Autonomous Learning of Object behaviour concepts and models through robotic interaction

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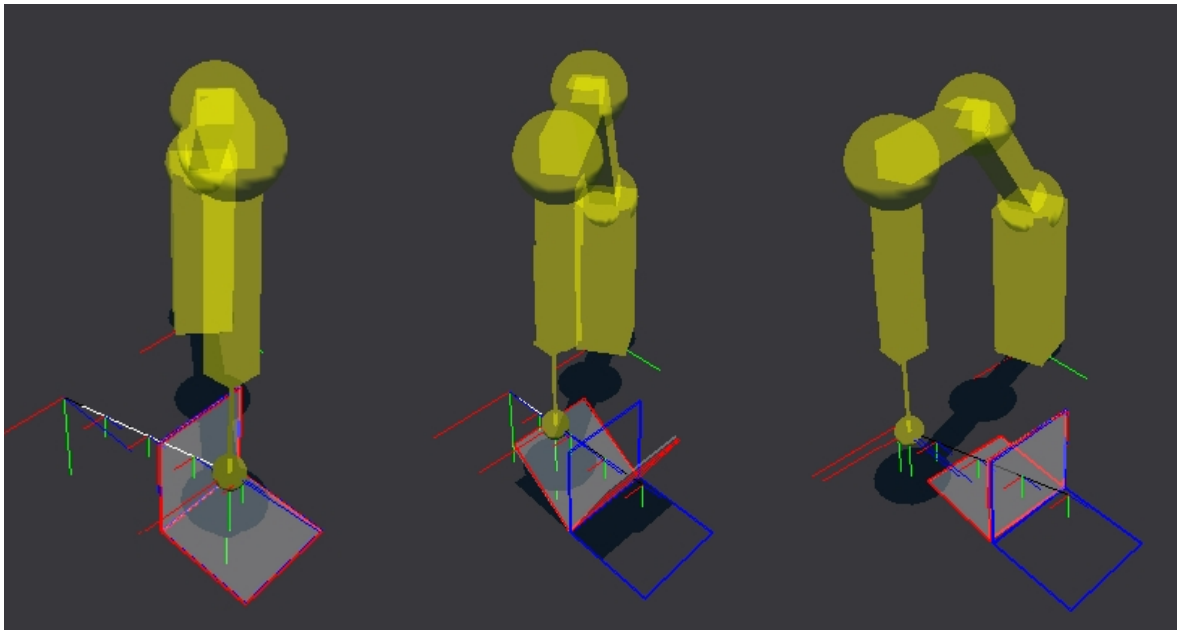
Introduction

- **Goal:** Prediction of sequences of object poses after a pushing action.
- **Learning methods:** Active Learning (selection of samples via information-theoretic clues like information gain, learning progress, novelty, etc).
- Probabilistic or Regression Models that discretize and compress a high-dimensional space of dynamical systems.
- So far, we use geometrical objects (e.g. *polyflaps*) in a simulated environment with a Katana arm.

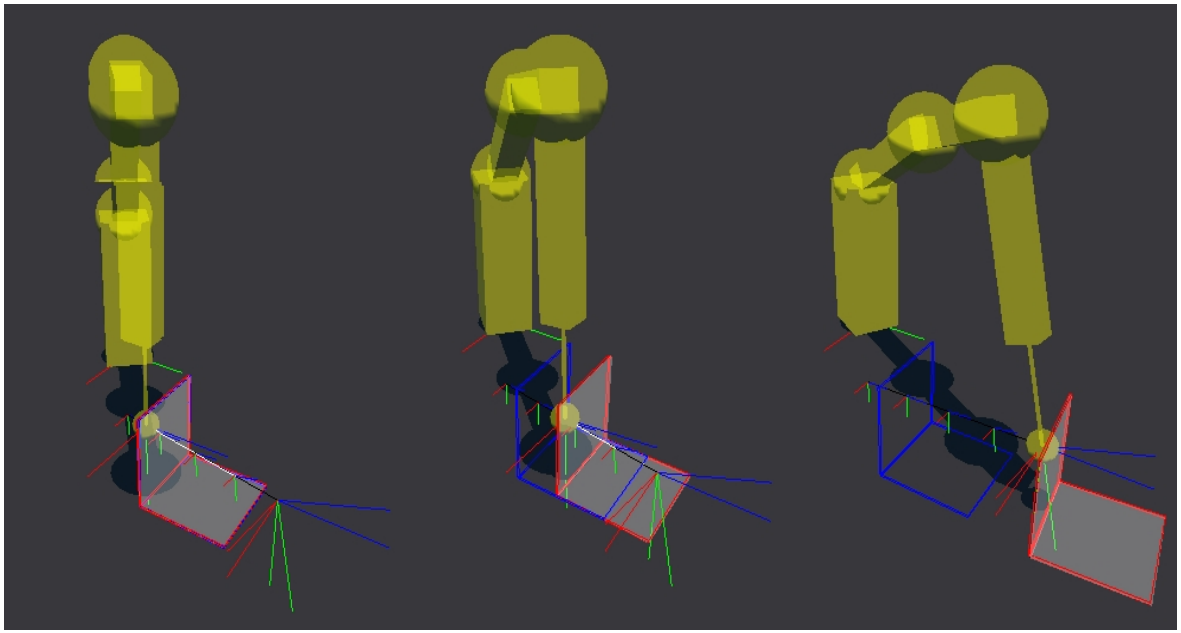
Results

Flipping affordance prediction:



Results

Sliding affordance prediction:



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Probabilistic discrete models

- Construction of a probabilistic automaton from geometrical data that allows the assessment of uncertainty or predictability based on Conditional Entropy.
- For 360 different motor commands, defined as a starting effector pose and a direction angle, we obtain 32 states for the automaton.

Probabilistic discrete models

An automaton extracted from 5 actions (not all possible transition symbols are shown):