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3.3 Efficient State and Covariance Recovery3.3.1 Recovery Using the Preconditioned Conjugated Gradient (PCG) Method; 3.3.2 Recovery Using Complete Cholesky Factorization; 3.4 Implementation Issues; 3.4.1 Admissible Measurements; 3.4.2 Data Association; 3.5 Computer Simulations; 3.6 Experimental Evaluation; 3.6.1 Experiment in a Small Environment; 3.6.2 Experiment Using the Victoria Park Dataset; 3.7 Computational Complexity; 3.7.1 Storage; 3.7.2 Localization; 3.7.3 Mapping; 3.7.4 State and Covariance Recovery; 3.8 Consistency of D-SLAM; 3.9 Bibliographical Remarks; 3.10 Summary
Chapter 4 D-SLAM Local Map Joining Filter4.1 Structure of D-SLAM Local Map Joining Filter; 4.1.1 State Vectors; 4.1.2 Relative Information Relating Feature Locations; 4.1.3 Combining Local Maps Using Relative Information; 4.2 Obtaining Relative Location Information in Local Maps; 4.2.1 Generating a Local Map; 4.2.2 Obtaining Relative Location Information in the Local Map; 4.3 Global Map Update; 4.3.1 Measurement Model; 4.3.2 Updating the Global Map; 4.3.3 Sparse Information Matrix; 4.4 Implementation Issues; 4.4.1 Robot Localization; 4.4.2 Data Association; 4.4.3 State and Covariance Recovery
4.4.4 When to Start a New Local Map4.5 Computational Complexity; 4.5.1 Storage; 4.5.2 Local Map Construction; 4.5.3 Global Map Update; 4.5.4 Rescheduling the Computational Effort; 4.6 Computer Simulations; 4.6.1 Simulation in a Small Area; 4.6.2 Simulation in a Large Area; 4.7 Experimental Evaluation; 4.8 Bibliographical Remarks; 4.9 Summary; Chapter 5 Sparse Local Submap Joining Filter; 5.1 Structure of Sparse Local Submap Joining Filter; 5.1.1 Input to SLSJF - Local Maps; 5.1.2 Output of SLSJF - One Global Map; 5.2 Fusing Local Maps into the Global Map
5.2.1 Adding XG(k+1)s into the Global Map

Sommario/riassunto

Simultaneous localization and mapping (SLAM) is a process where an autonomous vehicle builds a map of an unknown environment while concurrently generating an estimate for its location. This book is concerned with computationally efficient solutions to the large scale SLAM problems using exactly sparse Extended Information Filters (EIF). The invaluable book also provides a comprehensive theoretical analysis of the properties of the information matrix in EIF-based algorithms for SLAM. Three exactly sparse information filters for SLAM are described in detail, together with two efficient and exact methods for recovering the state vector and the covariance matrix. Proposed algorithms are extensively evaluated both in simulation and through experiments.