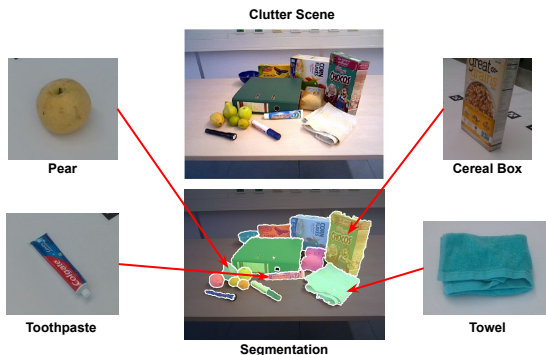


FEWSOL: A Dataset for Few-Shot Object Learning in Robotic Environments

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A sample robotics environment



Goal: A robot should identify various (daily) objects in clutter scenes

Our approach: Object Classification using Few-Shot Learning

Internet images, not suitable for indoor robotic settings!!!

Hence, 1. We introduce the FEWSOL Dataset

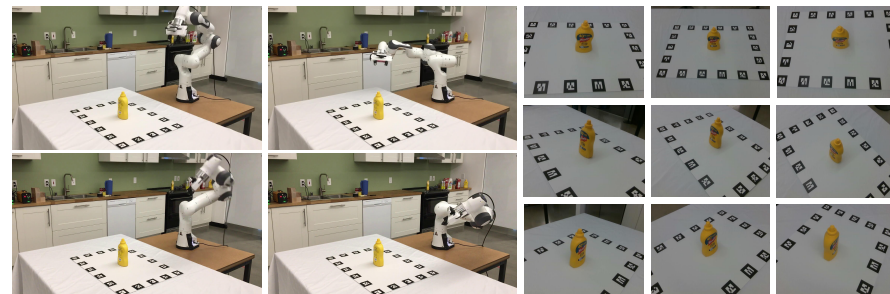
- 336 objects
- 198 object categories
- 9 images per object

Annotations

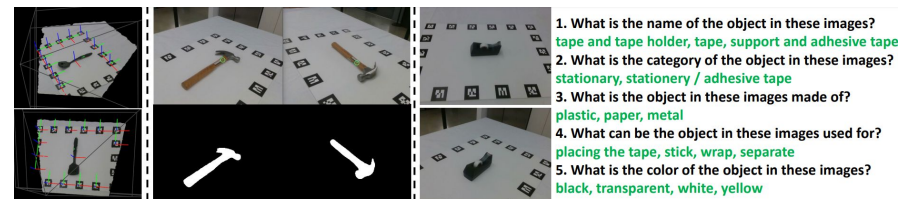
RGB-D images, Segmentation Masks

Object Poses, Object Attributes

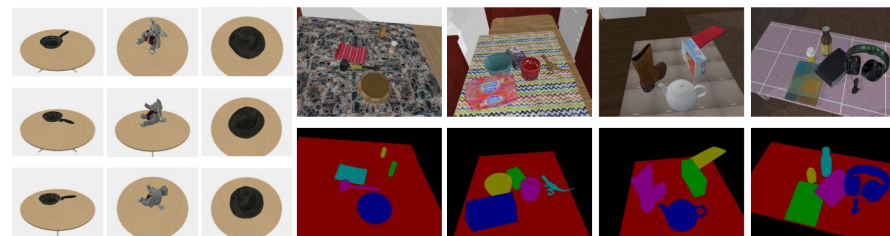
2. Benchmark FEWSOL using Meta-Dataset Framework and Few-Shot CLIP methods



+ Segmentation Masks, Object Poses, Object Attributes



+ Augmented with Synthetic data



**Few-Shot Object Recognition in Unstructured Robotics Environments
(Dataset+Benchmark)**

A sample robotics environment



Pear



Toothpaste



Clutter Scene



Segmentation



Cereal Box



Towel

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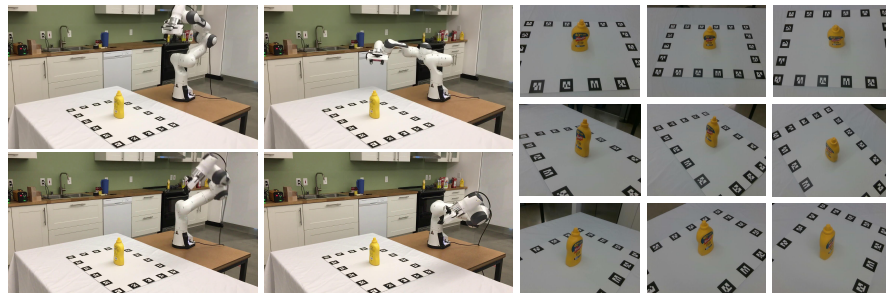
- 336 objects
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- 9 images per object

Annotations

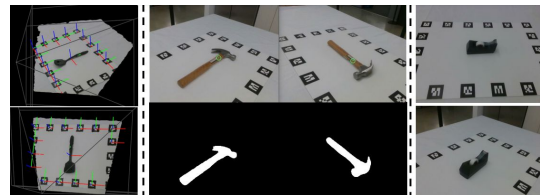
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2. Benchmark **FEWSOL** using **Meta-Dataset Framework** and **Few-Shot CLIP methods**

