

Grasping Pattern Estimation

Based on Co-occurrence of Object and Hand Shape

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1. INTRODUCTION

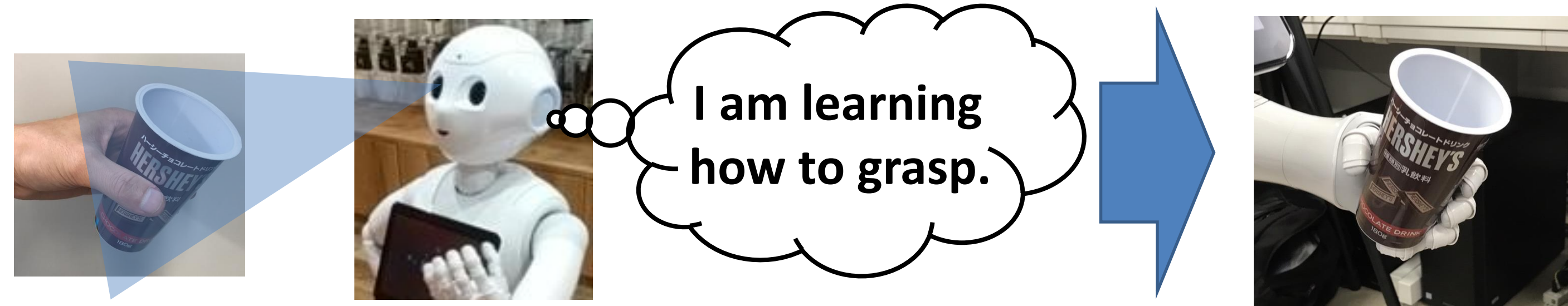
- There is relationship between the function of an object and the hand shape when grasping the object.
- It is difficult to register the relationship between many objects and the corresponding hand shape in the machine.

OUR PROPOSAL

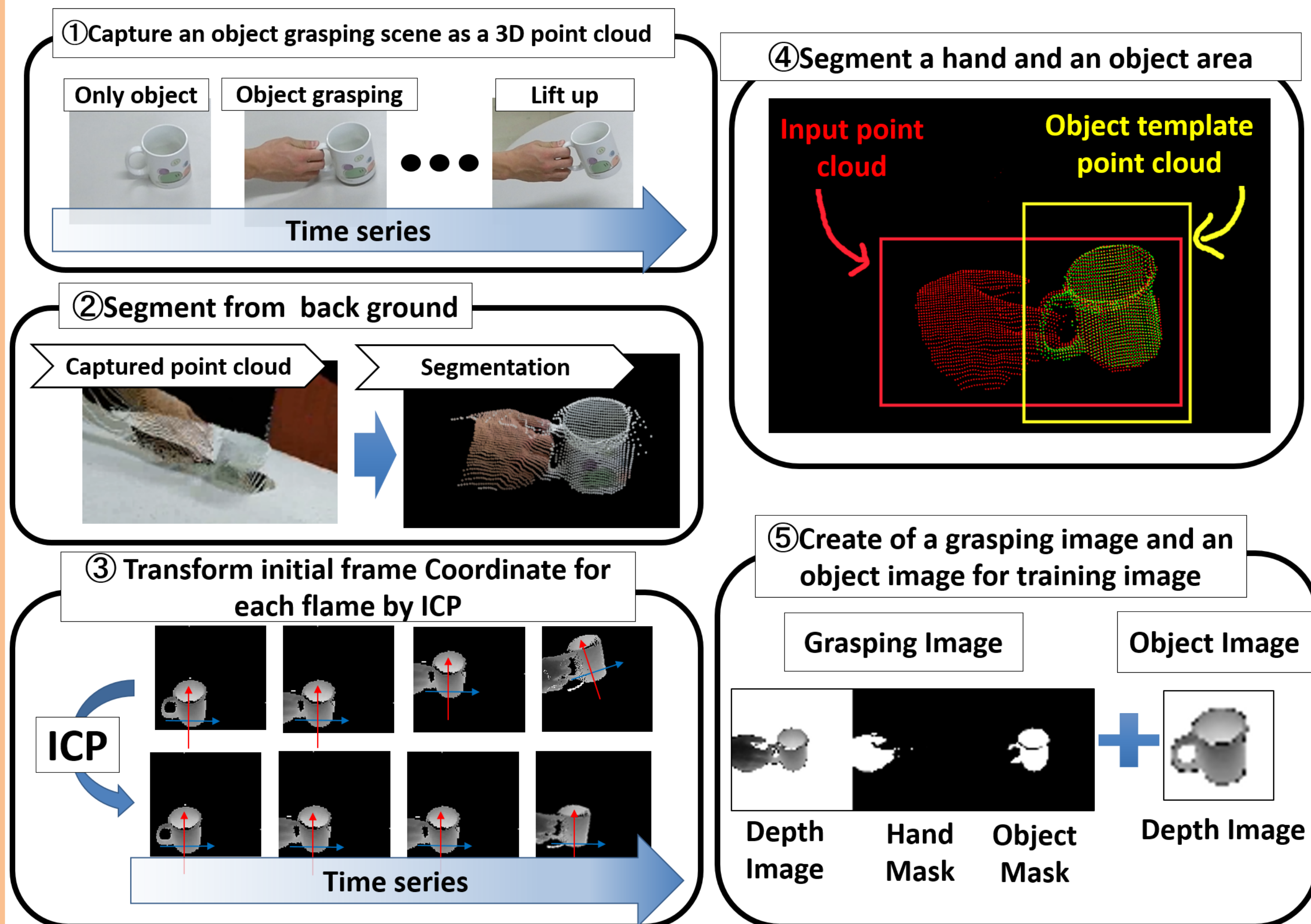
To automatically acquire **the relationship** by observing scenes of human grasping.

