Where am i

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Abstract—This project discusses the Problem of localization and gives an approach to solve the it in simulation in a ROS using Gazebo and RViz .i will use Adaptive Monte Carlo Localization (AMCL) algorithm with a navigation plugin to navigate the Robot in a maze to reach a predefined goal

1 Introduction

THE when the robot wants to localize itself, it uses the sensor and a given map but due to the uncertainty of measurements and errors in actuators we use some algorithms to determine where the robot currently is

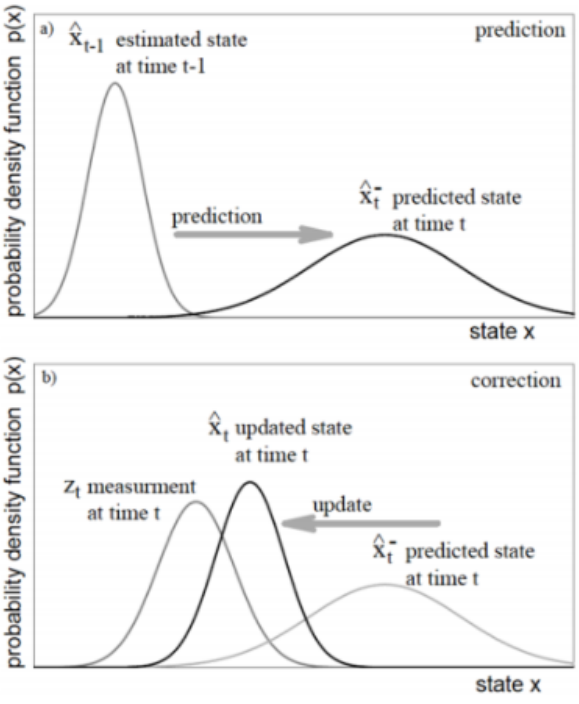
2 Background

Adaptive Monte Carlo Localization was chosen in this approach i will briefly explain some techniques used in localization problem

2.1 Kalman Filters

- I. prediction (propagation)
- II. update (correction)

filter.png



[1]

Kalman Filters are part of Bayesian Filter family Handle uncertainty by assuming Gaussian distribution modeling state and covariances Optimal for time discrete, linear processes, i.e., they minimize the quadratic error of state estimation Extensions exist for non-linear processes (Extended, Unscented Kalmanfilters)

2.2 Particle Filters

The Particle Filter spreads randomly particles within the entire state space. each of which represents a guess of where the Robot could be and it's orientation , in addition it has a weight corresponds to the accuracy of each guess working process :

- spread Particles randomly and uniformly over the entire pose space.
- update Measurement and assign an importance weight to each particle
- update motion and obtain new particle set with uniform weights and high number of particles around the three most likely places in re-sampling phase
- Measurement assigns non-uniform weight to the particle set
- Motion is updated and a new resampling step is about to start

[2]

3 Results

both robots could rich the goal

3.1 Topics

- Which robot performed better?
- both were performed well and avoided the wall and folled the trajectory
- AMCL cant't be used to solve the kidnapped robot problem.

3.2 Hardware Deployment

1) The two project models are deployed on Udacity Workspace

References

[1] *introduction to Robotics free university Berlin.*
[2] *Udcity ClassRoom.*