Ca3OH1

Contact Aware in 3D Object-Human Interaction

Thesis Proposal

Keywords: 3D human reconstruction, human-object interaction, contact aware geometric constraints, pose optimization,

HCY WRT ZBH

Done this week:

Foundation:

- Collect the ‘Sandwich’ cases in open datasets.

  (And the data-selector script)

- Get the intermediate results to verify our conjecture.

  (And the test pipeline)

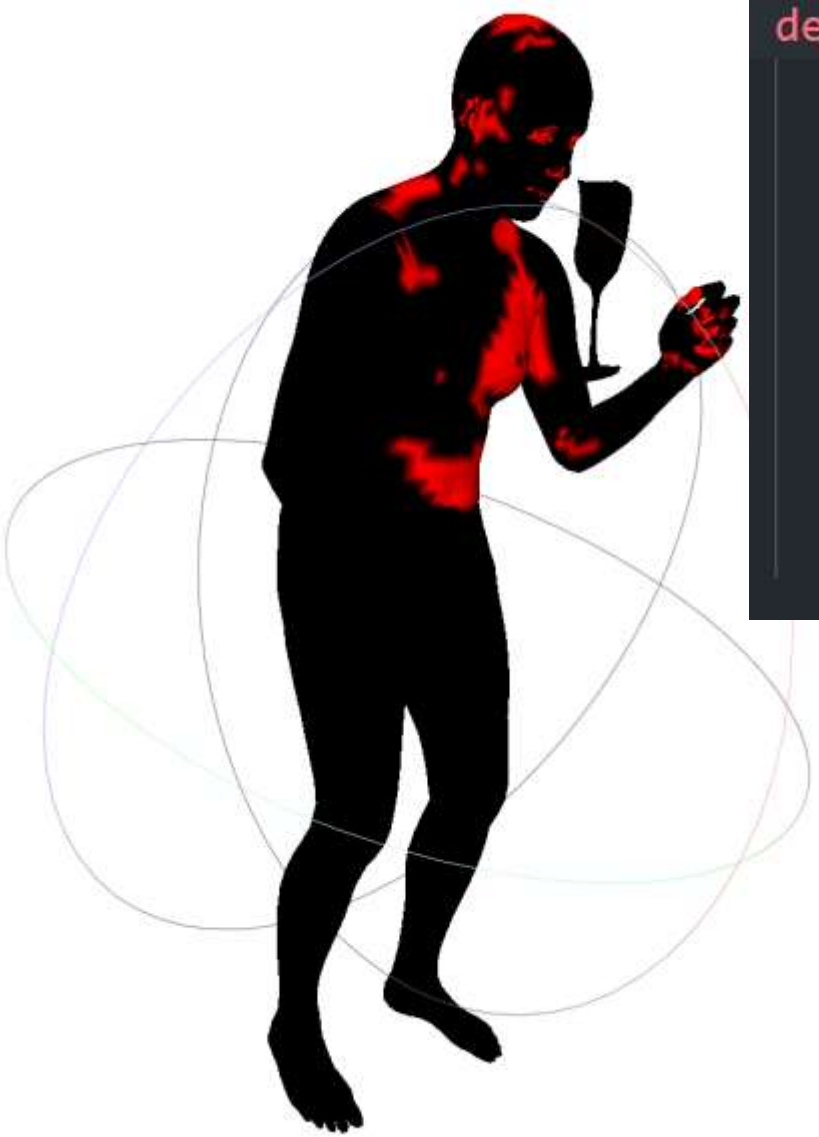
Main:

- A way to get **Contact Area GT**.
- Fix the problem that contact loss **Never** be optimized.
- The result with **Contact Area GT**.

