2021 ICCV OCTOBER 11-17 VIRTUAL

FloorPlanCAD: A Large-Scale CAD Drawing Dataset for Panoptic Symbol Spotting

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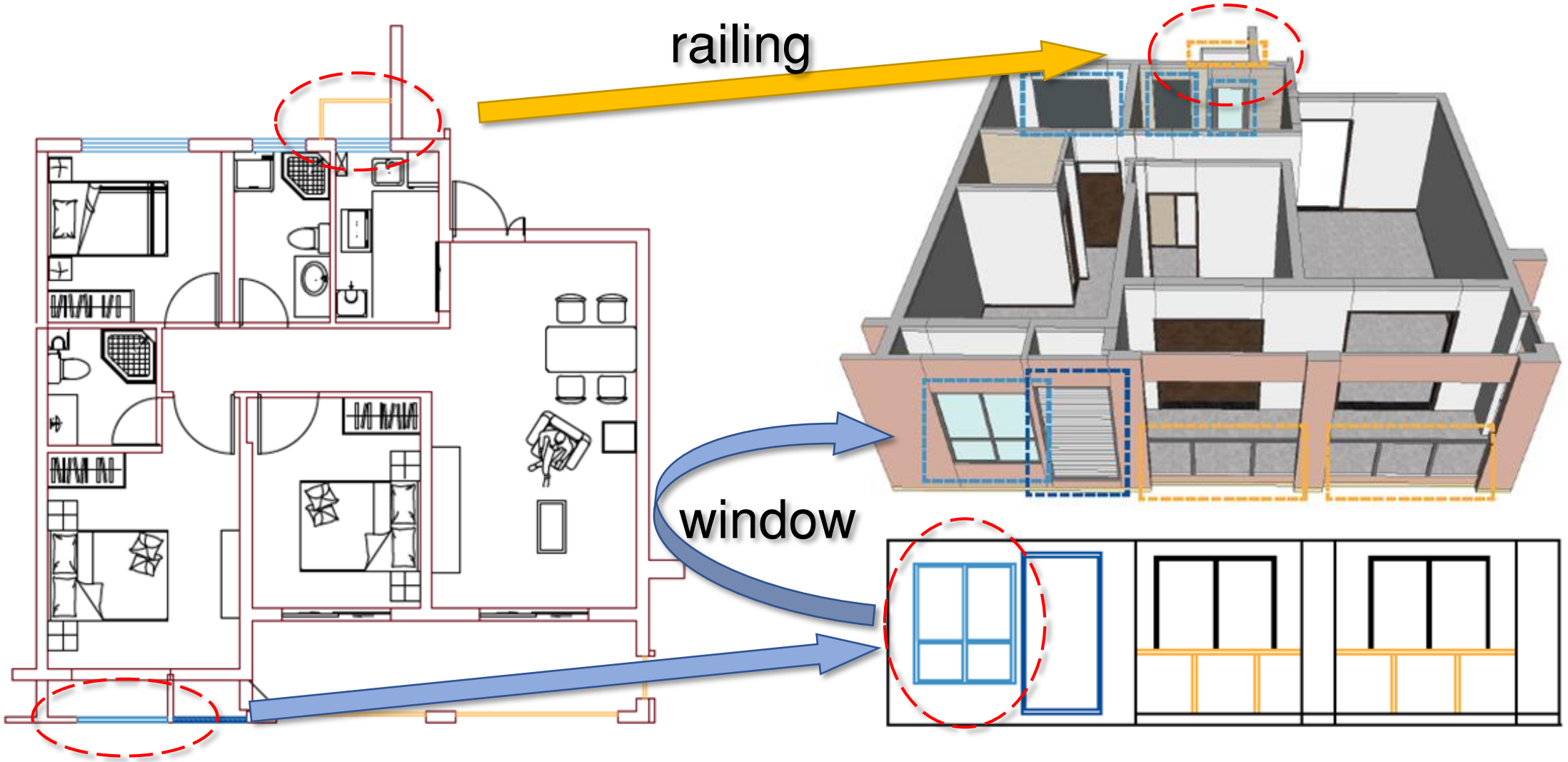
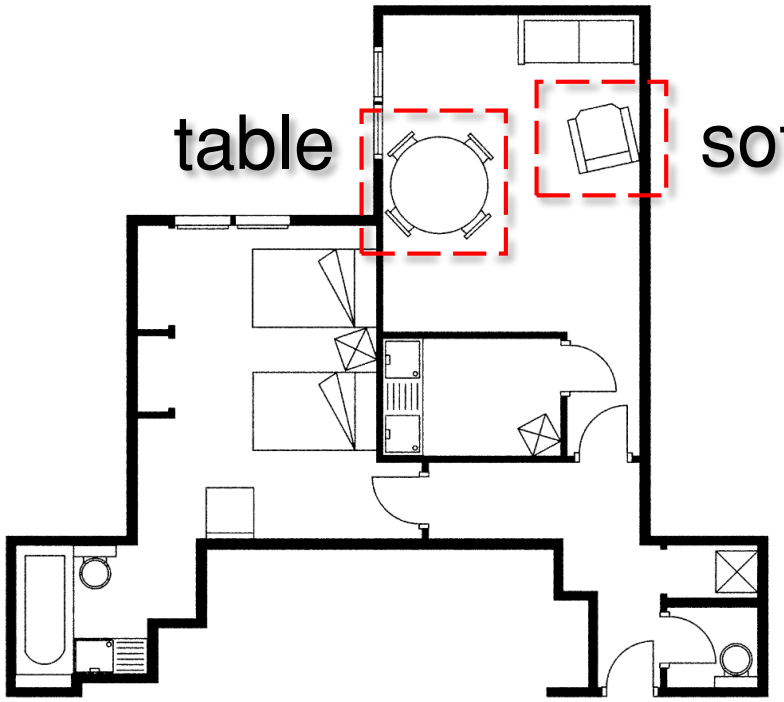
Github page: https://floorplancad.github.io

