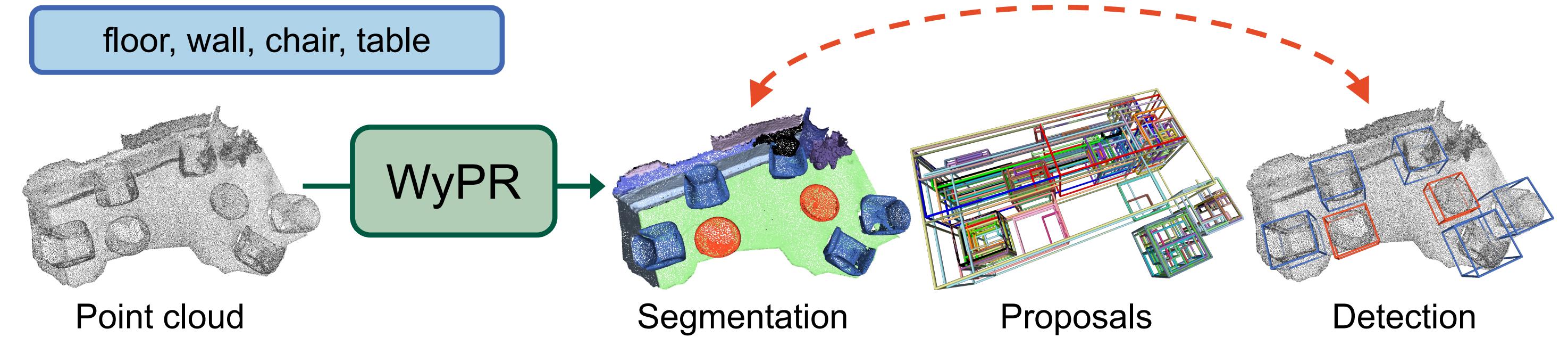


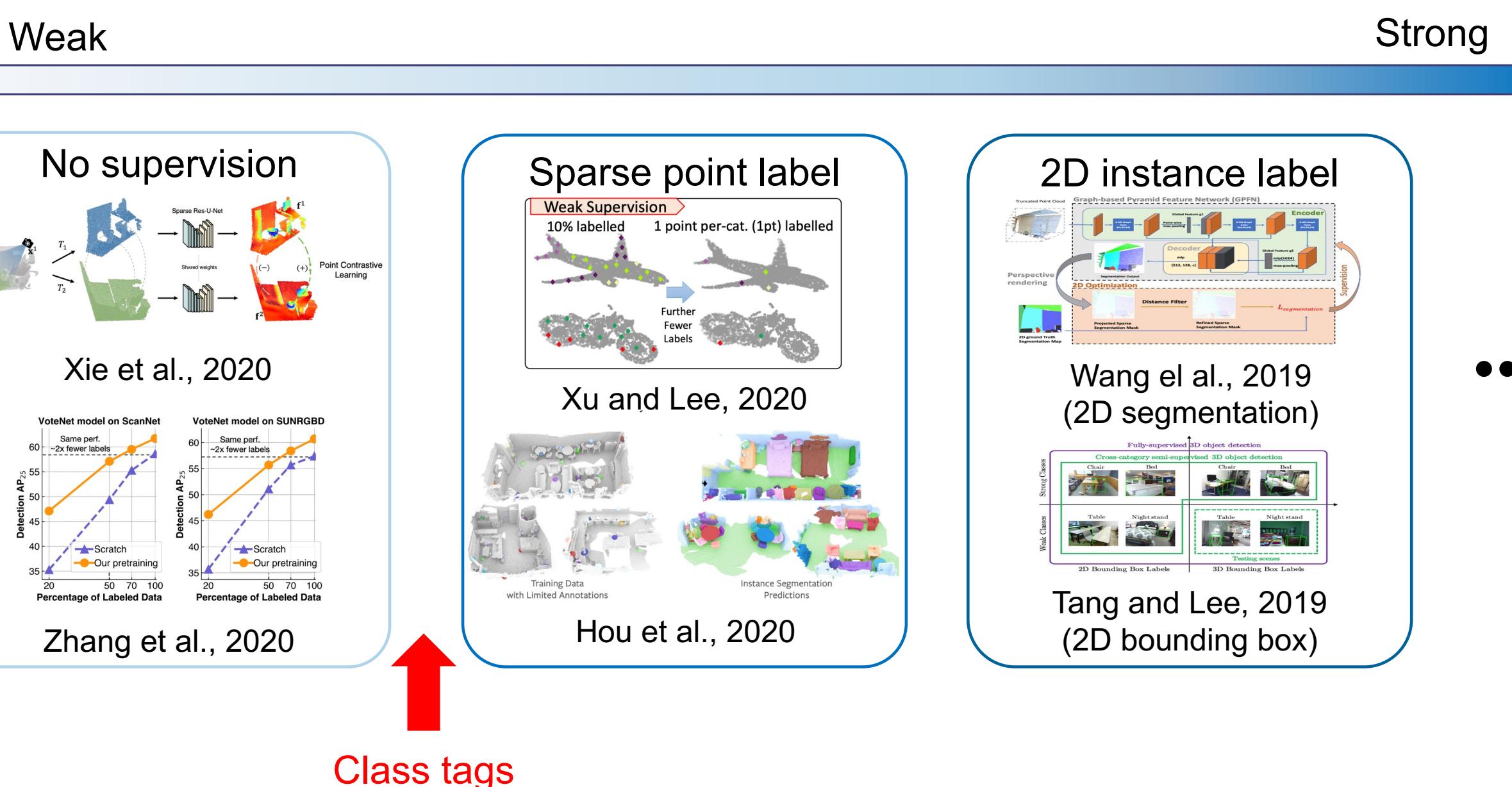
## Overview

**Goal:** train 3D recognition framework with class tags

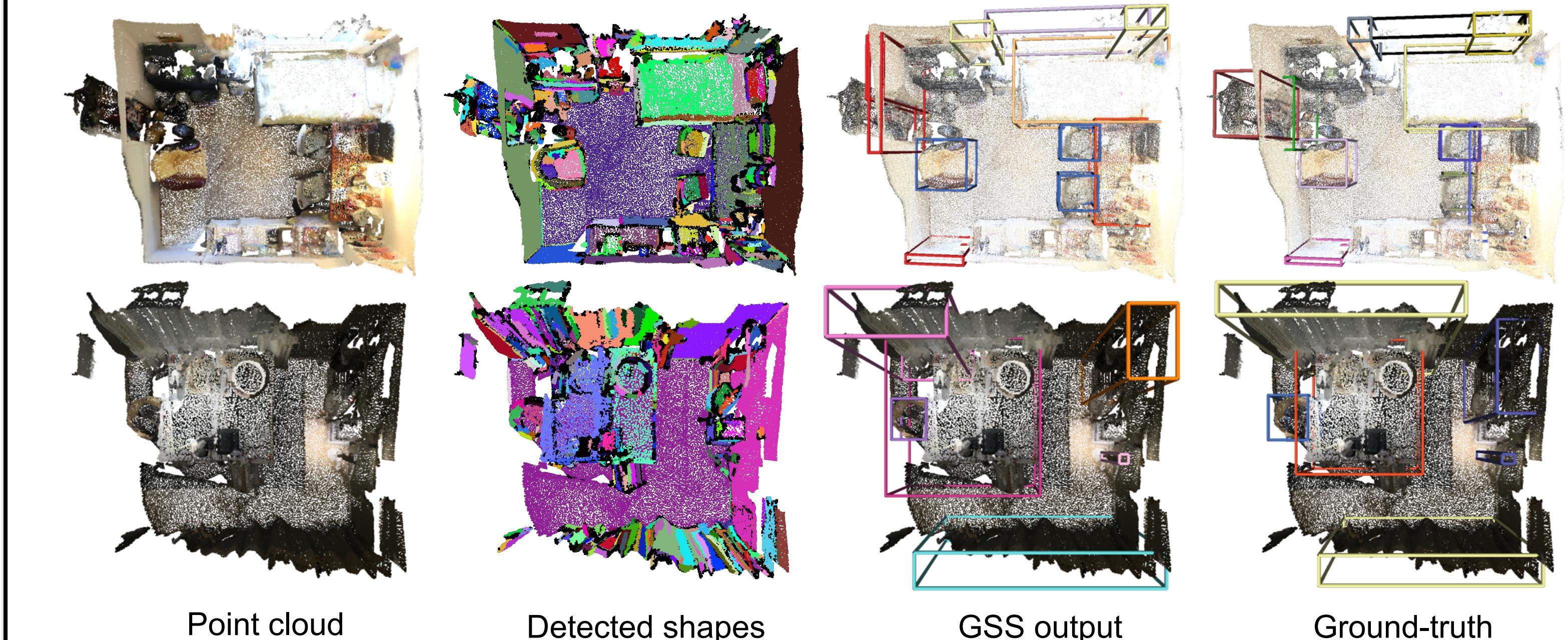


**Novelties:** 1) multi-task joint learning  
2) unsupervised proposal generation

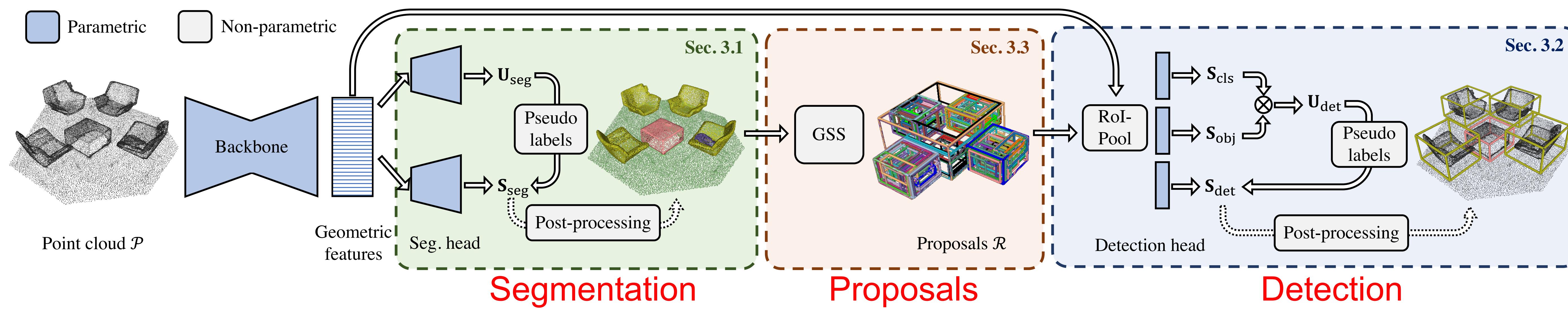
## Prior work



## Results

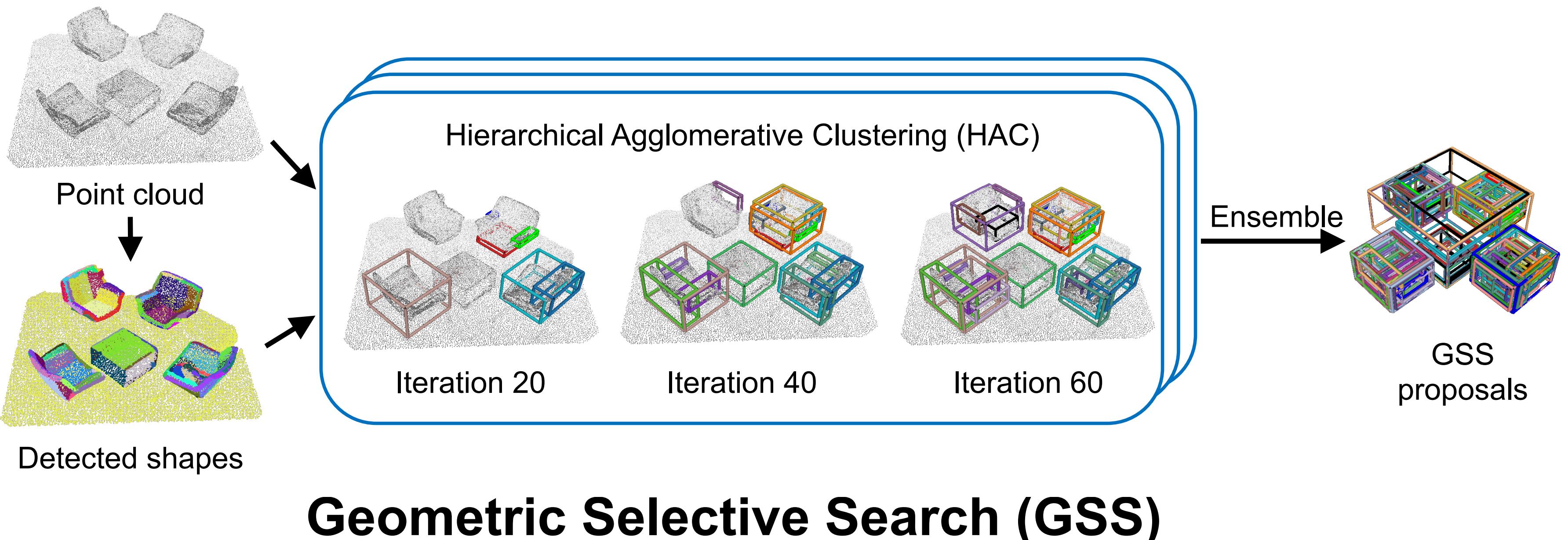


