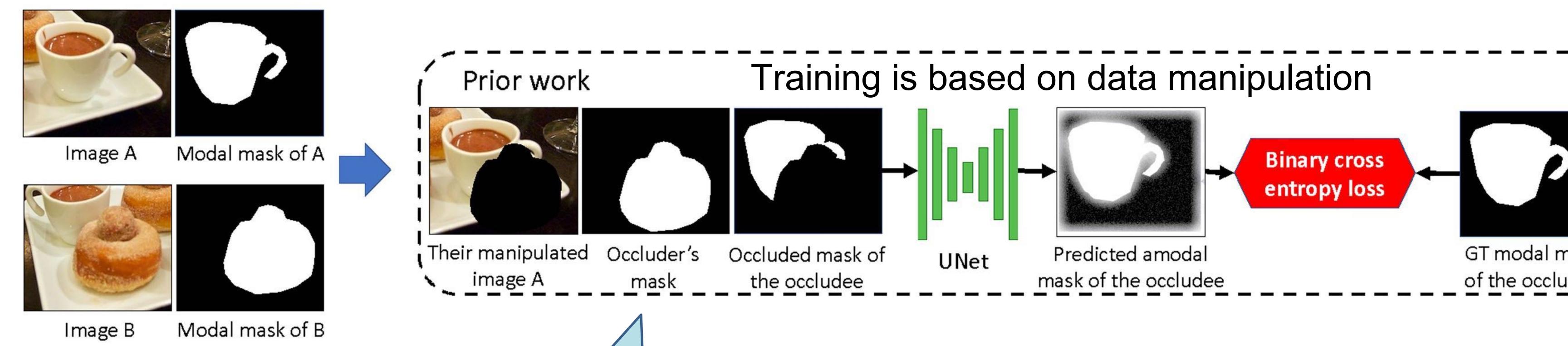


Khoi Nguyen and Sinisa Todorovic

Problem Statement

- Segmentation of visible and occluded object parts -- **amodal** object segmentation
- Weak supervision: training has access to ground-truth **modal** segmentation masks of visible object parts.

Prior Work – PCNet



Motivation

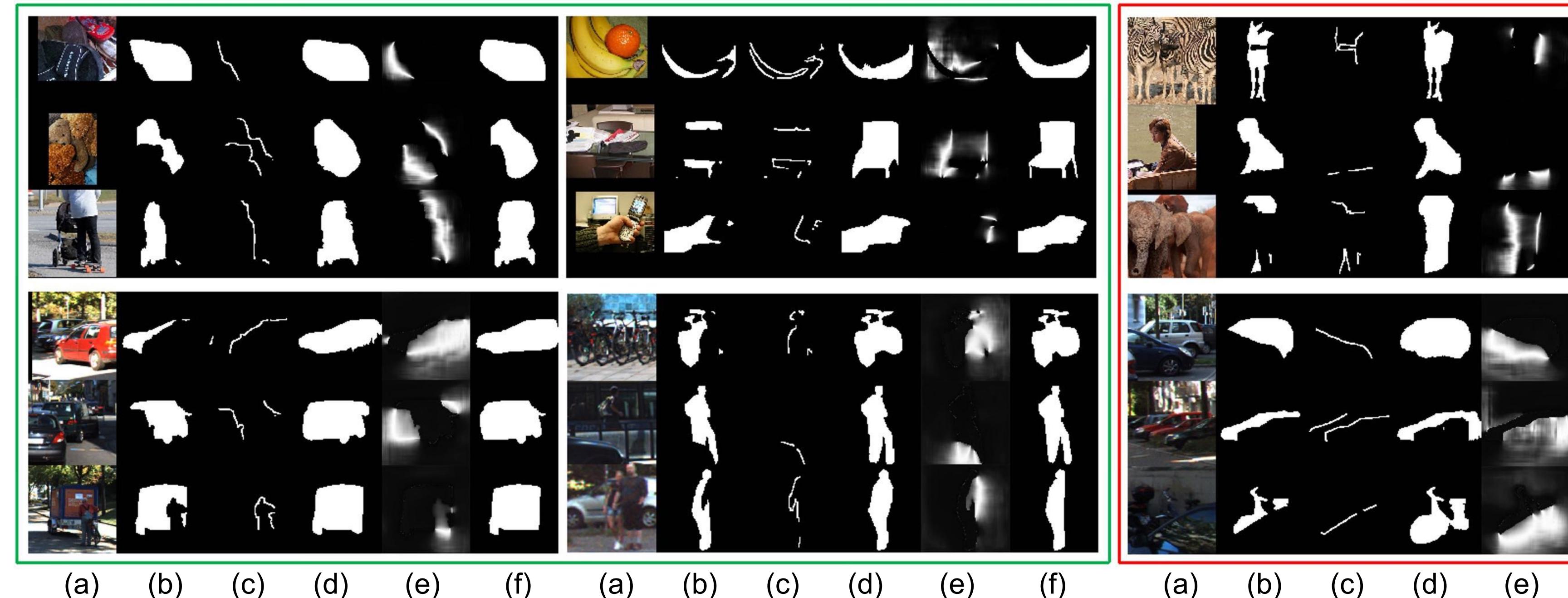
Restrictive, since the occluder itself cannot be partially occluded.