CAD Drawings

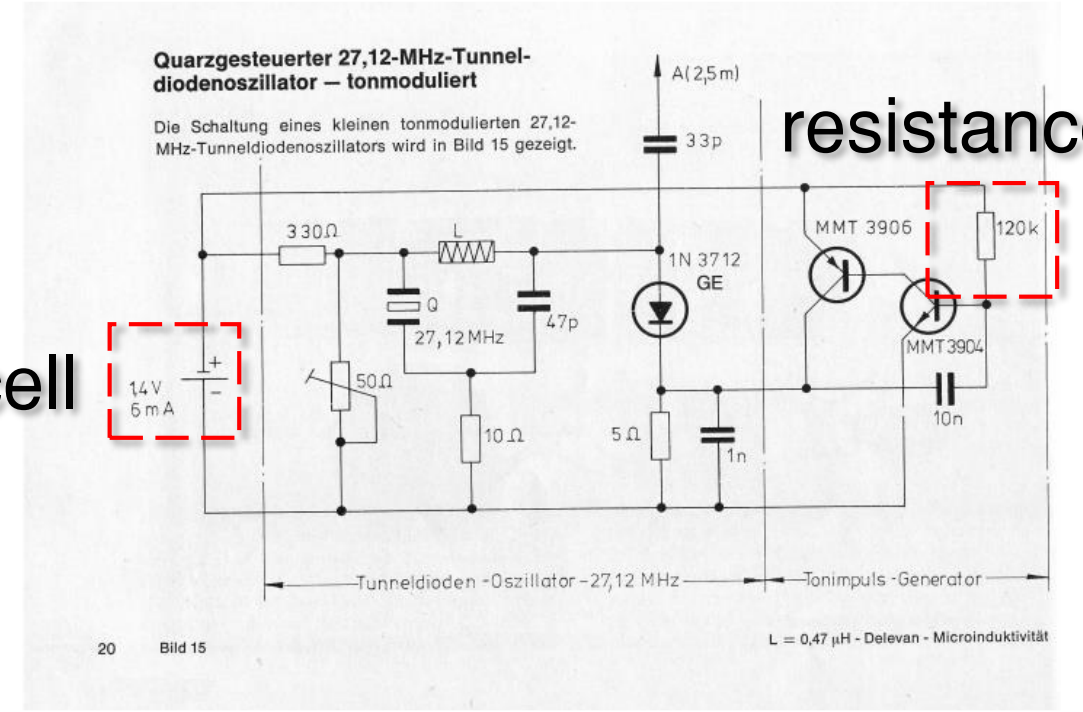


Symbol Spotting

- Recognition of embedded graphic symbols

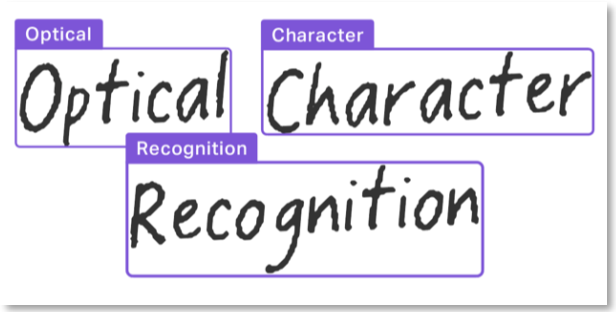


Floor plan



Scanned circuit diagram

Related Topics



OCR

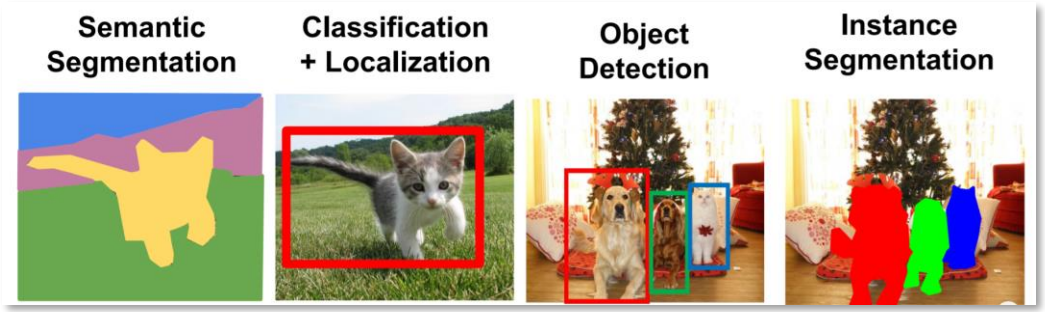
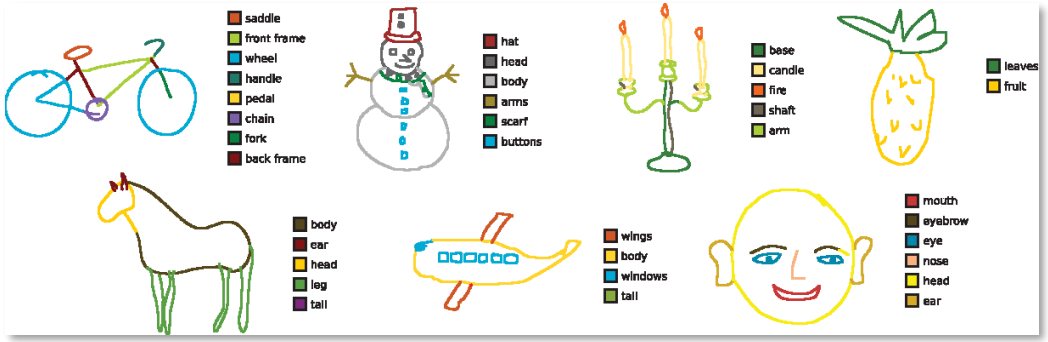