01

Contact Area GT

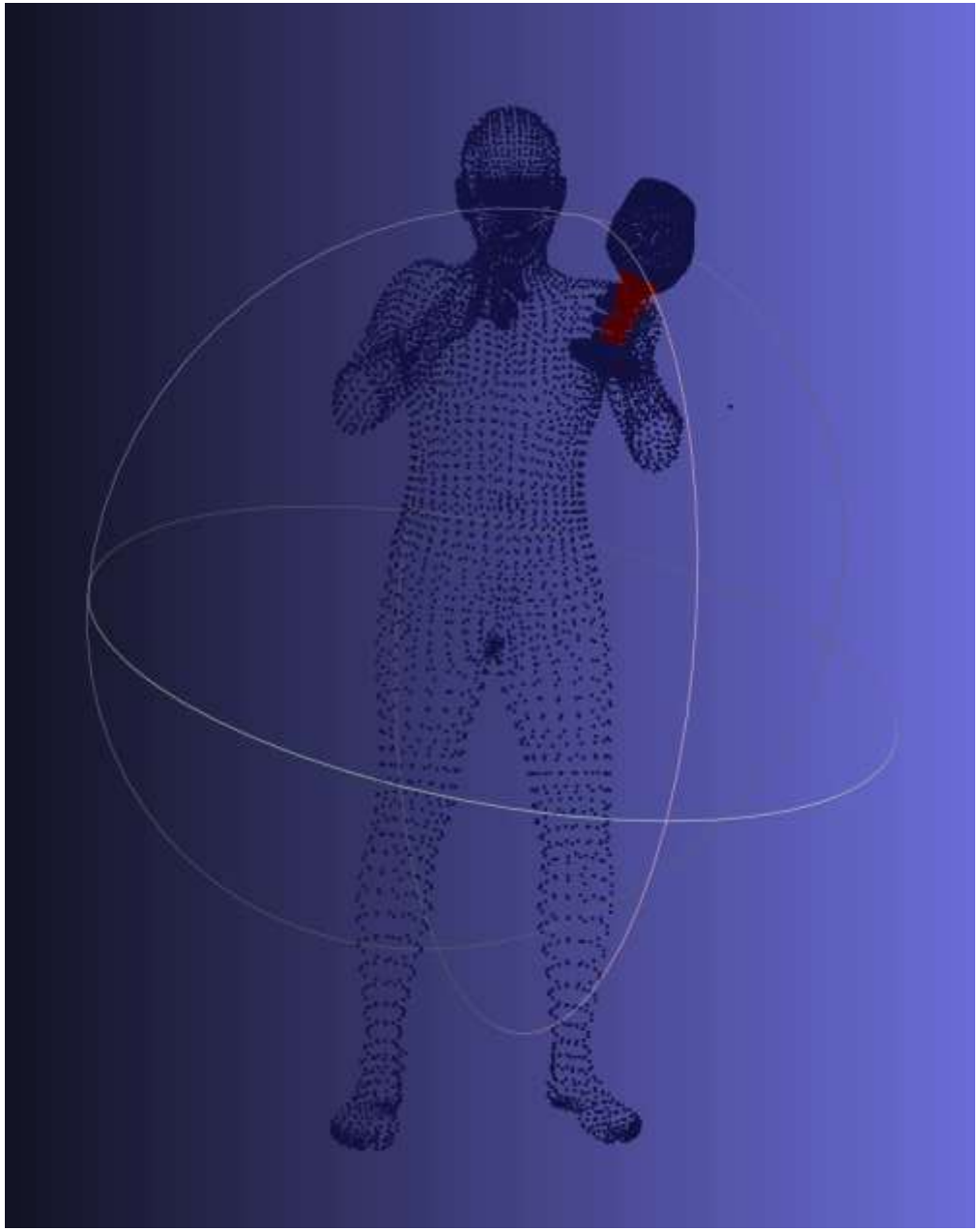
Contact Area on Object Matters too:



```python
def compute_contact_loss(self, hverts, overts,h_contact,o_contact):
    h_v_contact = hverts[h_contact]
    h_v_contact=h_v_contact.unsqueeze(0)
    o_v_contact = overts[o_contact]
    o_v_contact=o_v_contact.unsqueeze(0)
    hdist,odist=chamfer_distance(h_v_contact,o_v_contact)
    ho_distance = hdist.mean() + odist.mean()

    return {"loss_contact": ho_distance}
```

