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Applying 3D Human Hand Pose Estimation to Teleoperation

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Abstract

3D human hand pose estimation from visual data has received an increasing amount of attention, and the availability of low-cost depth cameras gives a great impetus to the development of this field. Nearly all recent hand pose estimation methods are oriented towards unified evaluation criteria defined by popular public benchmark datasets: the ultimate goal is to reduce the estimation error. However, the fact is that there exists a gap between human hand pose estimation and its applications. It is unclear how to recover global and local degrees of freedom from a set of structural hand joints, which is a necessary condition to apply human hand pose estimation to teleoperation, i.e., mapping estimated human hand poses at the master side to robotic hand poses at the slave side. Conventional teleoperation **systems are implemented with the aid of a data glove or essentially built on gesture recognition. These solutions are inferior to vision-based hand pose estimation in offering an easy-to-use and natural human-robot interaction interface. In this paper, we propose three methods to teleoperate robotic hands by 3D vision-based human hand pose estimation. The feasibility of the three methods is tested in a simulated environment.**

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