We define **the relationship** with a descriptor called **"Interaction Descriptor"**.

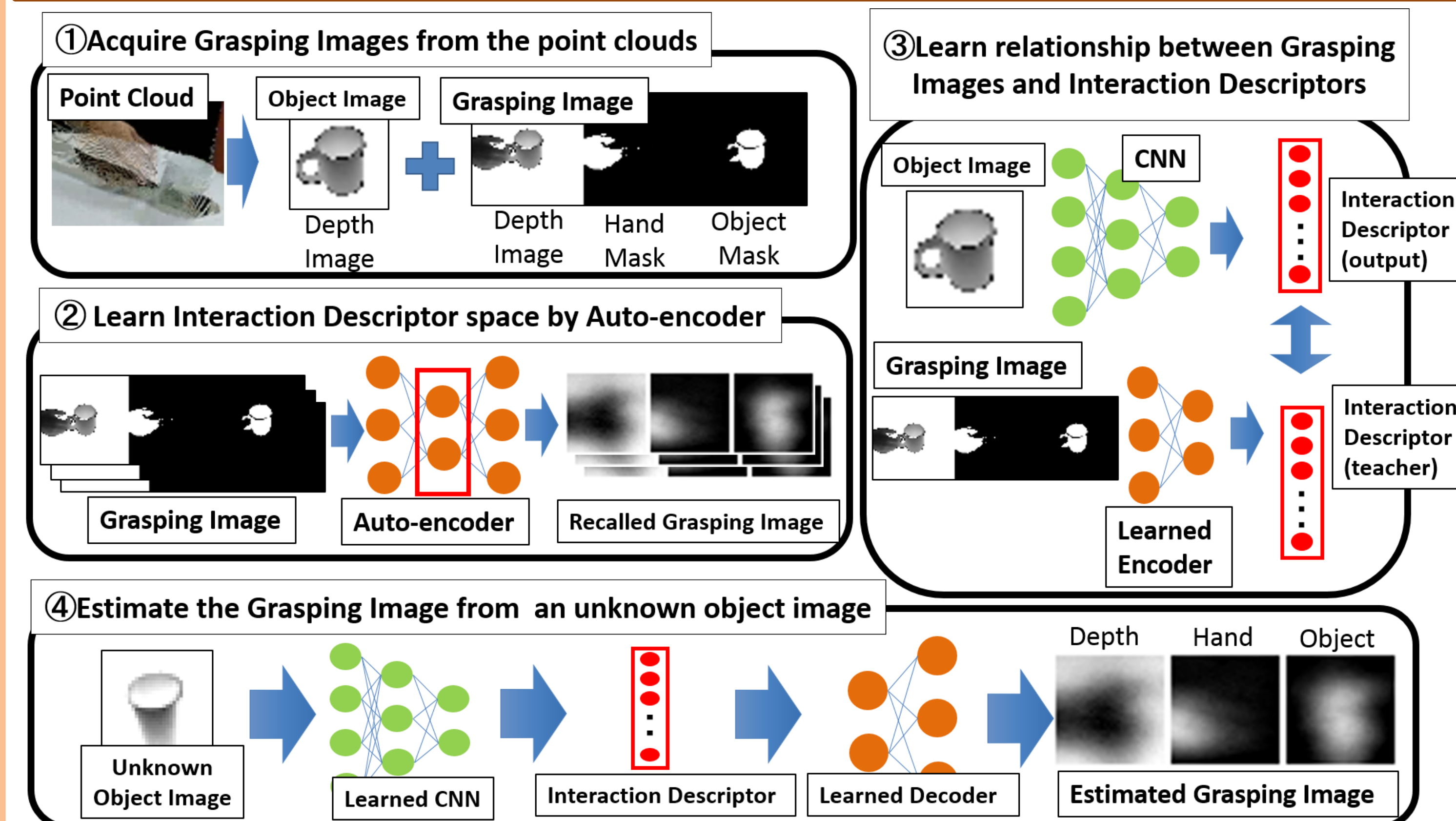
- It represents a grasping image in 30 dimensions.
- Robot can recall the relationship between hand and object from the object shape.



