



Generalizable Robot Programming by Demonstration with Diffusion Features

Michael Murray · Entong Su · Maya Cakmak

University of Washington



Motivation

Programming by Demonstration (PbD) is an intuitive technique for programming robots by demonstrating the desired behavior. But most existing approaches either require extensive demos or fail to generalize beyond initial demonstration conditions.

Diffusion-PbD

Diffusion-PbD leverages large scale pre-trained models to both extract salient structure from demonstration videos and to transfer that structure to new scenes.

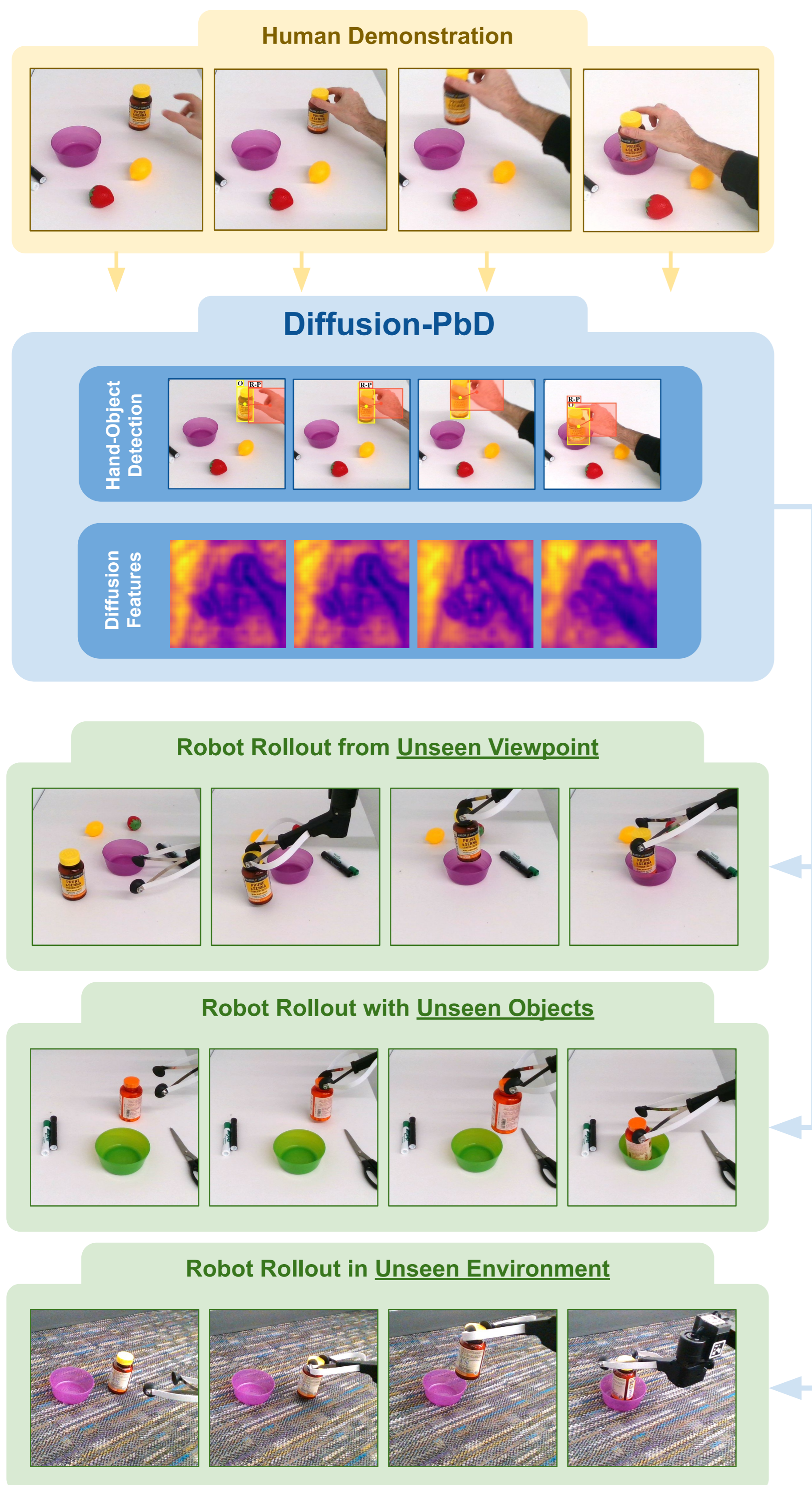


Figure 1. Given just a single observed human demonstration, Diffusion-PbD can synthesize robot manipulation programs that adapt to unseen objects, unseen viewpoints, and unseen environments.

