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3D Image Processing

Techniques and Clinical Applications

With Contributions by

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Foreword

The introduction of computer applications in medical imaging has had a tremendous impact on routine radiological practice in recent years. The possibilities for image processing, presentation and transmission of digitally acquired radiological data are now almost without limits.

This book sets out to provide a sorely needed update of our knowledge of the diagnostic potential of 3D imaging and the virtual rendering of images and constitutes a welcome addition to our series Medical Radiology, which aims to cover all important aspects of clinical imaging in modern diagnostic radiology.

The editors and the contributing authors have striven to focus not only on the theoretical foundations of digital imaging but also on the clinical value of these new methods. Therefore this volume should be of great interest not only to diagnostic radiologists but also to surgeons.

Davide Caramella and Carlo Bartolozzi have been involved in digital radiological techniques for many years, and the department of radiology of the University of Pisa has played a leading pioneer role in exploring the clinical potential of this new technology. Their own excellent knowledge and expertise has enabled them to engage a very distinguished group of internationally known experts in digital imaging as contributors. I would like to congratulate them most sincerely for this outstanding volume, its comprehensive contents as well as its superb illustrations.

I trust this book will meet with the same great success as previous volumes in the series.

Leuven

ALBERT L. BAERT

Preface

In recent times, few fields in medicine have witnessed such impressive progress as the application of computers to radiology: digital acquisition, display, management and processing of diagnostic images have revolutionized the practice of radiology and have determined a growing interest in this field on the part of other medical professionals also.

In particular, post-processing and 3D reconstruction of diagnostic images not only satisfy an aesthetic requirement of radiologists: they have become a necessary tool for the representation of complex anatomical structures and for the understanding of pathological changes in terms of both morphology and function. This is crucial if we consider that the volume of native images produced with new-generation cross-sectional techniques has become increasingly large.

Also the requirements of referring physicians have changed accordingly. Today they not only ask for the “simple” radiological diagnosis accompanying a series of native images; they also request the availability of reconstructed images that allow better appreciation of the disease process, appropriate selection of treatment options, and accurate planning of procedures.

This book, written by leading experts worldwide, provides a comprehensive and up-to-date overview of the role of 3D image processing, covering the introductory technical aspects and then providing in-depth analysis of the main clinical applications. Final chapters discuss the evolutionary aspects of this challenging new area of the radiological sciences, by focusing on recent developments in functional imaging and computer-aided surgery.

We hope that this book, which is the expression of the enthusiastic commitment of many distinguished colleagues, will fulfil the expectations of all medical professionals who are interested in this very important field.

Finally, we would like to express our deep appreciation to the Medical Radiology series Editor, Prof. Albert Baert, and thank most sincerely all the authors for having spent so much time and effort in preparing truly outstanding contributions.

Pisa

DAVIDE CARAMELLA
CARLO BARTOLOZZI

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