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**Volume I**

### Section 1
**Fundamental Concepts and Theories**

This section serves as a foundation for this extensive reference with chapters addressing the overall understanding of Image Processing and current trends in the field. The following chapters will discuss image analysis techniques, providing a framework on which subsequent sections will be built. Primary topics covered include image reconstruction, image analysis, 3D modeling, and object recognition and detection. In these 12 chapters, readers will obtain a clear understanding of the fundamental concepts and theories integral to the field of Image Processing.

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Section 2
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This section builds on the framework established in the first section in order to model techniques for the effective utilization of Image Processing technologies. Chapters in this section distill fundamental concepts into methodologies and applications, in particular the use of graph theory to assist in machine and computer vision applications. Topics covered range from abstract theories to best practices, from image compression benchmarks to object-detection methodologies. The 14 chapters that make up this section explore the development and design methodologies that bridge the gap between fundamental concepts and critical tools in Image Processing.

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Section 3
Frameworks and Methodologies

This section focuses primarily on Image Processing applications in robotics, computer vision, and machine learning. Techniques for utilizing mechanical, robotic, and digital tools to effectively automate and manage pattern recognition techniques form the backbone of this section. Applications include, in particular, gesture identification, mobile robotics, machine learning, and intravascular ultrasound, with additional implications in many other fields. With 10 chapters, this section offers a broad treatment of some of the many tools and technologies within Image Processing.

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This section applies the concepts and theories presented in the previous three sections to specific cases and scenarios making use of Image Processing techniques. In particular, the chapters in this section explore the use of imaging and pattern recognition technologies to improve the efficiency and effectiveness of diverse fields, such as medicine, agriculture, and manufacturing. From forensic anthropology and oncology to machine learning and computer vision, the topics covered in this section have implications across a variety of disciplines. The 15 chapters in this section provide an in-depth examination of the utilization and application of the fundamental principles of Image Processing.

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Emerging Trends
This section concludes the book with a look at how the field of Image Processing may evolve with the development of new applications and techniques. As was demonstrated in Section Five, the diversity of potential applications for image analysis techniques is vast, and future trends will build on present research in all of the areas previously discussed. Improved image segmentation, organ localization, 3D visualization, and computer vision techniques are just some of the topics covered in this section. The final 13 chapters of this extensive three-volume reference conclude with a detailed look at emerging trends in the field of Image Processing.

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