

Knowledge representations for planning manipulation tasks

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Abstrak

In this book, the capability map, a novel general representation of the kinematic capabilities of a robot arm, is introduced. The capability map allows to determine how well regions of the workspace are reachable for the end effector in different orientations. It is a representation that can be machine processed as well as intuitively visualized for the human. The capability map and the derived algorithms are a valuable source of information for high- and low-level planning processes. The versatile applicability of the capability map is shown by examples from several distinct application domains. In human-robot interaction, a bi-manual interface for tele-operation is objectively evaluated. In low-level geometric planning, more human-like motion is planned for a humanoid robot while also reducing the computation time. And in high-level task reasoning, the suitability of a robot for a task is evaluated.