



GMapping

GMapping is a highly efficient Rao-Blackwellized particle filter to learn grid maps from laser range data.

Authors

[Giorgio Grisetti](#); [Cyrill Stachniss](#); [Wolfram Burgard](#);

[Get the Source Code!](#)

Long Description

Recently Rao-Blackwellized particle filters have been introduced as effective means to solve the simultaneous localization and mapping (SLAM) problem. This approach uses a particle filter in which each particle carries an individual map of the environment. Accordingly, a key question is how to reduce the number of particles. We present adaptive techniques to reduce the number of particles in a Rao-Blackwellized particle filter for learning grid maps. We propose an approach to compute an accurate proposal distribution taking into account not only the movement of the robot but also the most recent observation. This drastically decreases the uncertainty about the robot's pose in the prediction step of the filter. Furthermore, we apply an approach to selectively carry out re-sampling operations which seriously reduces the problem of particle depletion.

Example Images



Nice 3d view of the best particle mapping the Intel Research Lab



Map of the Freiburg Campus



Map of the MIT Killian Court

Input Data

The approach takes raw laser range data and odometry. This version is optimized for long-range laser scanners like SICK LMS or PLS scanner. Short range lasers like Hokuyo scanner will not work that well with the standard parameter settings.

Logfile Format

Carmen log format

Type of Map

grid maps

Hardware/Software Requirements

Linux/Unix, GCC 3.3/4.0.x

CARMEN (latest version)

Quick Install-Guide using bash: `./configure; . ./setlibpath; make;`

Papers Describing the Approach

Giorgio Grisetti, Cyrill Stachniss, and Wolfram Burgard: Improved Techniques for Grid Mapping with Rao-Blackwellized Particle Filters, IEEE Transactions on Robotics, Volume 23, pages 34-46, 2007 ([link](#))

Giorgio Grisetti, Cyrill Stachniss, and Wolfram Burgard: Improving Grid-based SLAM with Rao-Blackwellized Particle Filters by Adaptive Proposals and Selective Resampling, In Proc. of the IEEE International Conference on Robotics and Automation (ICRA), 2005 ([link](#))

Further Reading

A. Doucet: On sequential simulation-based methods for bayesian filtering, Technical report, Signal Processing Group, Dept. of Engineering, University of Cambridge, 1998

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Further Information

The SLAM approach is available as a library and can be easily used as a black box. Making changes to the algorithm itself, however, requires quite some C++ experience.

Further Links

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