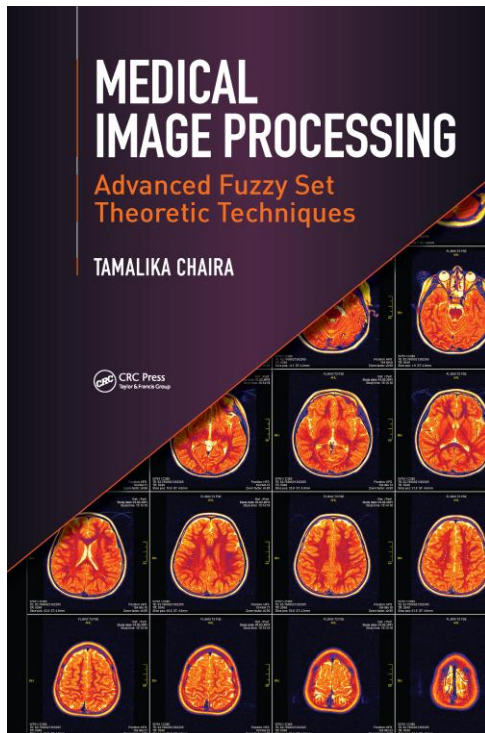


TAMALIKA CHAIRA MEDICAL IMAGE PROCESSING ADVANCED FUZZY SET THEORETIC TECHNIQUES



CRC Press
ISBN 9781498700450
Hard cover
236 pages
January 2015

Medical images are, usually, poorly illuminated, and thus many structures are not clearly visible. Therefore, sets that reflect better and inherently include various kinds of uncertainties may be useful for medical image analysis. Fuzzy sets and their extensions are particularly suitable for the task. In the recent years there has been an explosion of interest in advanced fuzzy set theories—such as intuitionistic fuzzy and Type II fuzzy set – that represent uncertainty in a better way.

Medical Image Processing: Advanced Fuzzy Set Theoretic Techniques deals with the application of intuitionistic fuzzy and Type II fuzzy set theories for medical image analysis. Aimed mainly at graduate and doctorate students, this book gives a brief introduction to advanced fuzzy sets (intuitionistic fuzzy sets, Type II fuzzy sets), fuzzy/intuitionistic fuzzy aggregation operators, and distance/similarity measures. It introduces medical image enhancement employing advanced fuzzy sets. Illustrative MATLAB®-based examples are provided for increasing the contrast of the images. Intuitionistic fuzzy and Type II fuzzy thresholding techniques that separate different regions/leukocyte types/abnormal lesions are discussed. Clustering of unwanted lesions/regions even in the presence of noise by applying intuitionistic fuzzy clustering is demonstrated.

The edges of poorly illuminated images are considered and intuitionistic fuzzy edge detection to find the edges of different regions is demonstrated. Fuzzy mathematical morphology applications to medical image processing using the Lukasiewicz operator, t-norms, and t-conorms are explored

Medical Image Processing: Advanced Fuzzy Set Theoretic Techniques can be used not only by students, but also by teachers, engineers, scientists, and those interested in the field of medical image analysis. A basic knowledge of fuzzy set is required, along with a solid understanding of mathematics and image processing.



Table of Contents

Preface xiii

Chapter 1 Intuitionistic Fuzzy Set and Type II Fuzzy Set..... 1

Chapter 2 Medical Image Processing 23

Chapter 3 Fuzzy and Intuitionistic Fuzzy Operators with Application in Decision-Making . 39

Chapter 4 Similarity, Distance Measures and Entropy..... 63

Chapter 5 Image Enhancement..... 83

Chapter 6 Thresholding of Medical Images 109

Chapter 7 Clustering of Medical Images 149

Chapter 8 Edge Detection..... 169

Chapter 9 Fuzzy Mathematical Morphology 191