Contribution 1: Instead of the occluder mask use the occlusion boundary as input to UNet.

Does not account for uncertainty that many amodal masks may correspond to the same modal mask.

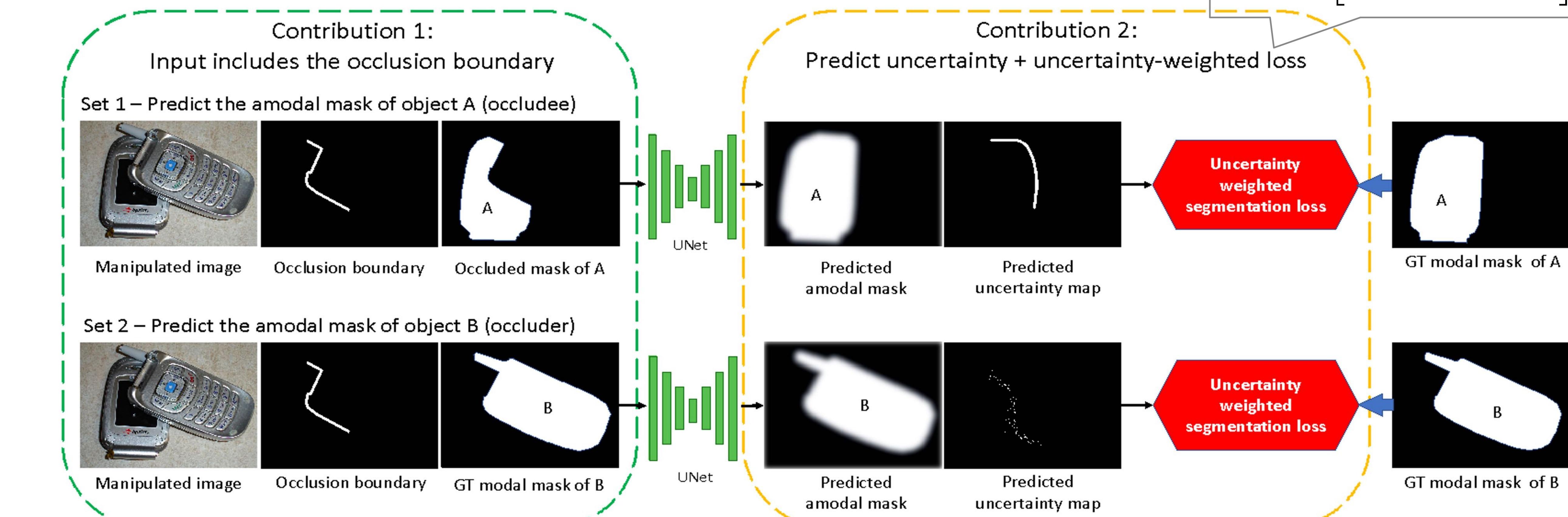
Contribution 2: Estimate uncertainty of the predicted amodal mask, and use uncertainty to regularize learning.

