Learning to Grasp for Robotics Applications in Uncertain Environments

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We are currently witnessing a revolution in the use and deployment of robotics systems. On top of an increased pace of automation in traditional industries like automotive and electronics manufacturing, robots are now used in a wide range of applications, from health care to agriculture. New records of robot sales have been set every year for the past several years. This revolution is fueled by incredible advances in several fields including machine learning, machine vision, human-robot interaction, and computing systems and architectures.

Grasping is a fundamental robotics skill. In a structured industrial environment, a robot can assume full knowledge of the object characteristics and the availability of a suitable gripper to grasp the object. Contact points usually are pre-programmed to fit with the overall task. As robots are being deployed in many unstructured environments these assumptions are no longer valid. Robots must grasp and manipulate a wide range of objects with different characteristics while using the same gripper and avoiding obstacles. This talk presents recent advances to enable robots to learn grasping skills from interacting with objects in their environment. This data-driven approach has gathered significant steam since the introduction of deep learning architectures. Several questions are examined: What to learn, how to learn it, and how to collected and process required data.