2. MAKING HAND/OBJECT MASK IMAGES



3. METHOD OF ESTIMATING DESCRIPTOR



6. FUTURE WORKS

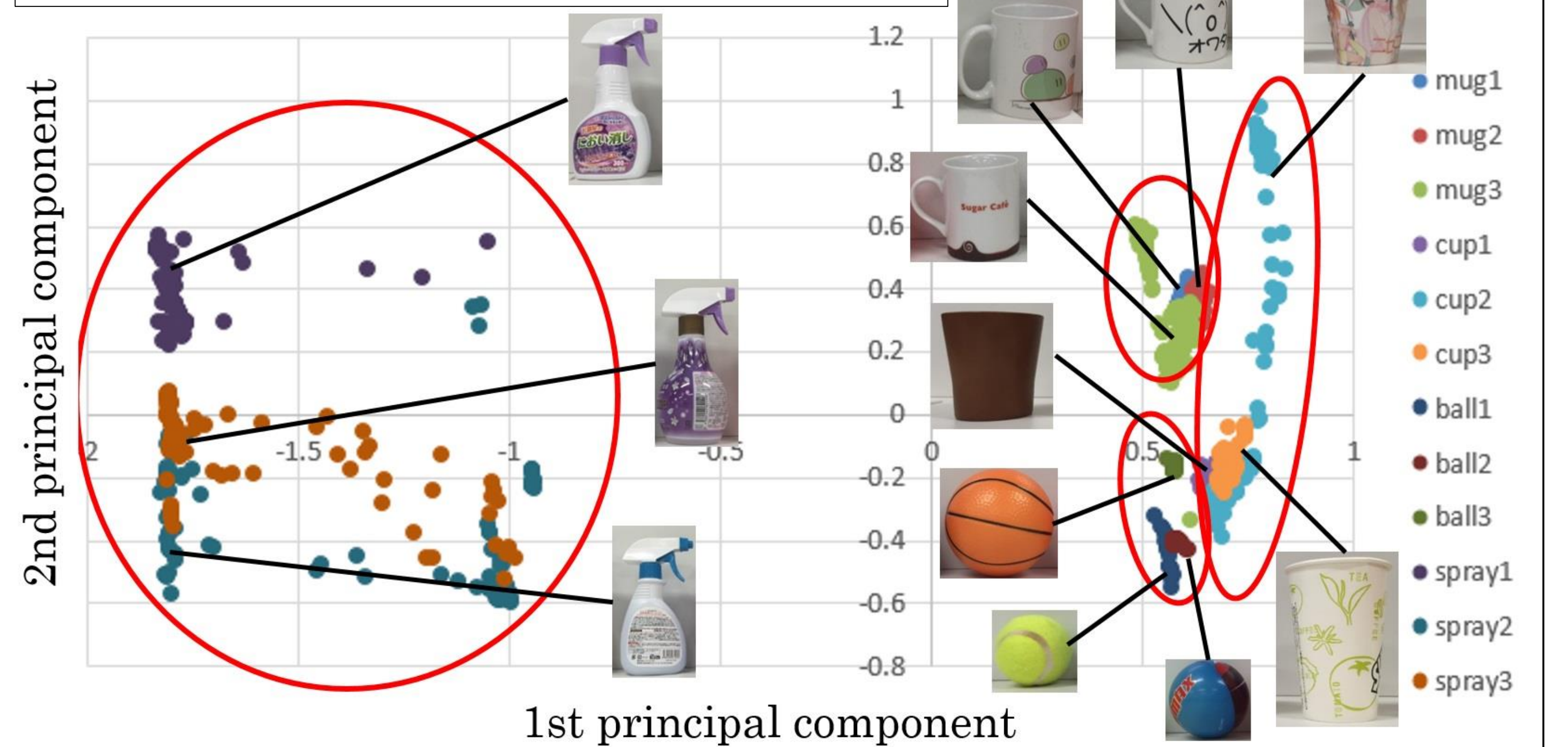
We proposed the method to recall the partial grasping image from the local patch image of functional objects. In order to recall the whole image of the grasping hand shape, we try to estimate the whole hand shape to grasp the object by integrate the partial grasping image.

