

Assignment 3

Due date: 11/06/2014

1

A clustering technique such as K-means can be used to select cluster with highest weights (heaviest cluster) and sum over particles.

Kernel density estimation. A gaussian function can be applied to each particle.

The weighted sum may be used to estimate the mean position of the robot.

2

The relative distance of a particle to the observed landmarks are calculated using its "virtual" sensors. The robot takes distance measurements using its sensors and compares these values to those generated by each particle to calculate the error. Essentially particles that are closest to the robot's position or those co-located with the robot are given higher weights. Through resampling, particles with higher weights will survive over time. Using the resampled particles, the XY position of the robot can be determined.

3

At different time intervals, re-sampling is used to discard old particles and inject new particles resulting in a restriction and diversification of the sample space. This works for systems with low dimensions, on the contrary this approach is slow in large scale systems with high dimensionality due to slow convergence rates.