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Applications of Invariance in Computer Vision

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Preface

This book is the proceedings of the Second Joint European–US Workshop on "Applications of Invariance in Computer Vision", held in Ponta Delgada, Azores during October 1993.

The First Workshop, held in Reykjavik, Iceland 1991, and subsequent proceedings, demonstrated the fruitfulness of using projective geometry and geometric invariance in computer vision. At that time, some areas, such as projective geometry and the classical theory of algebraic invariance, were well understood, while other issues such as invariants of 3D structures and recognition using invariants were only just emerging. Consequently, study and implementation initially focused on the planar case, since many invariants for the projective plane were known. Invariants then were primarily for sets of points, lines and conics in the plane, and their derivation largely based on geometric constructions. Ideas on 3D curved objects were sketchy and there was a lack of statistical analysis, except for a few empirical studies.

Now, a host of single view invariants for non-algebraic curves and 3D smooth surfaces are available. A sophisticated algebraic structure has developed, complementing geometric constructions, for modelling and partitioning camera projections, and the projective relationships among sets of cameras. New areas and applications, particularly the use of uncalibrated stereo in robotic navigation and surveillance, have proven feasible. These significant advances since the Reykjavik Workshop are extensively documented in this volume.

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