4. RESULT OF DESCRIPTOR SPACE LEARNING

Used Objects



Result of learning Interaction Descriptor Space (Auto-encoder's outputs)

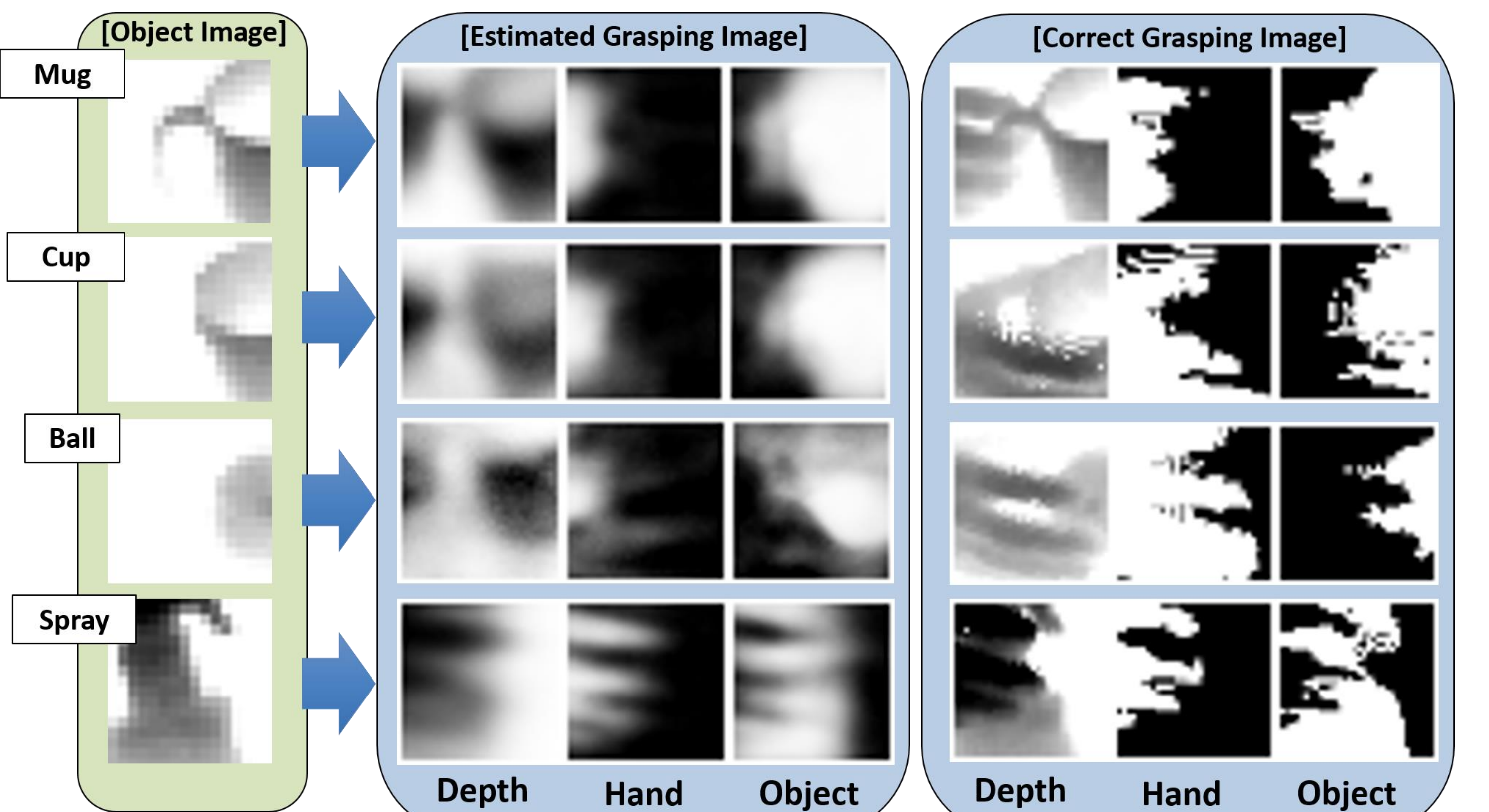


5. RESULTS OF ESTIMATING GRASPING IMAGE

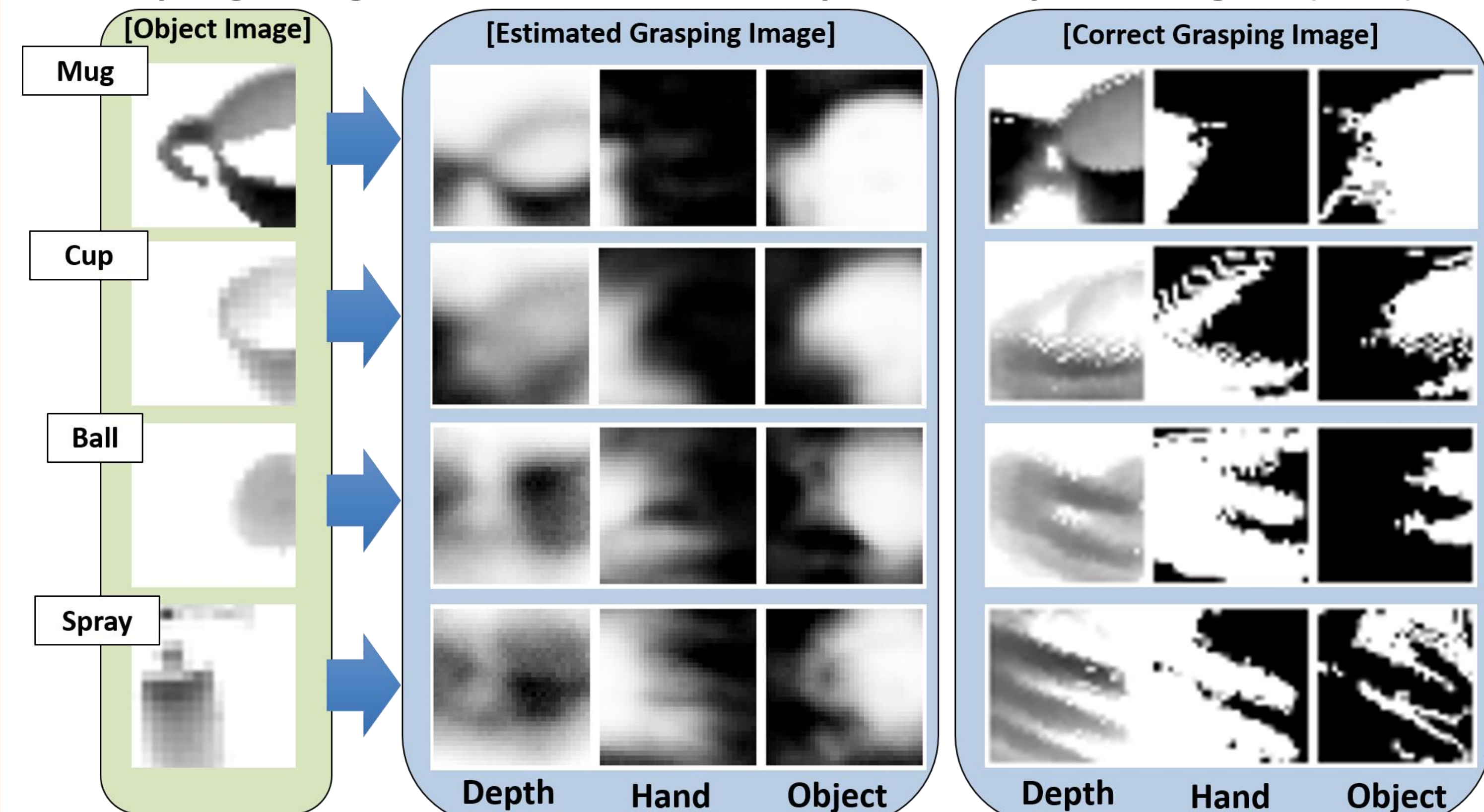
We used "Shift Invariant Auto-encoder".

