Contents

1 **Introduction** 1
Geoff Dougherty

2 **Rapid Prototyping of Image Analysis Applications** 5
Cris L. Luengo Hendriks, Patrik Malm, and Ewert Bengtsson

3 **Seeded Segmentation Methods for Medical Image Analysis** 27
Camille Couprie, Laurent Najman, and Hugues Talbot

4 **Deformable Models and Level Sets in Image Segmentation** 59
Agung Alfiansyah

5 **Fat Segmentation in Magnetic Resonance Images** 89
David P. Costello and Patrick A. Kenny

6 **Angiographic Image Analysis** 115
Olena Tankyevych, Hugues Talbot, Nicolas Passat, Mariano Musacchio, and Michel Lagneau

7 **Detecting and Analyzing Linear Structures in Biomedical Images: A Case Study Using Corneal Nerve Fibers** 145
Mohammad A. Dabbah, James Graham, Rayaz A. Malik, and Nathan Efron

8 **High-Throughput Detection of Linear Features: Selected Applications in Biological Imaging** 167
Luke Domanski, Changming Sun, Ryan Lagerstrom, Dadong Wang, Leanne Bischof, Matthew Payne, and Pascal Vallotton

9 **Medical Imaging in the Diagnosis of Osteoporosis and Estimation of the Individual Bone Fracture Risk** 193
Mark A. Haidekker and Geoff Dougherty

10 Applications of Medical Image Processing in the Diagnosis and Treatment of Spinal Deformity 227
Clayton Adam and Geoff Dougherty

11 Image Analysis of Retinal Images 249
Michael J. Cree and Herbert F. Jelinek

12 Tortuosity as an Indicator of the Severity of Diabetic Retinopathy ... 269
Michael Iorga and Geoff Dougherty

13 Medical Image Volumetric Visualization: Algorithms, Pipelines, and Surgical Applications 291
Qi Zhang, Terry M. Peters, and Roy Eagleson

14 Sparse Sampling in MRI 319
Philip J. Bones and Bing Wu

15 Digital Processing of Diffusion-Tensor Images of Avascular Tissues 341
Konstantin I. Momot, James M. Pope, and R. Mark Wellard

Index 373