

Grimson

## Object Recognition by Computer - The Role of Geometric Constraints

This book describes an extended series of experiments into the role of geometry in the critical area of object recognition. With contributions from Tomás Lozano Pérez and Daniel P. Huttenlocher. An intelligent system must know what the objects are and where they are in its environment. Examples of this ubiquitous problem in computer vision arise in tasks involving hand-eye coordination (such as assembling or sorting), inspection tasks, gauging operations, and in navigation and localization of mobile robots. This book describes an extended series of experiments into the role of geometry in the critical area of object recognition. It provides precise definitions of the recognition and localization problems, describes the methods used to address them, analyzes the solutions to these problems, and addresses the implications of this analysis. The solution to problems of object recognition are of fundamental importance in many real applications and versions of the techniques described here are already being used in industrial settings. Although a number of questions remain to be solved, the authors provide a valuable framework for understanding both the strengths and limitations of using object shape to guide recognition. Contents Introduction • Recognition as a Search Problem • Searching for Correspondences • Two-Dimensional Constraints • Three-Dimensional Constraints • Verifying Hypotheses • Controlling the Search Explosion • Selecting Subspaces of the Search Space • Empirical Testing • The Combinatorics of the Matching Process • The Combinatorics of Hough Transforms • The Combinatorics of Verification • The Combinatorics of Indexing • Evaluating the Methods • Recognition from Libraries • Parameterized Objects • The Role of Grouping • Sensing Strategies • Applications • The Next Steps



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