T.Matsuo et.al, "Transform Invariant Auto-encoder", IROS 2017, TuAT1.2, 2017

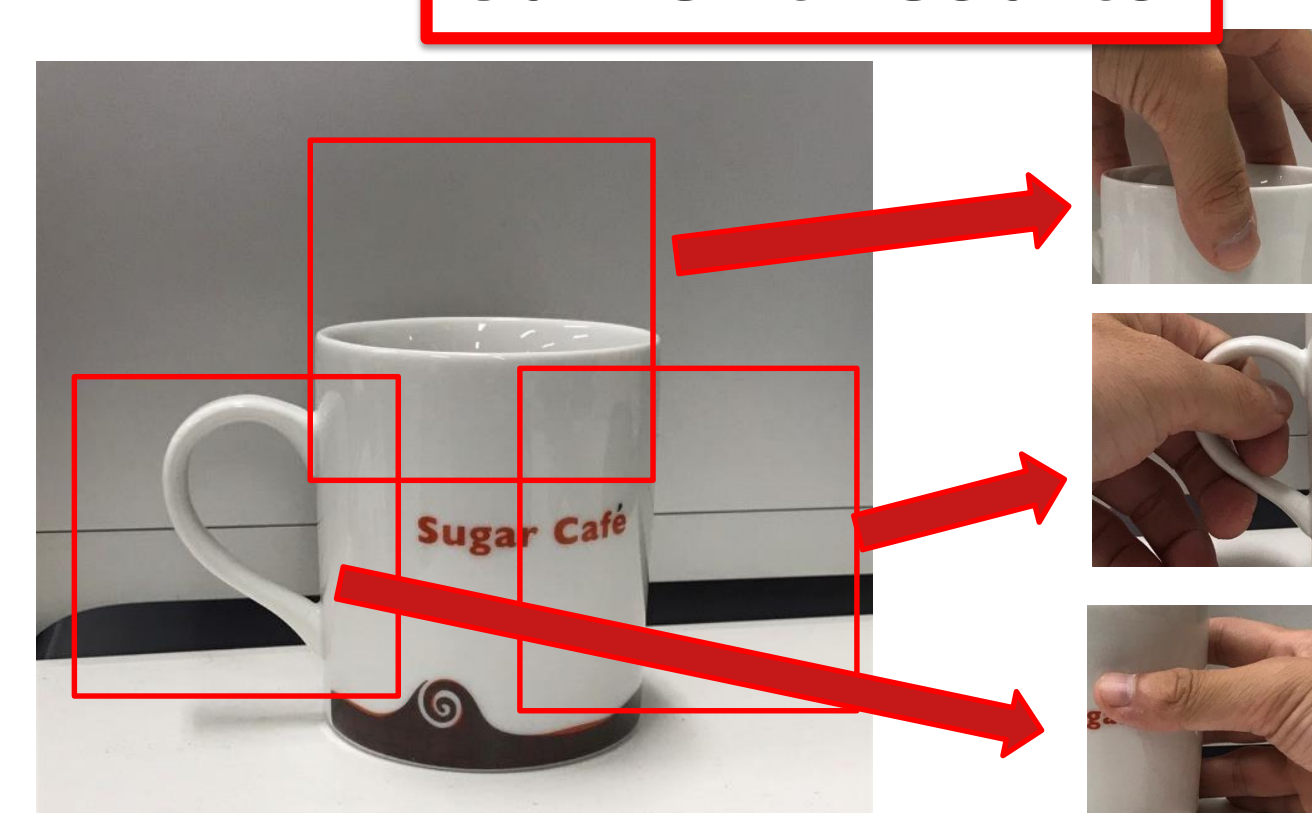
Grasping images recalled from the partial object images (training)



Grasping images recalled from the partial object images (test)



Current results



Future works

