dealing with texture*. John Wiley & Sons Ltd., West Sussex, England, 2006.

4)Pietikainen, M. K. *Texture analysis in machine vision*. World Scientific Publishing Co. Pte. Ltd., Singapore, 2000.

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