TECHNISCHE UNIVERSITÄT MÜNCHEN
Human-centered Assistive Robotics
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MASTER'S THESIS

Recognition and Reproduction of Contact-based Robot Skills

Problem description:

Programming a robot to execute contact-based interactions can be a time consuming task, where usually expert knowledge is required. To allow non-experts to model robotic contact tasks, they can use the more intuitive way of demonstrating these actions to the robot. As such demonstrations might not always lead to an efficient behavior, the intent of the user can be recognized based on the motion and force data. The goal of the classification is to extract the real intent of the user in order to parameterize predefined robot skills (e.g. [1]) for an efficient execution. To do so, skill templates need to be developed that are parameterized by the demonstration to reproduce the skill in an efficient way. Such templates might be constructed by the task frame formalism [2] for force-controlled actions or by action templates [3] for a symbolic action description. Finally, such templates shall be implemented and tested online in comparison with a simple reproduction of the demonstrated behavior.

Tasks:

- Literature survey on robot learning from demonstration, classification, force control
- Define and implement contact-based robot skills (e.g. touching [4], sliding [5], peg-in-hole [1])
- Recognition of predefined robot skills from kinesthetic demonstrations
- Evaluation of recognition accuracy and online task performance

Bibliography:

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[3] Daniel Leidner, Alexander Dietrich, Michael Beetz, and Alin Albu-Schäffer. Knowledge-enabled parameterization of whole-body control strategies for compliant service robots. *Autonomous Robots*, 40(3):519–536, 2016.

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