Image Reconstruction: Applications in Medical Sciences (De Gruyter Textbook)

Gengsheng Lawrence Zeng

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This book introduces the classical and modern image reconstruction technologies. It covers topics in two-dimensional (2D) parallel-beam and fan-beam imaging, three-dimensional (3D) parallel ray, parallel plane, and cone-beam imaging. Both analytical and iterative methods are presented. The applications in X-ray CT, SPECT (single photon emission computed tomography), PET (positron emission tomography), and MRI (magnetic resonance imaging) are discussed. Contemporary research results in exact region-of-interest (ROI) reconstruction with truncated projections, Katsevich s cone-beam filtered backprojection algorithm, and reconstruction with highly under-sampled data are included.

The last chapter of the book is devoted to the techniques of using a fast analytical algorithm to reconstruct an image that is equivalent to an iterative reconstruction. These techniques are the author s most recent research results.

This book is intended for students, engineers, and researchers who are interested in medical image reconstruction. Written in a non-mathematical way, this book provides an easy access to modern mathematical methods in medical imaging.

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