The way to get CAGT:



02

Experiments

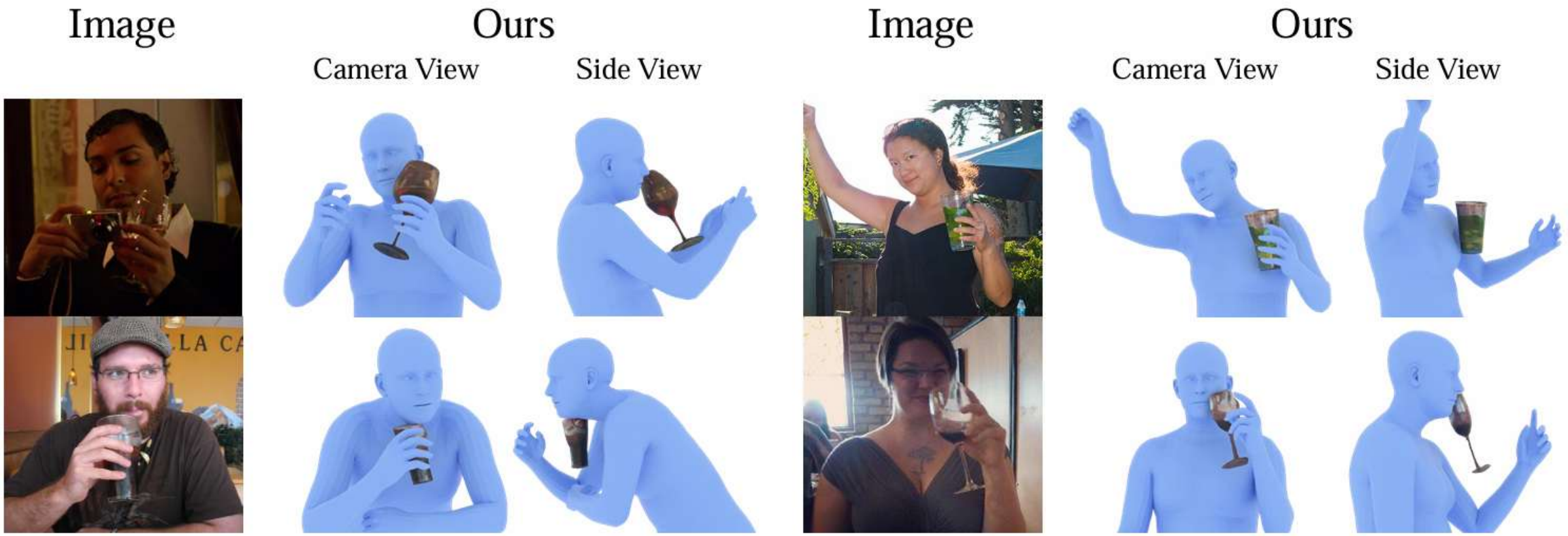


Figure 21. Failure cases of HOI-Gaussian.

