TECHNISCHE UNIVERSITÄT MÜNCHEN
Human-centered Assistive Robotics
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B A C H E L O R T H E S I S
for
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Reduce the Execution Time of Structured Tasks by Merging Sequential Movements

Problem description:

The cpmbination of attentional monitoring and learning by demonstration proposed in [1, 2] allows human users to teach structured robotic tasks in an intuitive manner. After the teaching phase, the robot has acquired full knowledge of the demonstrated task, consisting of a symbolic representation of the task with associated execution constraints, and of a set of movement primitives in the form of point-to-point motions. In the current implementation, each motion primitives terminates when the robot reaches the goal pose. However, in some cases like a reach and grasp motion, consecutive movements can be consecutively executed, without the need of stopping in an "intermediate" goal. The focus of this Bachelor Thesis work is to reduce the time needed to execute a structured task by merging sequential movement primitives. The developed approach has to guarantee a smooth transition between consecutive primitives in order to generate feasible motor commands [3].

Tasks:

- Literature research on motion primitive merging
- Development of an algorithm to generate smooth transitions between consecutive motion primitives
- Experimental evaluation on a real robot
- Comparison with the approach in [2] - Optional

Bibliography:

[1] R. Caccavale, M. Saveriano, G. A. Fontanelli, F. Ficuciello, D. Lee, and A. Finzi, Learning and Attentional Supervision of Dual-Arm Structured Tasks, in *International Conference on Development and Learning and on Epigenetic Robotics*, 2017.
[2] R. Caccavale, M. Saveriano, A. Finzi, and D. Lee, Kinesthetic Teaching and Attentional Supervision of Structured Tasks in Human-Robot Interaction, in *Autonomous Robots*, 2018.
[3] S. Manschitz, J. Kober, M. Gienger, and J. Peters, Learning Movement Primitive Attractor Goals and Sequential Skills from Kinesthetic Demonstrations, in *Robotics and Autonomous Systems*, vol. 74, pp. 97–107, 2015.

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