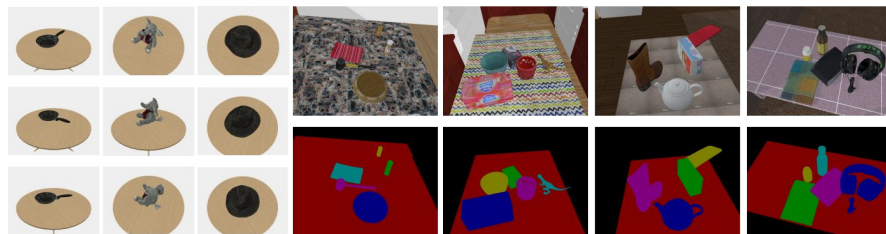


+ Segmentation Masks, Object Poses, Object Attributes



1. What is the name of the object in these images?
tape and tape holder, tape, support and adhesive tape
2. What is the category of the object in these images?
stationary, stationery / adhesive tape
3. What is the object in these images made of?
plastic, paper, metal
4. What can be the object in these images used for?
placing the tape, stick, wrap, separate
5. What is the color of the object in these images?
black, transparent, white, yellow

+ Augmented with Synthetic data



Few-Shot Object Recognition in Unstructured Robotics Environments
(Dataset+Benchmark)



Pear



Test scene



Cereal box



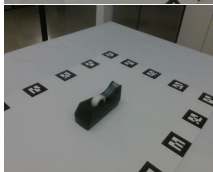
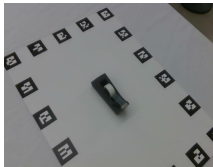
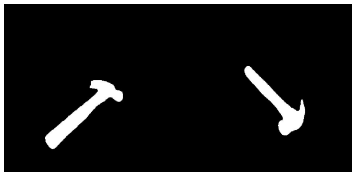
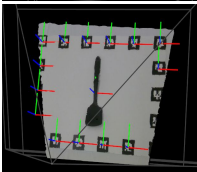
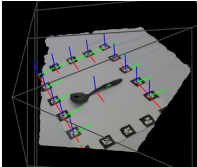
Toothpaste



Segmentation



Towel



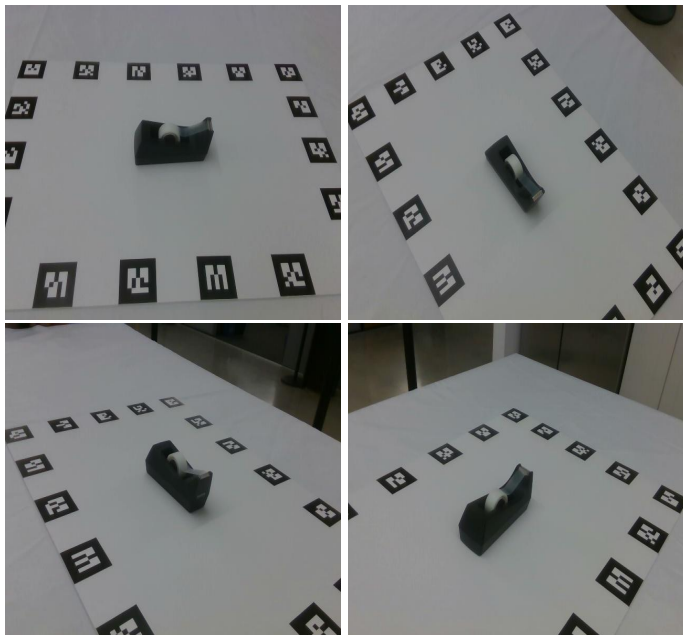
1. What is the name of the object in these images?
 Hammer, claw hammer, claw, hammer, claw hammer, claw

2. What is the category of the object in these images?
 Hammer, clawhammer, clawhammer, claw

3. What is the object in these images made of? (list all materials of the object)
 wood, metal, wood

4. What can be the object in these images used for? (list all functions of the object)
 driving the nails, driving, driving, driving

5. What is the color of the object in these images? (list all colors of the object)
 black, transparent, white, yellow



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tape and tape holder, tape, support and adhesive tape

