LOCALIZATION METHODS FOR MOBILE ROBOTS

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ABSTRACT

Localization aims to provide the best estimate of the robot pose. It is a crucial algorithm in every robotics application, since its output directly determines the inputs of the robot to be controlled in its configuration space. In real world of engineering the robot dynamics related measurements are subject to both uncertainties and disturbances. These error sources yield unreliable inferences of the robot state, which inherently result in wrong consensus about the appropriate control strategy to be applied. This outcome may drive the system out of stability and damage both the physical system and its environment. The localization algorithm captures the uncertainties with probabilistic approaches. Namely, the measurement processes are modelled along with their unreliability, moreover, the synergy of multiple information sources is formulated with the aim to calculate the most probable estimate of the robot pose. In essence, this algorithm is composed of two main parts, i.e., first the dynamics of the system is derived, and the corresponding uncertainties are initially predicted, next the additional sensor information is incorporated in the algorithm to refine the posterior estimate. This approach provides the state-of-the-art solution for the derivation of mobile robot poses in real applications.

Keywords: mobile robot, pose estimation, state estimation, bayes state estimation framework, localization