Amodal Completion Results



(a) input image, (b) modal mask, (c) occlusion boundary, (d) predicted amodal mask, (e) predicted uncertainty map, (f) ground-truth amodal mask.

Our Approach



Amodal Instance Segmentation Results

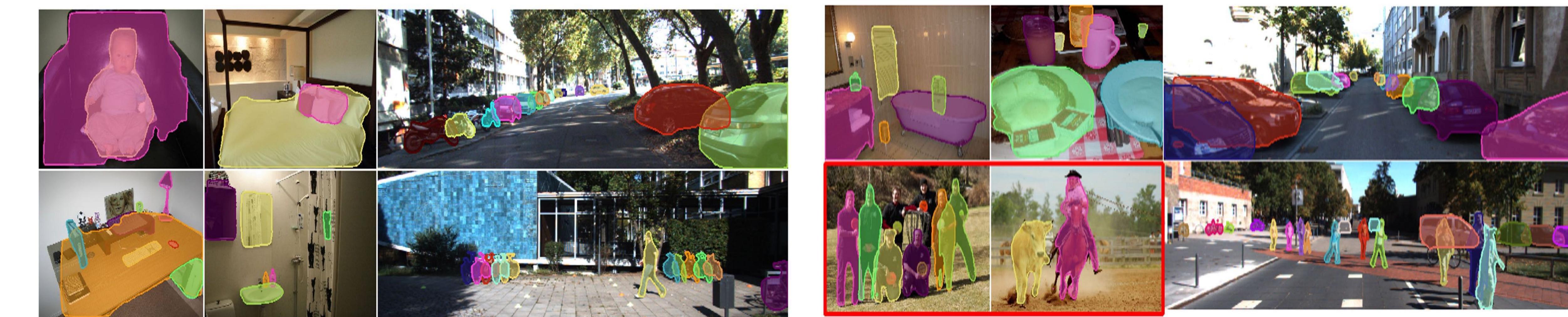


Table 1. Amodal completion and ordering recovery

| Methods | COCOA-val | | COCOA-test | | KINS-test | | |
|----------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | O-Acc | mIOU | O-Acc | mIoU | O-Acc | mIoU | inv-mIoU |
| Amodal-VAE [75] (reported) | - | - | - | - | - | 94.68 | 62.85 |
| PCNet-m [123] (reported) | 87.10 | 81.35 | - | - | 92.50 | 94.76 | - |
| PCNet-m (reproduced) | 85.75 | 80.73 | 86.73 | 86.63 | 91.73 | 94.52 | 59.24 |
| Boundary→PCNet-m | 89.01 | 82.85 | 89.22 | 88.67 | 92.26 | 94.65 | 62.77 |
| Uncertainty→PCNet-m | 88.60 | 82.49 | 88.40 | 88.15 | 92.08 | 94.61 | 62.00 |
| uBCE→ASBU | 89.23 | 83.18 | 89.32 | 88.10 | 92.15 | 94.34 | 63.41 |
| ASBU | 90.33 | 84.22 | 90.77 | 89.87 | 92.65 | 94.83 | 64.41 |

Table 2. Amodal segmentation of Mask-RCNN

| Datasets | Trained on | AP | AP ₅₀ | AP ₇₅ |
|------------|----------------|------|------------------|------------------|
| COCOA-val | GT amodal | 22.2 | 44.8 | 20.0 |
| COCOA-test | PCNet-m amodal | 21.0 | 43.4 | 18.5 |
| KINS-test | ASBU amodal | 22.2 | 44.5 | 20.0 |
| COCOA-val | GT amodal | 23.9 | 48.4 | 21.5 |
| COCOA-test | PCNet-m amodal | 22.6 | 46.8 | 19.7 |
| KINS-test | ASBU amodal | 23.8 | 47.9 | 21.2 |
| COCOA-val | GT amodal | 30.8 | 53.9 | 31.6 |
| COCOA-test | PCNet-m amodal | 29.1 | 51.8 | 29.6 |
| KINS-test | ASBU amodal | 29.3 | 52.1 | 29.7 |