

INTEGRATED IMAGE AND GRAPHICS TECHNOLOGIES

David Zhang
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Kluwer Academic Publishers

INTEGRATED IMAGE AND GRAPHICS TECHNOLOGIES

edited by David Zhang, Mohamed Kamel and George Baciuc

Image technology is a continually evolving field with various applications such as image processing and analysis, biometrics, pattern recognition, object tracking, remote sensing, medicine diagnoses and multimedia. Significant progress has been made in the level of interest in image morphology, neural networks, full color image processing, image data compression, image recognition, and knowledge-based image analysis systems.

Computer graphics has been mainly driven by engineering design processes and has established itself as a dominating methodology in computer aided design (CAD). Subsequently, computer graphics has found applications in information visualization, computer art, digital entertainment, user interfaces, visual programming, scientific visualization, education and training. Traditionally, the image technology and the computer graphics technology have subsumed slightly different goals. In computer graphics, computers are used to create pictures, animations and simulations. The image technology, on the other hand, consists of techniques and methodologies that modify or interpret existing pictures.

INTEGRATED IMAGE AND GRAPHICS TECHNOLOGIES attempts to enhance the access points to both introductory and advanced material in this area, and to facilitate the reader with a comprehensive reference for the study of integrated technologies, systems of image and graphics conveniently and effectively. This edited volume will provide a collection of fifteen contributed chapters by experts, containing tutorial articles and new material describing in a unified way, the basic concepts, theories, characteristic features of the technology and the integration of image and graphics technologies, with recent developments and significant applications.

INTEGRATED IMAGE AND GRAPHICS TECHNOLOGIES is designed for a professional audience composed of researchers and practitioners in industry. This book is also suitable as a secondary text for graduate-level students in computer science and engineering.

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INTEGRATED IMAGE AND GRAPHICS TECHNOLOGIES

**THE KLUWER INTERNATIONAL SERIES IN
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PREFACE

The ultimate goal of image technology is to seamlessly perform visual functions equivalent to the recognition and the reconstruction power of living beings. Computer graphics has been mainly driven by engineering design processes and has established itself as a dominating methodology. Traditionally, image technology and computer graphics technology have been concerned with different goals. In computer graphics, computers are used to create pictures, animations and simulations. Image technology, on the other hand, consists of techniques and methodologies that modify or interpret existing pictures. Many methods proposed and used in these two areas often overlap and cross-fertilization between them can impact their progress. In the past, image technology and computer graphics have been typically combined in subtle ways, mainly in applications. In fact, the convergence of image processing and computer graphics has become the main research stream in both the computer graphics community as well as in the computer vision and image processing community. The image, vision and graphics research streams culminate with the interactive fusion of digital image and computer graphics. Therefore, it is useful to study approaches and methodologies that foster the integration of image and graphics technologies. This will provide the background and inspiration for some new creative methods or techniques.

This book provides a collection of 20 chapters containing tutorial articles and applications, in a unified way, the basic concepts, theories and characteristic features of integrating different facets of Image and Graphics, with recent developments and significant applications. The articles, written by recognized international experts, demonstrate the various ways in which this integration can be made possible in order to design methodologies and their applications efficiently. With the exception of the first chapter that serves as an introduction to image and graphics, each chapter provides detailed technical analysis of the development in the respective area, keeping a cohesive character with other chapters. Although there is an extensive coverage of problems and solutions that make the integration of graphics and image technologies more practical, it is generally difficult to compile in one volume all the possible techniques and design issues that arise in the multitude of application domains. We have attempted as much as possible to incorporate three main streams in this book: (1) From graphics to image, (2) From image to graphics, and (3) Applications of image and graphics integration.

The book, which is unique in its characters, is useful to graduate students and researchers in computer science, electrical engineering, systems science, and information technology not only as a reference book, but also as a textbook for some parts of the curriculum of courses in image processing and graphics. Researchers and practitioners in industry and R&D laboratories working in the fields of image processing, computer vision and graphics, system design, pattern recognition will also benefit from the new perspectives and techniques described in the book.

We take this opportunity to thank all the authors for agreeing to contribute chapters for the book. We owe a vote of thanks to Susan Lagerstrom-Fife and Sharon Palleschi of Kluwer Academic Publisher, USA, for taking the initiative in bringing the volume out. The technical/software support provided by Martin Kyle and Lily Yu is also acknowledged.

David Zhang
Mohamed Kamel
George Baci

November 2003

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