PART

3D vision and motion

4

Part 4 covers the developments needed for an understanding of real scenes, which necessarily contain 3D objects—a number of which may be in motion. 3D vision is considerably more complex than 2D vision, not least because the number of degrees of freedom of an object will typically have increased from three to six, with an accompanying combinatorial increase in the number of scene configurations to be considered.

This part of the book starts (Chapter 16: The three-dimensional world) by airing the problems, before considering the complexities of full perspective projection (Chapter 17: Tackling the perspective n*-point problem). Next, it is*

useful to see what shortcuts can be achieved by taking invariants into account (Chapter 18: Invariants and perspective). Chapter 19, Image transformations and camera calibration, deals with camera calibration but also shows how recent research has attempted to avoid the need for explicit calibration by making careful computations that interrelate multiple scenes: here the emphasis is on taking opportunities that permit some of the complexities to be bypassed. Finally, Chapter 20, Motion, examines the problems of motion in the context of 3D vision.