Image segmentation / detection

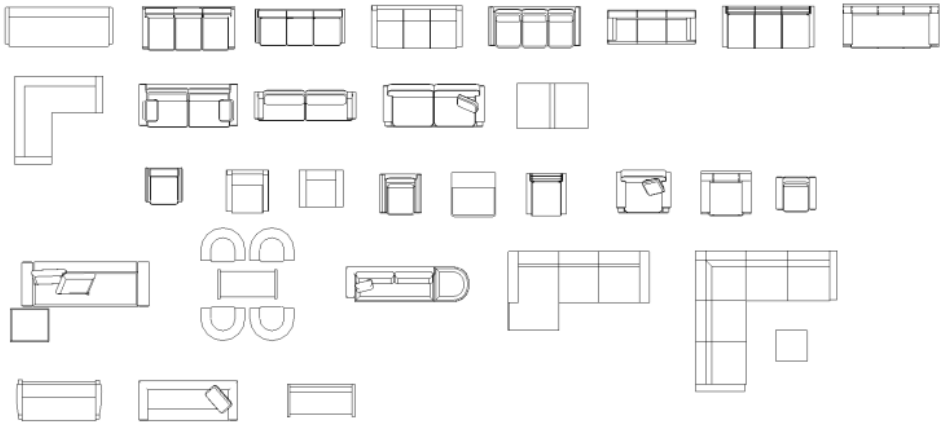
Panoptic segmentation



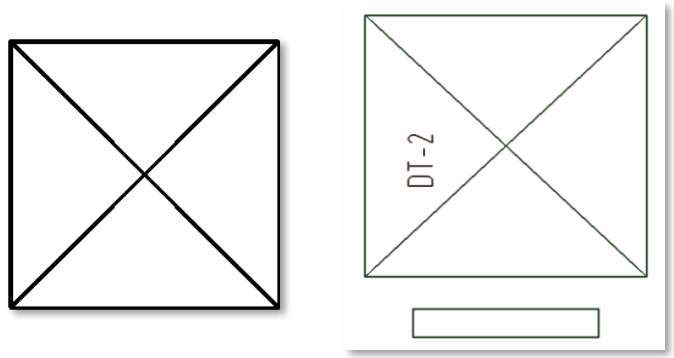
Sketch segmentation

Symbol Spotting Challenges

- Assembly of **geometric primitives**
- Abstract symbols with **low texture**
- **Professional knowledge** in the field



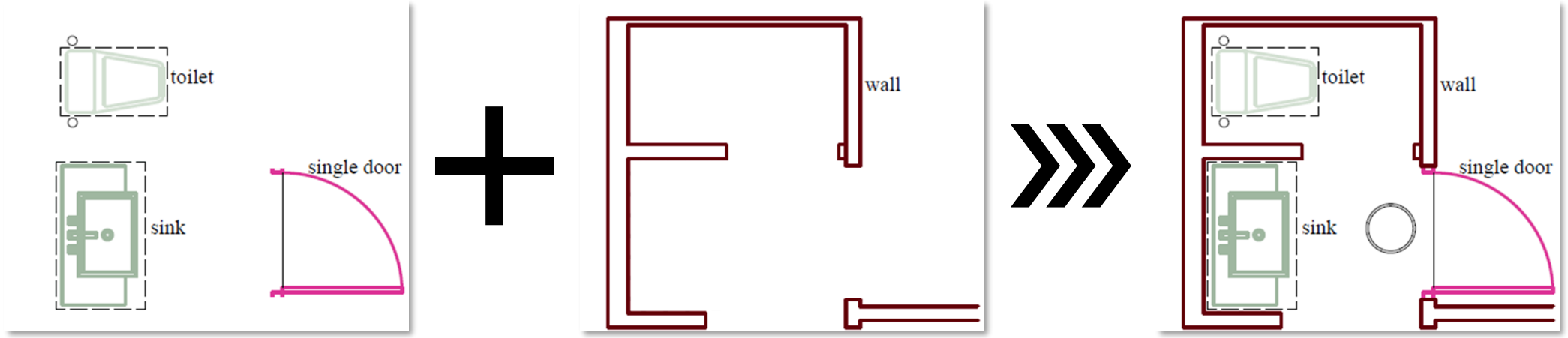
Intra-class variance (sofa)



Inter-class similarity (table & elevator)

