



Probabilistic Joint State Estimation of Robot and Non-static Objects for Mobile Manipulation

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Abstract- In this paper, a unified and probabilistic method is proposed for simultaneously localization of a mobile service robot and states estimation of surrounding objects and co-existing people. This method allows intelligent robots to navigate reliably in dynamic environments and provide home-care services based on joint localization results. The algorithm makes use of probabilistic model to represent non-static people and objects states. Moreover, Rao-Blackwellized particle filters (RBPFs) are utilized for efficient joint estimation and laser sensing based smooth observation model is also introduced. The resulting algorithm works in real-time and estimates the position of people and state of doors with sufficient precision. Our approach has been tested in typical indoor environment with people, doors and other non-static objects. Experimental results demonstrate the favorable performance of the position estimation accuracy as well as the capability to deal with the uncertainty of mobile sensing.

Index terms: Intelligent robot, localization, mobile manipulation, laser sensing, particle filters.