Adaptive Image Processing: A Computational Intelligence Perspective (Image Processing Series)

Ling Guan, Stuart William Perry, Hau San Wong

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Adaptive image processing is one of the most important techniques in visual information processing, especially in early vision such as image restoration, filtering, enhancement, and segmentation. While existing books present some important aspects of the issue, there is not a single book that treats this problem from a viewpoint that is directly linked to human perception - until now.

This reference treats adaptive image processing from a computational intelligence viewpoint, systematically and successfully, from theory to applications, using the synergies of neural networks, fuzzy logic, and evolutionary computation. Based on the fundamentals of human perception, this book gives a detailed account of computational intelligence methods and algorithms for adaptive image processing in regularization, edge detection, and early vision.

Adaptive Image Processing: A Computational Intelligence Perspective consists of 8 chapters:

Chapter 1 - Provides material of an introductory nature to describe the basic concepts and current state-of-the-art in the field of computational intelligence for image restoration and edge detection
Chapter 2 - Gives a mathematical description of the restoration problem from the neural network perspective, and describes current algorithms based on this method
Chapter 3 - Extends the algorithm presented in chapter 2 to implement adaptive constraint restoration methods for both spatially invariant and spatially variant degradations
Chapter 4 - Utilizes a perceptually motivated image error measure to introduce novel restoration algorithms
Chapter 5 - Examines how model-based neural networks can be used to solve image restoration problems
Chapter 6 - Probes image restoration algorithms, making use of the principles of evolutionary computation
Chapter 7 - Explores the difficult concept of image restoration when insufficient knowledge of the degrading function is available
Chapter 8 - Studies the subject of edge detection and characterization using model-based neural networks

The first to treat adaptive image processing from a computational intelligence perspective, this work provides an excellent reference in R&D practice to researchers and IT technologists, is most suitable for teaching image processing and applied neural network courses, and will be of equal value for technical managers and executives in industries where intelligent visual information processing is required.

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