Panoptic Symbol Spotting

- Panoptic segmentation + symbol spotting

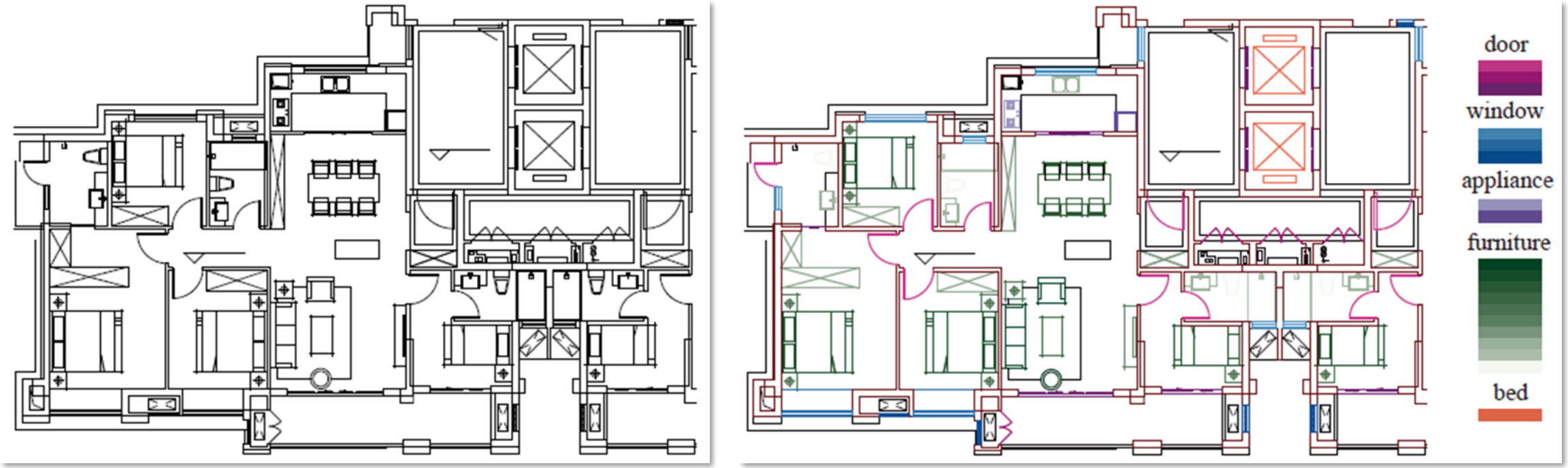


countable thing symbol uncountable stuff symbol panoptic symbol spotting

$$PQ = RQ \times SQ = \frac{\sum_{(s^p, s^g) \in TP} \text{IoU}(s^p, s^g)}{|TP| + \frac{1}{2}|FP| + \frac{1}{2}|FN|}.$$

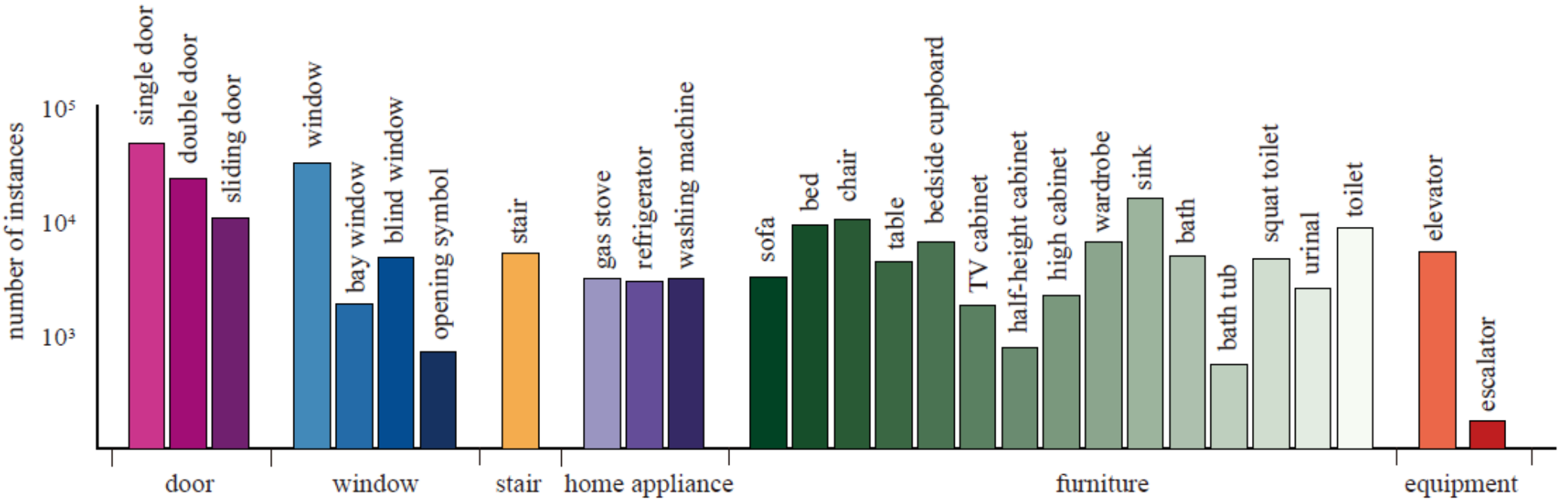
FloorPlanCAD Dataset

- Line **segment grained** annotation
- **Large-scale**, **real-world** and **vector graphics**



