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# Statistical and Geometrical Approaches to Visual Motion Analysis

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# Preface

Motion analysis is central to both human and machine vision. It involves the interpretation of image data over time and is crucial for a range of motion tasks such as obstacle detection, depth estimation, video analysis, scene interpretation, video compression and other applications. Motion analysis is unsolved because it requires modeling of the complicated relationships between the observed image data and the motion of objects and motion patterns (e.g., falling rain) in the visual scene.

The Dagstuhl Seminar 08291 on *Statistical and Geometrical Approaches to Visual Motion Analysis* was held during July 13–18, 2008 at the International Conference and Research Center (IBFI), Schloss Dagstuhl, near Wadern in Germany. The workshop focused on critical aspects of motion analysis, including motion segmentation, the modeling of motion patterns and the different techniques used. These techniques include variational approaches, level set methods, probabilistic models, graph cut approaches, factorization techniques, and neural networks. All these techniques can be subsumed within statistical and geometrical frameworks. We further involved experts in the study of human and primate vision. Primate visual systems are extremely sophisticated at processing motion, thus there is much to be learnt from studying them. In particular, we discussed how to relate the computational models of primate visual systems to those developed for machine vision.

In total, 15 papers were accepted for these proceedings after the workshop. We were careful to ensure a high standard of quality for the accepted papers. All submissions were double-blind reviewed by at least two experts. The accepted papers reflect the state of the art in the field and cover various topics related to motion analysis. The papers in this volume are classified into four categories based on the topics *optic flow and extensions*, *human motion modeling*, *biological and statistical approaches* and *alternative approaches to motion analysis*.

We would like to thank the team at castle Dagstuhl for the professional support before, after and during the seminar. We are grateful to the participants of the Dagstuhl workshop for their active discussions and commitment during the seminar and for the remarkable efforts and the quality of timely delivered reviews. Apart from all the authors, we would like to also thank Christoph Garbe, Timo Kohlberger and Thomas Schoenemann for providing additional reviews.

The organization of this event would not have been possible without the effort and the enthusiasm of several people, and we thank all who contributed.

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