Blake / Zisserman / Bobrow

Visual Reconstruction

Visual Reconstruction presents a unified and highly original approach to the treatment of continuity in vision. It introduces, analyzes, and illustrates two new concepts. The first—the weak continuity constraint—is a concise, computational formalization of piecewise continuity. It is a mechanism for expressing the expectation that visual quantities such as intensity, surface color, and surface depth vary continuously almost everywhere, but with occasional abrupt changes. The second concept—the graduated nonconvexity algorithm—arises naturally from the first. It is an efficient, deterministic (nonrandom) algorithm for fitting piecewise continuous functions to visual data. The book first illustrates the breadth of application of reconstruction processes in vision with results that the authors' theory and program yield for a variety of problems. The mathematics of weak continuity and the graduated nonconvexity (GNC) algorithm are then developed carefully and progressively.Contents Modeling Piecewise Continuity • Applications of Piecewise Continuous Reconstruction • Introducing Weak Continuity Constraints • Properties of the Weak String and Membrane • Properties of Weak Rod and Plate • The Discrete Problem • The Graduated Nonconvexity (GNC) Algorithm • Appendixes: Energy Calculations for the String and Membrane • Noise Performance of the Weak Elastic String • Energy Calculations for the Rod and Plate • Establishing Convexity • Analysis of the GNC Algorithm Visual Reconstruction is included in the Artificial Intelligence series, edited by Michael Brady and Patrick Winston.



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