Dataset Statistics

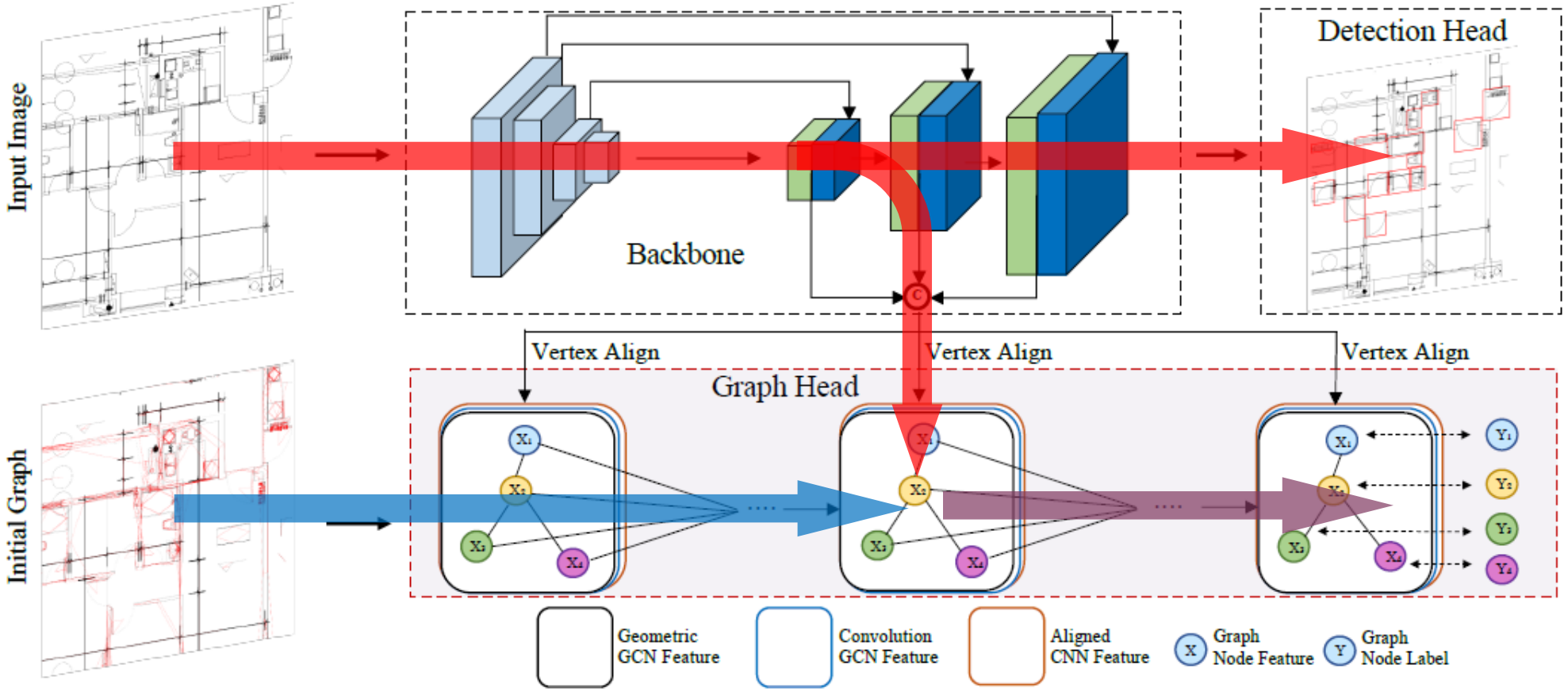
Dataset	source	scale		image		annotation		
		#classes	#size	raster	vector	instance	semantic	vector
SESYD [8]	synthetic	16	1000	✓	✓	✓		
FPLAN-POLY [33]	internet	38	48	✓		✓		
BRIDGE [13]	internet	-	13000			✓		
FloorPlanCAD	industry	30	10094	✓	✓	✓	✓	✓