## WyPR: Weakly-supervised Point Cloud Recognition



### Training objectives:

- Multiple instance learning (MIL)
- Self-training
- Cross-task consistency
- Cross-transformation consistency
- Local smoothness



## Geometric Selective Search (GSS)

### Segmentation

Methods	Split	mIoU
PCAM (Wei 2020)	train	22.1
MPRM (Wei 2020)	train	24.4
WyPR	train	<b>30.7</b>
MIL-Seg	val	20.7
WyPR	val	<b>29.6</b>
WyPR+prior	val	<b>31.1</b>
PointNet++ (Qi 2017)	val	55.7
SparseConv (Choy 2019)	val	73.6

### Proposal & Detection

Methods	#boxes	MABO	AR	mAP
Qin 2020	1k	0.092	23.6	N/A
GSS	256	0.321	73.4	N/A
GSS	1k	<b>0.378</b>	<b>86.2</b>	N/A
MIL-det	1k	0.378	86.2	9.6
WyPR	1k	<b>0.409</b>	<b>89.3</b>	<b>18.3</b>
WyPR+prior	1k	<b>0.427</b>	<b>90.5</b>	<b>19.7</b>
VoteNet (Qi 2021)	256	0.436	84.7	58.6
VoteNet (Qi 2021)	1k	0.450	88.1	55.3