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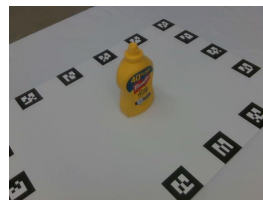
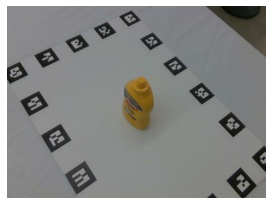
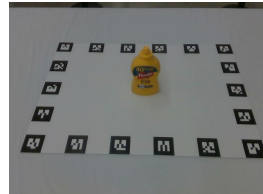
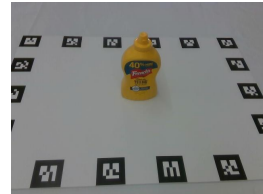
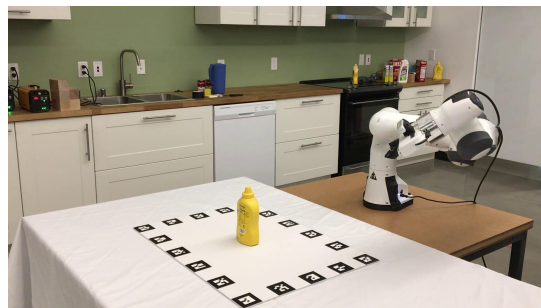
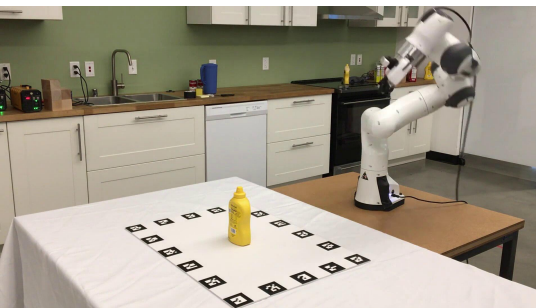
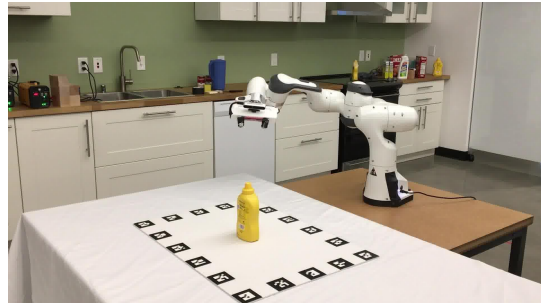
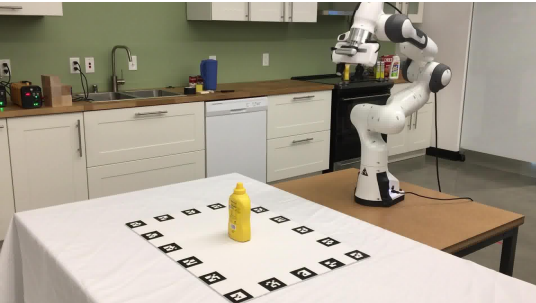
plastic, paper, metal

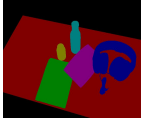
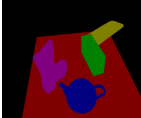
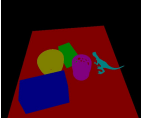
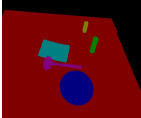
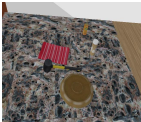
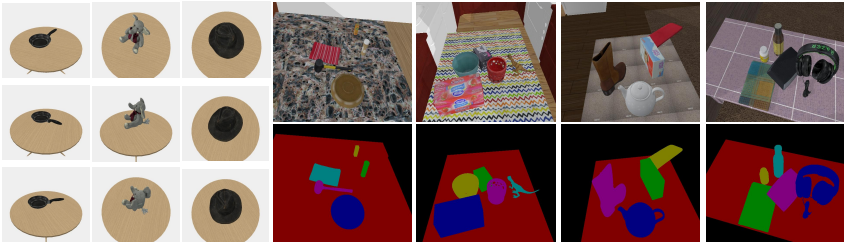
4. What can be the object in these images used for? (list all function of the object)

placing the tape, stick, wrap, separate

5. What is the color of the object in these images? (list all colors of the object)

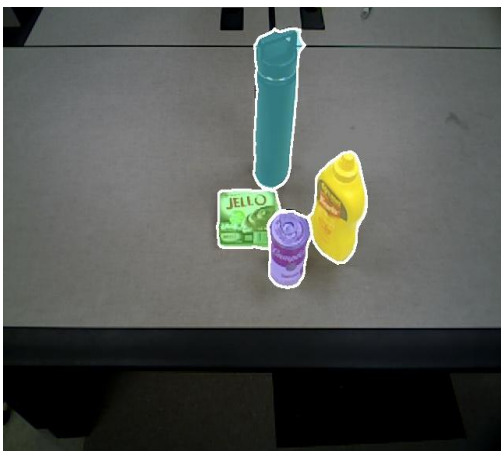
black, transparent, white, yellow







Real-world setting



Segmented Objects



1. jello_box (96.88%)
2. cling_wrap_box (0.65%)
3. jar (0.40%)
4. label_marker (0.40%)
5. food_storage_container (0.34%)



True:
water_bottle

1. coffee_bottle (11.90%)
2. arm_filter_holder (9.41%)
3. coffee_can (7.56%)
4. food_storage_container (7.56%)
5. tea_tin (5.20%)



1. soup_can (90.82%)
2. can_opener (3.26%)
3. tuna_can (1.54%)
4. pringles_can (0.90%)
5. meat_can (0.89%)



1. mustard_bottle (60.99%)
2. glue_bottle (13.18%)
3. drano_dual_force_bottle (7.40%)
4. palmolive_bottle (7.06%)
5. chili_powder_bottle (1.93%)

Few-shot-classification