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Thresholding; 4.3.1 Adaptive Thresholding; 4.3.2 Band Thresholding; 4.3.3 Semi-thresholding; 4.3.4 Multispectral Thresholding; 4.4 Mathematical Morphology; 4.4.1 Dilation; 4.4.2 Erosion; 4.4.3 Opening and Closing; 4.4.4 Grey-scale and Colour Morphology; 4.5 Connectivity; 4.5.1 Connectedness: Paradoxes and Solutions; 4.5.2 Connected Components Analysis; 5 Geometric Transformations; 5.1 Problem Specification and Algorithm; 5.2 Affine Transformations; 5.2.1 Known Affine Transformations; 5.2.2 Unknown Affine Transformations 5.3 Perspective Transformations 5.4 Specification of More Complex Transformations; 5.5 Interpolation; 5.5.1 Nearest Neighbour Interpolation; 5.5.2 Bilinear Interpolation; 5.5.3 Bi-Cubic Interpolation; 5.6 Modelling and Removing Distortion from Cameras; 5.6.1 Camera Distortions; 5.6.2 Camera Calibration and Removing Distortion; 6 Edges; 6.1 Edge Detection; 6.1.1 First Derivative Edge Detectors; 6.1.2 Second Derivative Edge Detectors; 6.1.3 Multispectral Edge Detection; 6.1.4 Image Sharpening; 6.2 Contour Segmentation; 6.2.1 Basic Representations of Edge Data; 6.2.2 Border Detection 6.2.3 Extracting Line Segment Representations of Edge Contours 6.3 Hough Transform; 6.3.1 Hough for Lines; 6.3.2 Hough for Circles; 6.3.3 Generalised Hough; 7 Features; 7.1 Moravec Corner Detection; 7.2 Harris Corner Detection; 7.3 FAST Corner Detection; 7.4 SIFT; 7.4.1 Scale Space Extrema Detection; 7.4.2 Accurate Keypoint Location; 7.4.3 Keypoint Orientation Assignment; 7.4.4 Keypoint Descriptor; 7.4.5 Matching Keypoints; 7.4.6 Recognition; 7.5 Other Detectors; 7.5.1 Minimum Eigenvalues; 7.5.2 SURF; 8 Recognition; 8.1 Template Matching; 8.1.1 Applications; 8.1.2 Template Matching Algorithm 8.1.3 Matching Metrics

Sommario/riassunto

Explains the theory behind basic computer vision and provides a bridge from the theory to practical implementation using the industry standard. OpenCV libraries Computer Vision is a rapidly expanding area and it is becoming progressively easier for developers to make use of this field due to the ready availability of high quality libraries (such as OpenCV 2). This text is intended to facilitate the practical use of computer vision with the goal being to bridge the gap between the theory and the practical implementation of computer vision. The book will explain how to use the relevant OpenCV library routines and will be accompanied by a full working program including the code snippets from the text. This textbook is a heavily illustrated, practical introduction to an exciting field, the applications of which are becoming almost ubiquitous. We are now surrounded by cameras, for example cameras on computers & tablets/ cameras built into our mobile phones/ cameras in games consoles; cameras imaging difficult modalities (such as ultrasound, X-ray, MRI) in hospitals, and surveillance cameras. This book is concerned with helping the next generation of computer developers to make use of all these images in order to develop systems which are more intuitive and interact with us in more intelligent ways. Explains the theory behind basic computer vision and provides a bridge from the theory to practical implementation using the industry standard. OpenCV libraries offers an introduction to computer vision, with enough theory to make clear how the various algorithms work but with an emphasis on practical programming issues. Provides enough material for a one semester course in computer vision at senior undergraduate and Masters levels. Includes the basics of cameras and images and image processing to remove noise, before moving on to topics such as image histogramming; binary imaging; video processing to detect and model moving objects; geometric operations & camera models; edge detection; features detection; recognition in images. Contains a large

number of vision application problems to provide students with the opportunity to solve real problems. Images or videos for these problems are provided in the resources associated with this book.
