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Efficient Algorithms for Global Optimization Methods in Computer Vision

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Preface

Most of the leading algorithms in computer vision are based on global optimization methods. Such methods compute the solution of a given problem as minimizer of a suitable cost functional that penalizes deviations from previously made assumptions and integrates them in a global manner, i.e., over the entire image domain. Since this way of modelling is very transparent and intuitive, it is not surprising that such methods have become popular and successful tools to tackle many fundamental problems in computer vision such as, e.g., motion estimation, stereo reconstruction, image restoration, and object segmentation. However, there is also a price to pay when employing global optimization methods. The corresponding cost functionals often lead to optimization problems that are both mathematically challenging and computationally expensive.

In order to discuss recent advances and challenges in the design and the solution of global optimization methods, Dagstuhl Seminar 11471 on *Efficient Algorithms for Global Optimisation Methods in Computer Vision* was held during November 20–25, 2011, at the International Conference and Research Center (IBFI), Schloss Dagstuhl, near Wadern in Germany. The seminar focused on the *entire* algorithmic development pipeline for global optimization problems in computer vision: *modelling, mathematical analysis, numerical solvers,* and *parallelization.* In particular, the goal of the seminar was to bring together researchers from all four fields to analyze and discuss the connections between the different stages of the algorithmic design pipeline. The seminar included researchers from the fields of *computer science* and *mathematics alike.*

From all submissions, eight high-quality full articles were finally accepted after a strict reviewing process. Each article was reviewed by at least two international experts in the field and only articles with exclusively positive reviews were accepted for publication. The accepted articles reflect the state of the art in the field and focus on recent developments in efficient approaches for continuous optimization and related parallelization aspects on high-end cluster systems.

We would like to thank the team at castle Dagstuhl for the professional support and the perfect atmosphere during the seminar. Furthermore, we would like to thank the participants of the Dagstuhl seminar for their active discussions, their dedication during the seminar as well as for the quality of their timely reviews. Apart from all authors, we would also like to thank Ke Chen and Martin Welk for providing additional reviews. The organization of this event would not have been possible without the effort and the enthusiasm of many people. We would like to thank all who contributed to the success of this seminar.

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