METADATA

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Authors: Maragos, P., Professor, NTUA

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Abstract

This book is a postgraduate-level textbook that bridges theory and applications on selected topics in computer vision and machine learning. The first part (Chapters 1–5) develops the theoretical foundations, covering linear operators and Hilbert spaces, least-squares methods and SVD for ill-posed problems, regression and PCA, elements of abstract algebra for vision and robotics, nonlinear operators from mathematical morphology and tropical algebra on lattice spaces, and theoretical analysis of fractals for vision and signal processing. The second part (Chapters 6–9), co-authored with collaborators, focuses on modern deep learning applications, including deep neural networks for object detection and image segmentation, action and gesture recognition for human–machine interaction, visual emotion recognition, and 3D models for deformable objects. Appendices provide supporting mathematical tools, making the book a comprehensive resource for students with prior background in linear algebra, image processing, and machine learning.

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