

Interval Analysis for Kidnapping Problem using Range Sensors.

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Abstract

The problem addressed is the global localization problem, or kidnapping problem.

We consider that a wheeled robot with a LIDAR (Light Detection And Ranging) sensor is placed in an unknown pose (orientation and position) in an indoor environment. We also consider that a discrete map of the environment is known. The robot has to localize itself (find its position (x, y) and its orientation) in the map according to the sensor measurements.

In the proposed method the global localization problem is seen as a Constraint Satisfaction Problem. Interval analysis techniques are used to obtain all the feasible poses of the robot consistent with the sensor measurements and the map.

This method is efficient in symmetric environment and is also robust according to outliers from the sensor measurements. A simulator shows the efficiency of the proposed method. Those results are promising and lead us to think that this method can be reliable in a real context.