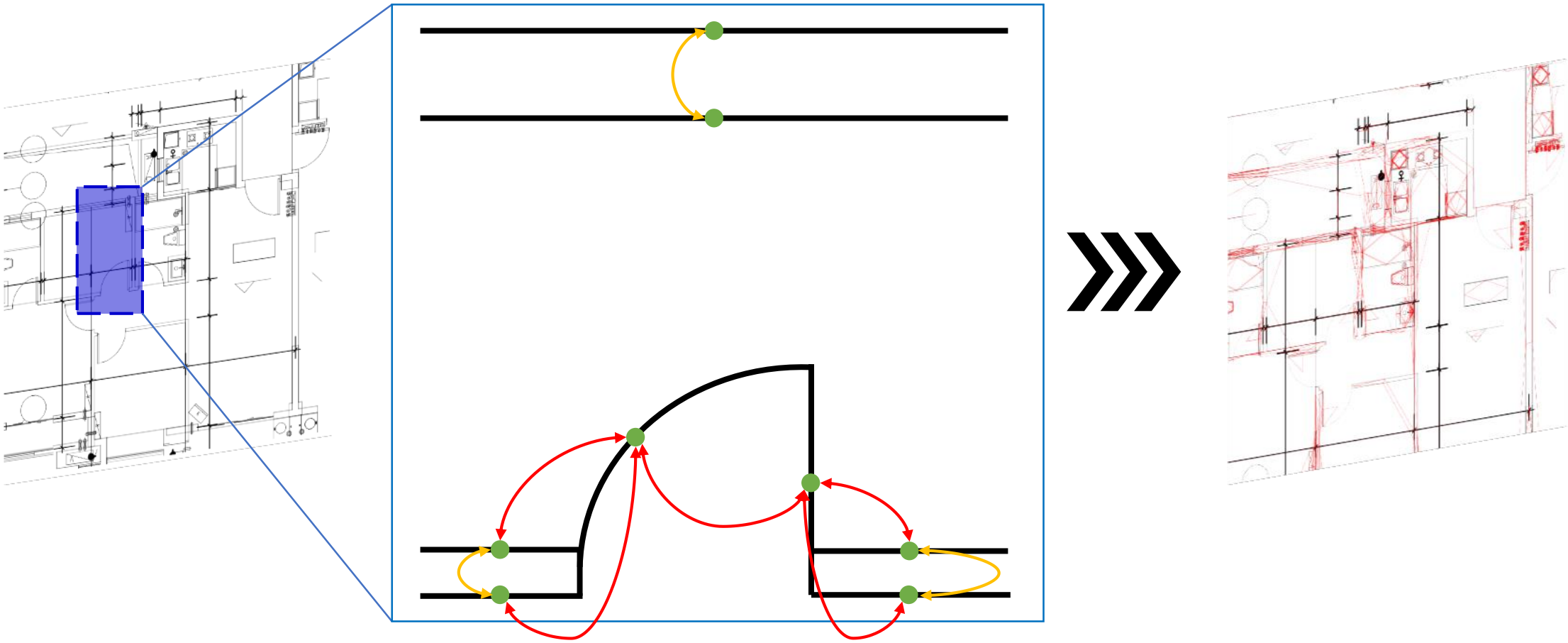
PanCADNet Architecture

- Visual + Geometric features

$$Loss_{Total} = \lambda * Loss_{GCN} + Loss_{Detection}$$

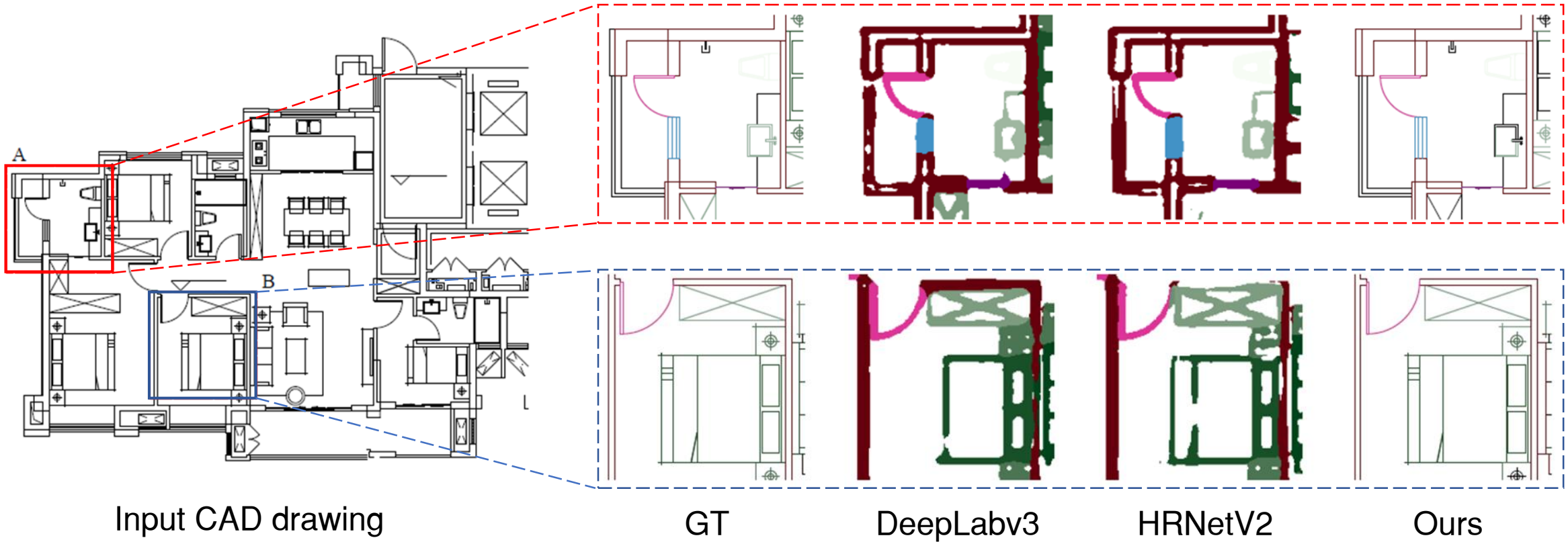


