

Servicerobotik Autonome Mobile Serviceroboter

Lifelong Localization of a Mobile Service-Robot in Everyday Indoor Environments Using Omnidirectional Vision

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Outline

- System Overview
- Problem description
- Method
 - Landmark rating and selection
- Results
 - Real world experiment
- Conclusions





System Overview







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Which Landmark has a low benefit?





Which Landmark has a low benefit?





Landmark rating and selection



- The position of a landmark does not itself give a hint on its usefulness for localizing a robot.
- In fact, we require to know the poses from which a landmark can be observed to know in which parts of an environment this landmark can be used for localization purposes.
- represent the observability region of each landmark by calculating arithmetic mean of the observation poses

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Which Landmark has a low benefit?

Which Landmark has a low benefit?

Everyday Indoor Environment

Mobile Robot Pioneer 3DX

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Results: Localization Quality

DBSCAN clustering based limitation with a maximum of 150 landmarks Hochschule Ulm

Results: Localization Quality

Results: Landmark Coverage

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Results: Localization Quality

Eigenvalues of the robot position covariance matrix during the run without landmark limitation (top) and with restricted number of landmarks (bottom).

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Video: Visual SLAM in everyday environments

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Conclusions

- The proposed approach covers the operational area with landmarks in such a way that a minimum localization quality is achieved in the whole map
- Our approach to handle the problem of an ever growing number of landmarks is a further step towards lifelong operation.
- The approach can be used with all kinds of featurebased EKF SLAM approaches.

Questions?

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