# Image Processing And Analysis: Variational, Pde, Wavelet, And Stochastic Methods

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At no other time in human history have the influence and impact of image processing on modern society, science, and technology been so explosive. Image processing has become a critical component in contemporary science and technology and has many important applications. This book develops the mathematical foundation of modern image processing and low-level computer vision, and presents a general framework from the analysis of image structures and patterns to their processing. The core mathematical and computational ingredients of several important image processing tasks are investigated. The book bridges contemporary mathematics with state-of-the-art methodologies in modern image processing while organizing the vast contemporary literature into a coherent and logical structure. Image processing has traditionally been built on the machinery of Fourier and spectral analysis; however, in the past few decades numerous novel competing methods and tools have emerged. These diversified approaches, although seemingly distinct, are in fact intrinsically connected. The authors integrate this diversity of modern image processing approaches by revealing the few common threads connecting them. Some newer emergent integration efforts have also been highlighted and analyzed. Image Processing and Analysis: Variational, PDE, Wavelet, and Stochastic Methods is systematic and well organized. The authors first investigate the geometric, functional, and atomic structures of images and then rigorously develop and analyze several image processors. The book is comprehensive and integrative, covering the four most powerful classes of mathematical tools in contemporary image analysis and processing while exploring their intrinsic connections and integration. The material is balanced in theory and computation, following a solid theoretical analysis of model building and performance with computational implementation and numerical examples. This book is written for graduate students and researchers in applied mathematics, computer science, electrical engineering, and other disciplines who are interested in problems in imaging and computer vision. It can be used as a reference by scientists with specific tasks in image processing, as well as by researchers with a general interest in finding out about the latest advances. Contents List of Figures; Preface; Chapter 1: Introduction; Chapter 2: Some Modern Image Analysis Tools; Chapter 3: Image Modeling and Representation; Chapter 4: Image Denoising; Chapter 5: Image Deblurring; Chapter 6: Image Inpainting; Chapter 7: Image Processing: Segmentation; Bibliography; Index.

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