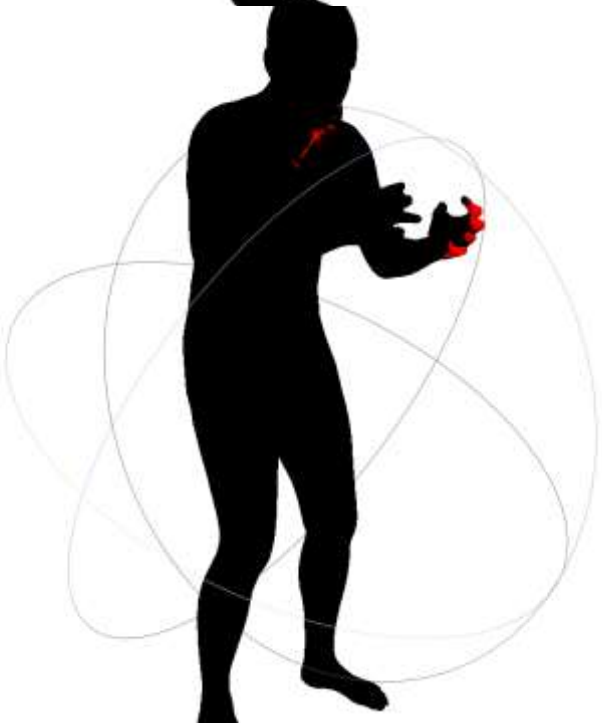
C.2. Failure Cases

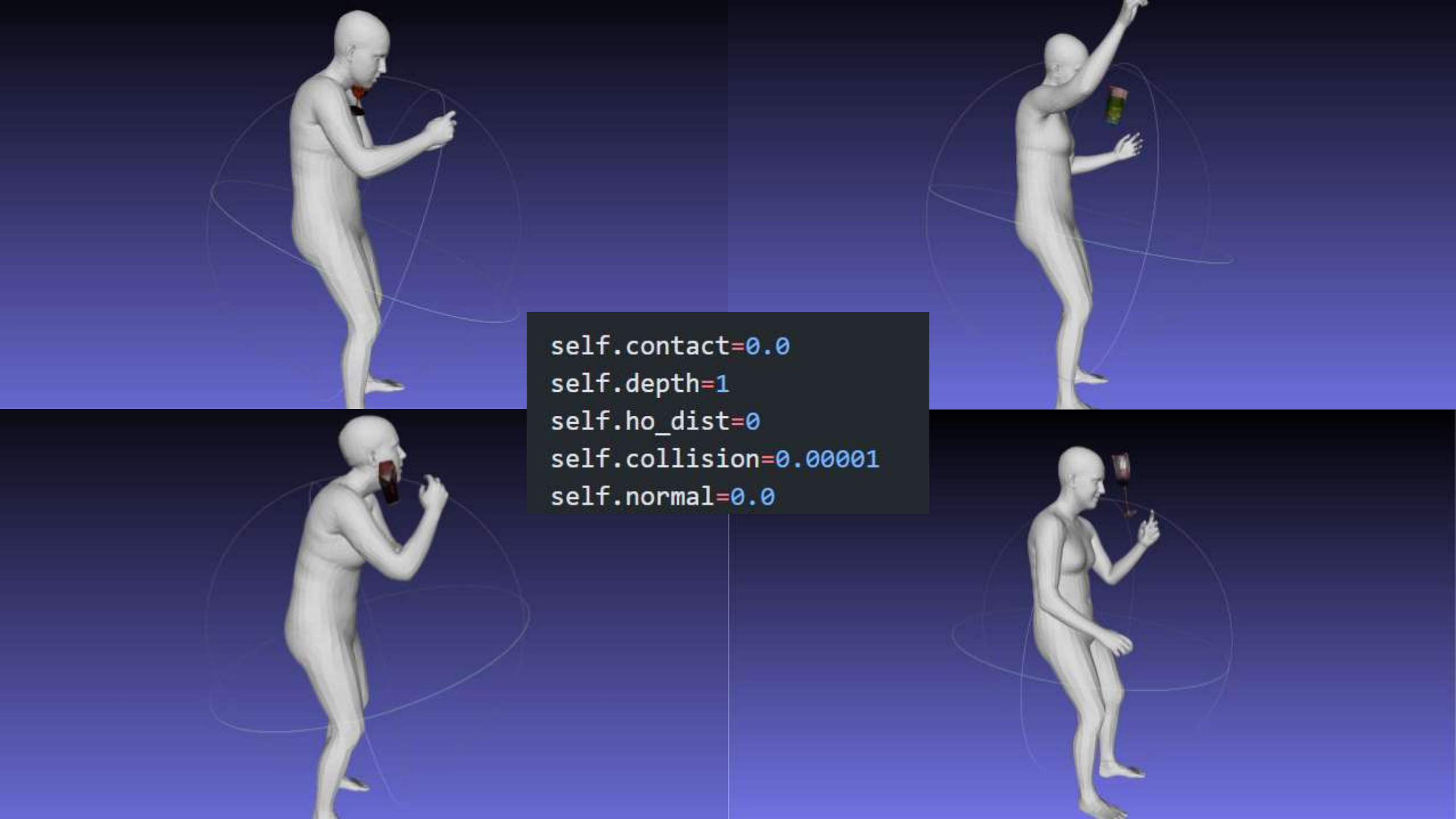
Fig. 21 shows some failure cases of our HOI-Gaussian optimizer. In these cases, human body parts occlude each other severely, and the object happens to be located between the occluded areas, which becomes challenging to determine which body part the object should contact with.

