Deep reinforcement learning for dexterous hand manipulation

Problem description:
Multi-fingered hands are very flexible and capable of performing a variety of tasks on objects of diverse shapes and sizes. However, achieving a human-like dexterity for a prosthetic hand is a big challenge due to its highly complex mechanisms. To address this challenge, state-of-the-art deep reinforcement learning methods are implemented [1]. These methods require human demonstrations of high quality to achieve the desired robustness and their applicability is limited to specific objects shapes and used scenarios. In this thesis, we tackle these limitations by relaxing the necessity of high quality demonstrations. We extend the applicability of these methods to a wider variety of object manipulation tasks [2, 3].

Tasks:
- Literature overview of learning from demonstrations and imitation learning with deep reinforcement learning.
- Implementation of learning with behaviour cloning based on hand pose estimation [4].
- Task domain definition including features of manipulated objects and force sensors.
- Assessment of the stability of the learned control policies when relocating the objects of different shapes and sizes.

Bibliography: