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Computer Vision

Three-Dimensional Data from Images

- *** A well-balanced textbook with theoretical foundations and algorithms * contains many hints on how to apply the discussed approaches * theoretical and applied exercises accompany each chapter**

This computer vision textbook describes the reconstruction of object surfaces and the analysis of distances between camera and objects. Main topics are static and dynamic stereo analysis, shape from shading, photometric stereo analysis, and structured illumination. The selected procedures, e.g., complex algorithms as Tsai calibration, Frankot-Chellapa depth map generation, or Lee-Rosenfield shape from shading, are discussed at a detailed level such that implementations can follow the given descriptions. Fundamentals are given for these application oriented approaches with respect to camera modeling and calibration, to geometric surface modeling, and to surface reflectance models. New research and laboratory results in shape reconstruction and depth analysis, e.g., based on color images have been included. The text is suitable for graduate courses in computer science, in several engineering disciplines, or in applied mathematics. Theoretical and applied exercises accompany each chapter.

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