Download

– Get the code and supplementary video:

Learn more

– Read the full pre-released paper:

Diffusion-based Affordance Transfer



Figure 2. Diffusion features are used to transfer affordances across novel viewpoints, novel objects, and novel scenes.

Real World Robot Evaluation



Figure 3. We evaluate using a Stretch RE2 robot

- 14 real world manipulation tasks
- 5 visually distinct environments
- Average success rate: 83%

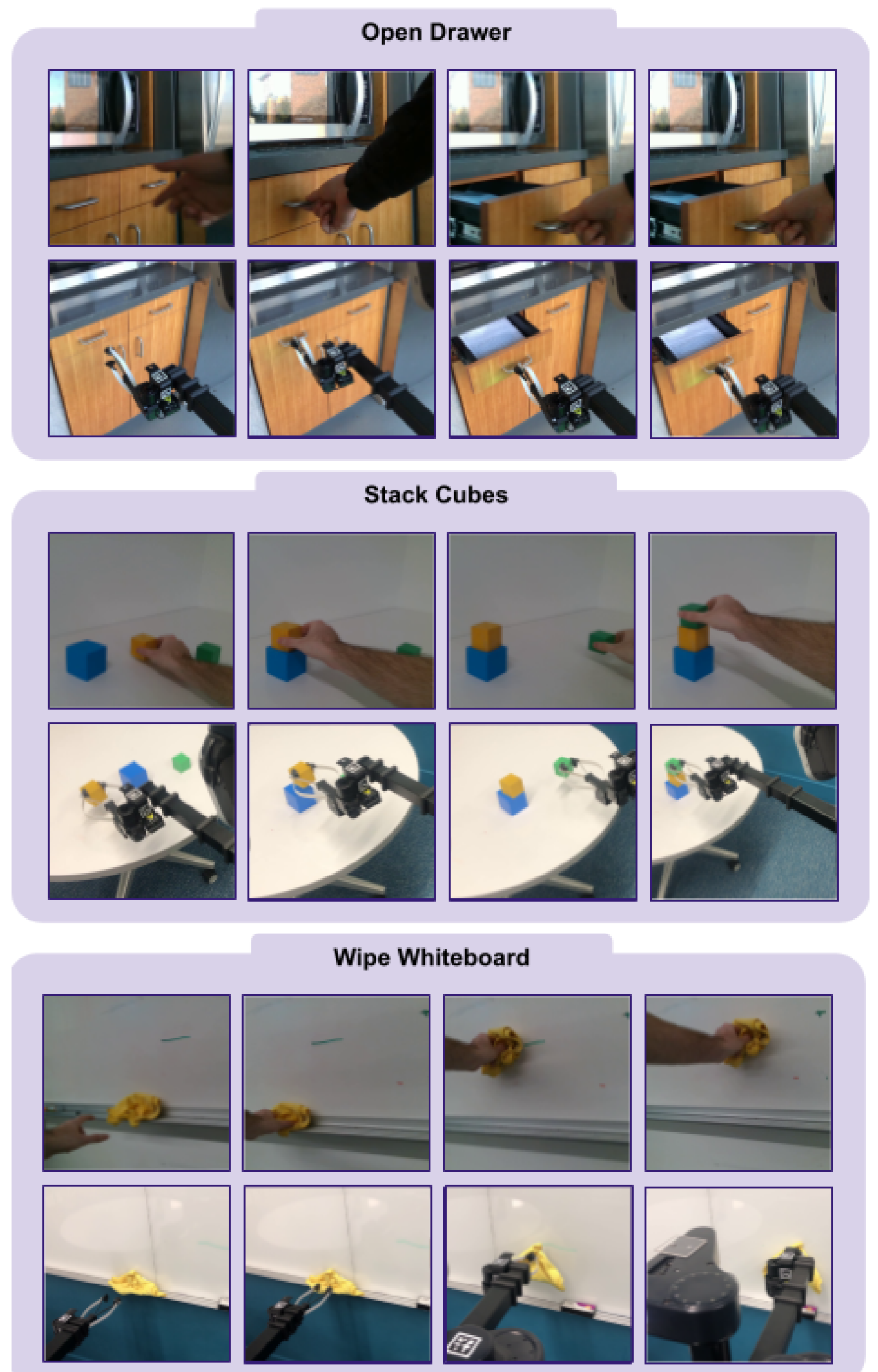


Figure 4. Representative human demonstrations and robot executions.