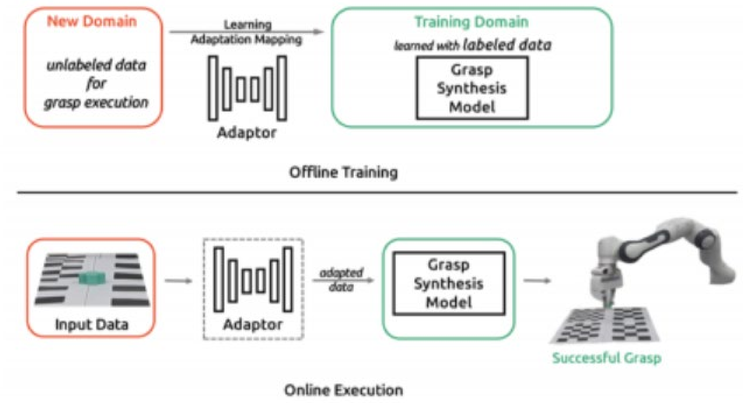
GraspAda: Deep Grasp Adaptation through Domain Transfer

Yiting Chen, Junnan Jiang, Ruiqi Lei, Yasemin Bekiroglu, Fei Chen, Miao Li
Wuhan University, Chalmers University of Technology, Tsinghua University, University College London, The Chinese University of Hong Kong

Introduction

This work presents a novel grasp adaptation strategy to transfer the learned grasping ability to new domains based on input visual data transformation.



Given a trained grasp synthesis model, we address following issues:

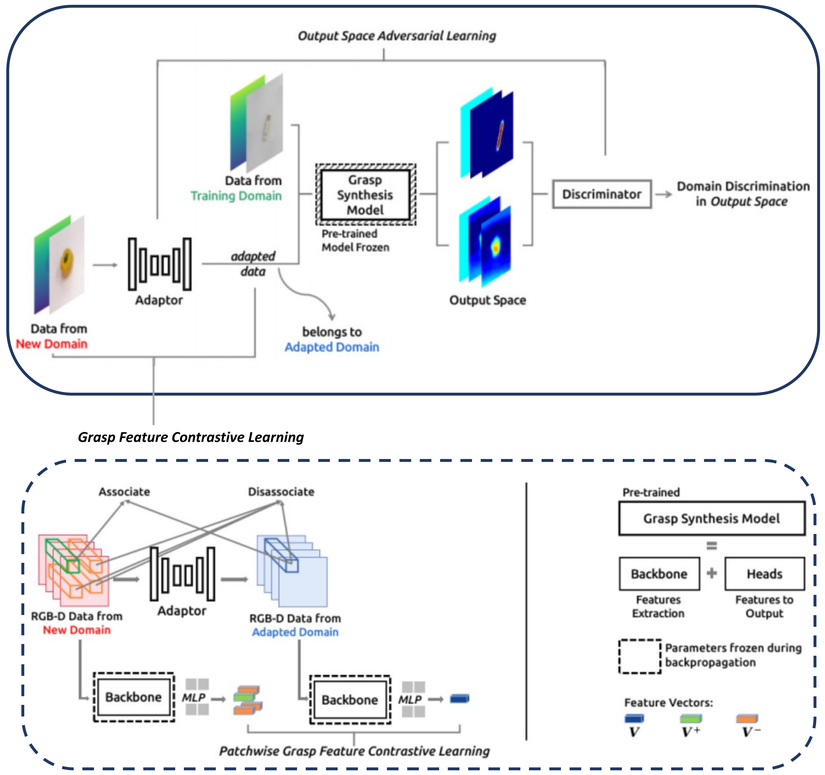
- How to generalize it to new domains through input data adaptation using a GAN-based generator.

- How to maintain the deep grasp feature consistency during the transfer process, while bridging the gap of domain-specific bias between the new domain and the training data domain.

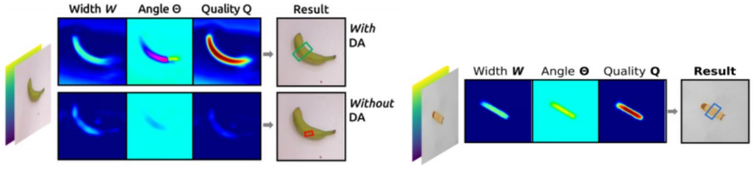
The process mentioned above does **NOT** require:
- model fine-tuning
- labeled data from new domain

Method Overview

The overall structure of our data adaptation strategy:



Output space visualization with/without Data Adaptation



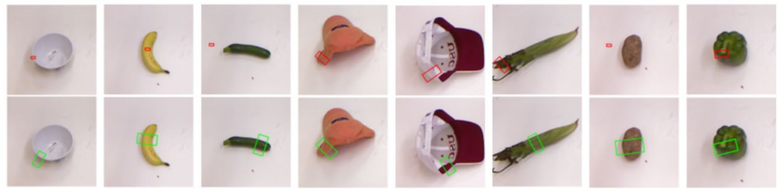
New Domain **Training Domain**

Experiments

Experiments using benchmark datasets

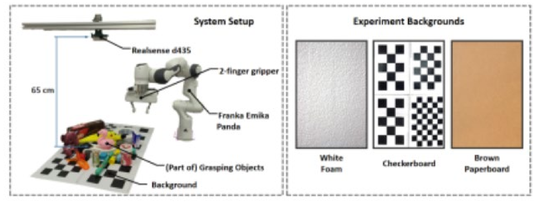
The grasp synthesis model is trained on Jacquard Dataset and tested on Cornell Dataset.

Tested on Cornell Dataset Rectangle: Without DA Rectangle: With DA



Experiments on real-world scenarios

Three cases with different backgrounds are used in the experiments.



PERFORMANCE OF PRE-TRAINED MODEL ON CORNELL DATASET AND REAL-WORLD SCENARIOS

Dataset/Background	direct	with DA	Improvement
Cornell	23.4%	74.6%	**218.8%**
White Foam	76.7%	86.7%	11.3%
Checkerboard	40%	80%	**100%**