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Autore	Jeong Hong
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3.8 Multidimensional Array; 3.9 Queue; 3.10 Stack; 3.11 Linear Systolic Array; Problems; References; 4 Verilog Vision Simulator; 4.1 Vision Simulator; 4.2 Image Format Conversion; 4.3 Line-based Vision Simulator Principle; 4.4 LVSIM Top Module; 4.5 LVSIM IO System; 4.6 LVSIM RAM and Processor; 4.7 Frame-based Vision Simulator Principle; 4.8 FVSIM Top Module; 4.9 FVSIM IO System; 4.10 FVSIM RAM and Processor; 4.11 OpenCV Interface; Problems; References; Part Two Vision Principles; 5 Energy Function; 5.1 Discrete Labeling Problem; 5.2 MRF Model; 5.3 Energy Function; 5.4 Energy Function Models; 5.5 Free Energy; 5.6 Inference Schemes; 5.7 Learning Methods; 5.8 Structure of the Energy Function; 5.9 Basic Energy Functions; Problems; References; 6 Stereo Vision; 6.1 Camera Systems; 6.2 Camera Matrices; 6.3 Camera Calibration; 6.4 Correspondence Geometry; 6.5 Camera Geometry; 6.6 Scene Geometry; 6.7 Rectification; 6.8 Appearance Models; 6.9 Fundamental Constraints; 6.10 Segment Constraints; 6.11 Constraints in Discrete Space; 6.12 Constraints in Frequency Space; 6.13 Basic Energy Functions; Problems; References; 7 Motion and Vision Modules; 7.1 3D Motion; 7.2 Direct Motion Estimation; 7.3 Structure from Optical Flow; 7.4 Factorization Method; 7.5 Constraints on the Data Term; 7.6 Continuity Equation; 7.7 The Prior Term; 7.8 Energy Minimization; 7.9 Binocular Motion; 7.10 Segmentation Prior; 7.11 Blur Diameter; 7.12 Blur Diameter and Disparity; 7.13 Surface Normal and Disparity; 7.14 Surface Normal and Blur Diameter; 7.15 Links between Vision Modules; Problems; References; Part Three Vision Architectures; 8 Relaxation for Energy Minimization; 8.1 Euler-Lagrange Equation of the Energy Function; 8.2 Discrete Diffusion and Biharmonic Operators; 8.3 SOR Equation; 8.4 Relaxation Equation

Sommario/riassunto

This book provides comprehensive coverage of 3D vision systems, from vision models and state-of-the-art algorithms to their hardware architectures for implementation on DSPs, FPGA and ASIC chips, and GPUs. It aims to fill the gaps between computer vision algorithms and real-time digital circuit implementations, especially with Verilog HDL design. The organization of this book is vision and hardware module directed, based on Verilog vision modules, 3D vision modules, parallel vision architectures, and Verilog designs for the stereo matching system with various parallel architectures. It provide