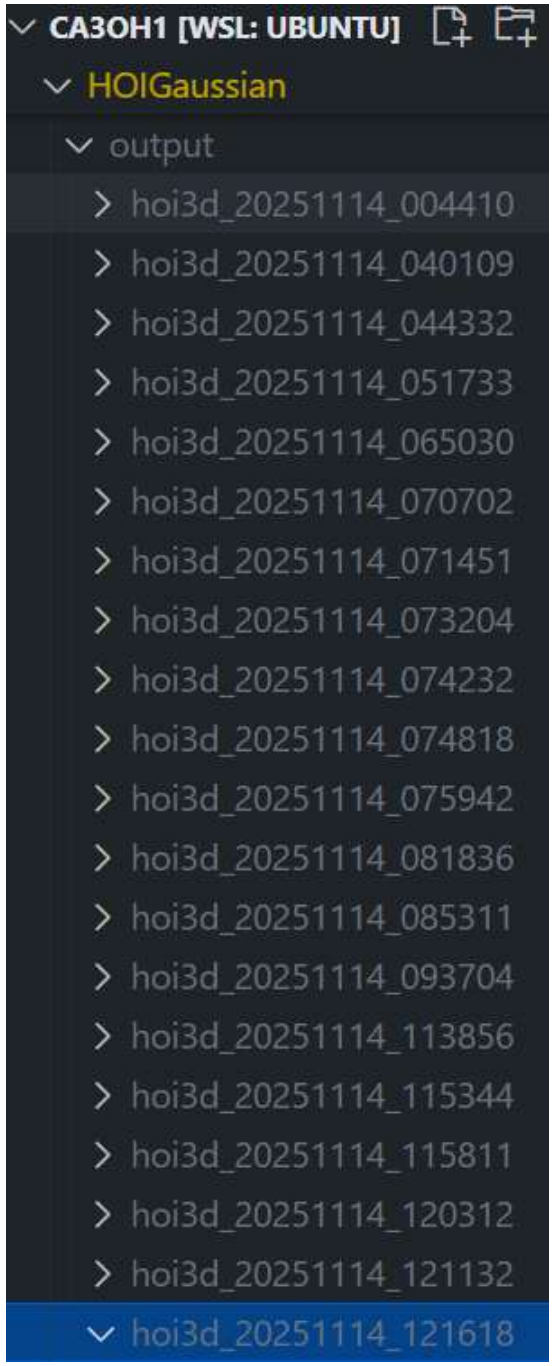
Sandwich

Paper

GT




self.contact=0.0
self.depth=1
self.ho_dist=0
self.collision=0.00001
self.normal=0.0




```
self.contact=100
self.depth=0
self.ho_dist=0
self.collision=0
self.normal=0.0
```

```
0, contact=1.21, depth=0, collision=0]
0, contact=1.21, depth=0, collision=0]
, contact=1.21, depth=0, collision=0]
, contact=1.21, depth=0, collision=0]
0, contact=1.21, depth=0, collision=0]
0, contact=1.21, depth=0, collision=0]
0, contact=1.21, depth=0, collision=0]
0, contact=1.21, depth=0, collision=0]
0, contact=1.21, depth=0, collision=0]
0, contact=1.21, depth=0, collision=0]
0, contact=1.21, depth=0, collision=0]
, contact=1.21, depth=0, collision=0]
, contact=1.21, depth=0, collision=0]
0, contact=1.21, depth=0, collision=0]
0, contact=1.21, depth=0, collision=0]
0, contact=1.21, depth=0, collision=0]
0, contact=1.21, depth=0, collision=0]
, contact=1.21, depth=0, collision=0]
, contact=1.21, depth=0, collision=0]
n will switch to that of iio.v3.imread.
```

```
337         if contact_loss != 0 and contact_loss is not None:
```

