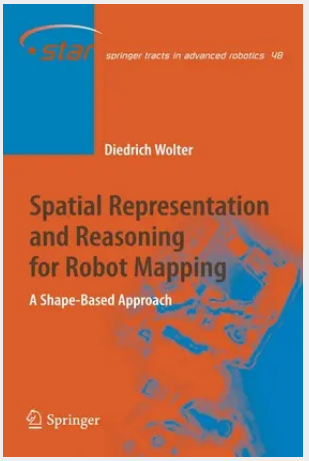
Wolter

Spatial Representation and Reasoning for Robot Mapping

A Shape-Based Approach



This book demonstrates bene?ts of abstract and qualitative reasoning that have not received much attention in the context of autonomous robotics before. Bremen, Christian Freksa December 2007 Director of the SFB/TR 8 Spatial Cognition Preface This book addresses spatial representations and reasoning techniques for - bile robot mapping, providing an analysis of fundamental representations and processes involved. A spatial representation based on shape information is p- posed and shape analysis techniques are developed to tackle the correspondence problem in robot mapping. A general mathematical formulation is presented to provide the formal ground for an e?cient matching of con?gurations of objects. This book is a slightly revised version of my doctoral thesis submitted to the Faculty of Mathematics and Computer Science of the University of Bremen, Germany. Manycontributeto the developmentofa dissertation,butsomeofthemstand out. Christian Freksa, I thank you for supporting and encouraging my work, for introducing me to interdisciplinary work, for giving me the freedom to develop this dissertation, and for providing an enjoyable atmosphere to work in. Longin Jan Latecki, thank you for countless in-depth discussions helping me to develop andtopositionmywork,forthefruitfulcollaboration,andformakingaresearch stay possible that has been very valuable to me. I thank the research groups in Bremen and Philadelphia for helpful discussions and feedback, in particular Jan Oliver Wallgrun. ¨ I also thank Kai-Florian Richter, Sven Bertel, and Lutz Frommberger for feedback on this work. Robert Ross, thank you for helping to proof-read this dissertation.

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