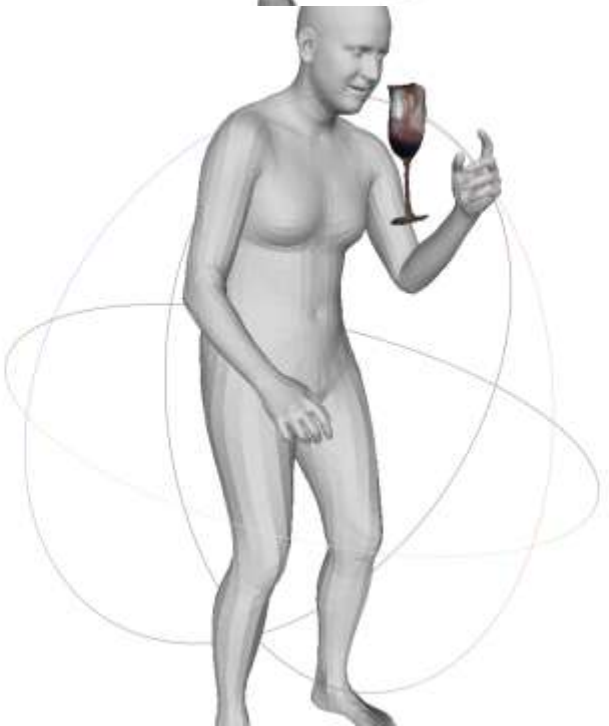
train.py Git 本地更改(工作树) - 第 7 个更改(共 13 个)

```
                else:
274 335             collision_loss = None
275 336
276             if contact_loss != 0 and contact_loss is None:
    337         if contact_loss != 0 and contact_loss is not None:
277 338             contact_loss.backward(retain_graph=True)
278 339
                if depth_loss != 0 and depth_loss != None:
338             contact_loss.backward(retain_graph=True)
```


```
contact=1.19, depth=0, collision=0]
 contact=1.19, depth=0, collision=0]
 contact=0.2, depth=0, collision=0]
contact=0.2, depth=0, collision=0]
contact=0.208, depth=0, collision=0]
 contact=0.208, depth=0, collision=0]
 contact=0.278, depth=0, collision=0]
 contact=0.278, depth=0, collision=0]
 contact=0.158, depth=0, collision=0]
contact=0.158, depth=0, collision=0]
contact=0.0845, depth=0, collision=0]
 contact=0.0845, depth=0, collision=0]
 contact=0.0977, depth=0, collision=0]
 contact=0.0977, depth=0, collision=0]
 contact=0.0857, depth=0, collision=0]
 contact=0.0857, depth=0, collision=0]
 contact=0.0654, depth=0, collision=0]
 contact=0.0654, depth=0, collision=0]
```

```
self.contact=100
self.depth=0
self.ho_dist=0
self.collision=0
self.normal=0.0
```

Paper




self.contact=100
self.depth=0
self.ho_dist=0
self.collision=0
self.normal=0.0
GT

TODO & Problems

TODO:

- Debug: Prevent the ‘not None’ like cases.

- Convert the current dataset to train Contact Area GT Model/Network!

- **Structure & Training!**

- Enable scaling rotating & **SMPLX Changing** in HOI-Optimizer.

-

Problems:

- **As an output, the size of contact score on Object is not fixed:**

  Current solution, down sampling to under 8000, and add 0 to 8000

- **Dataset Size might not enough:**

  .....

THANKS