Graph Construction



Experiments

- Results of the semantic symbol spotting task

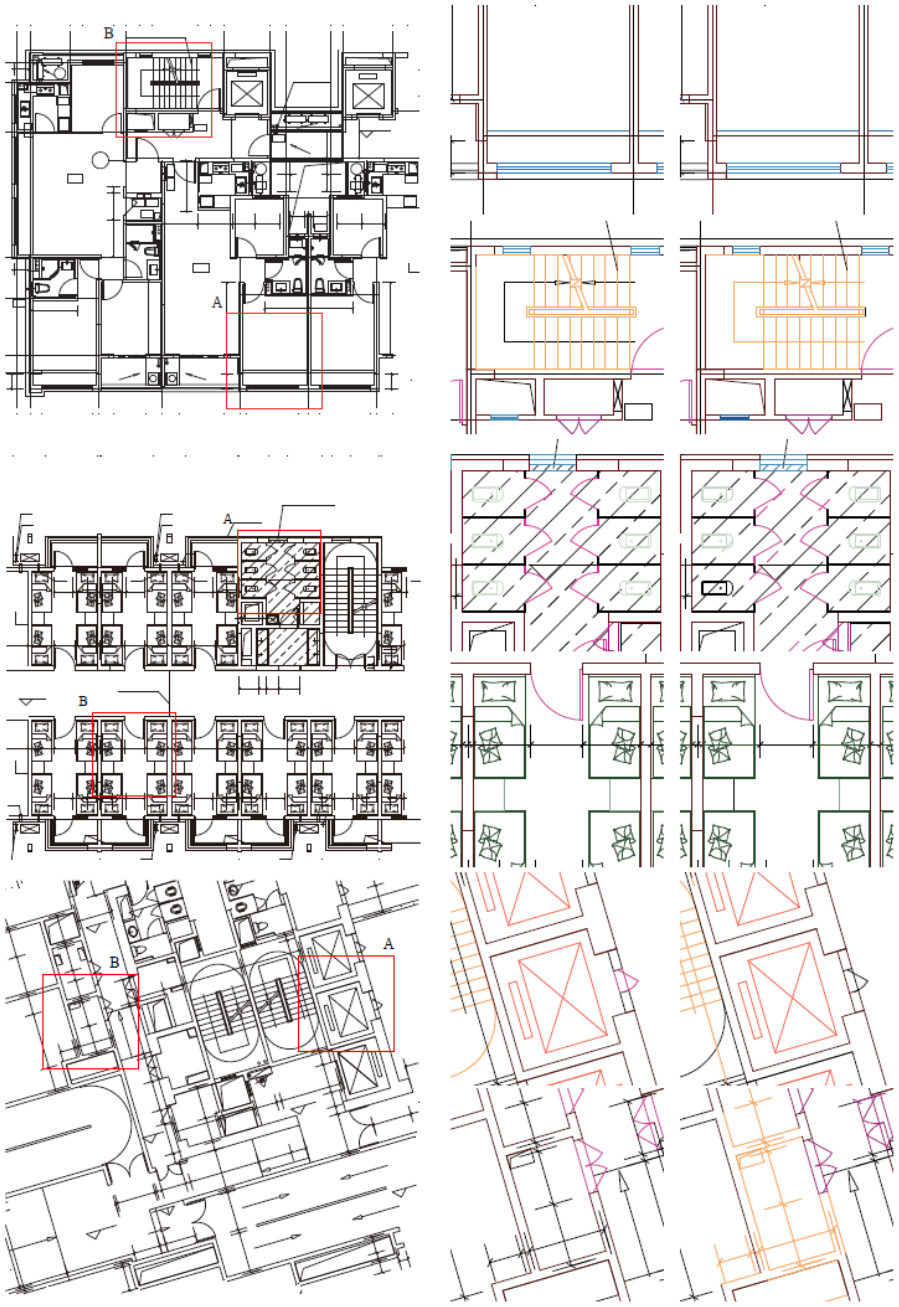


Experiments

- Effectiveness of the proposed GCN head

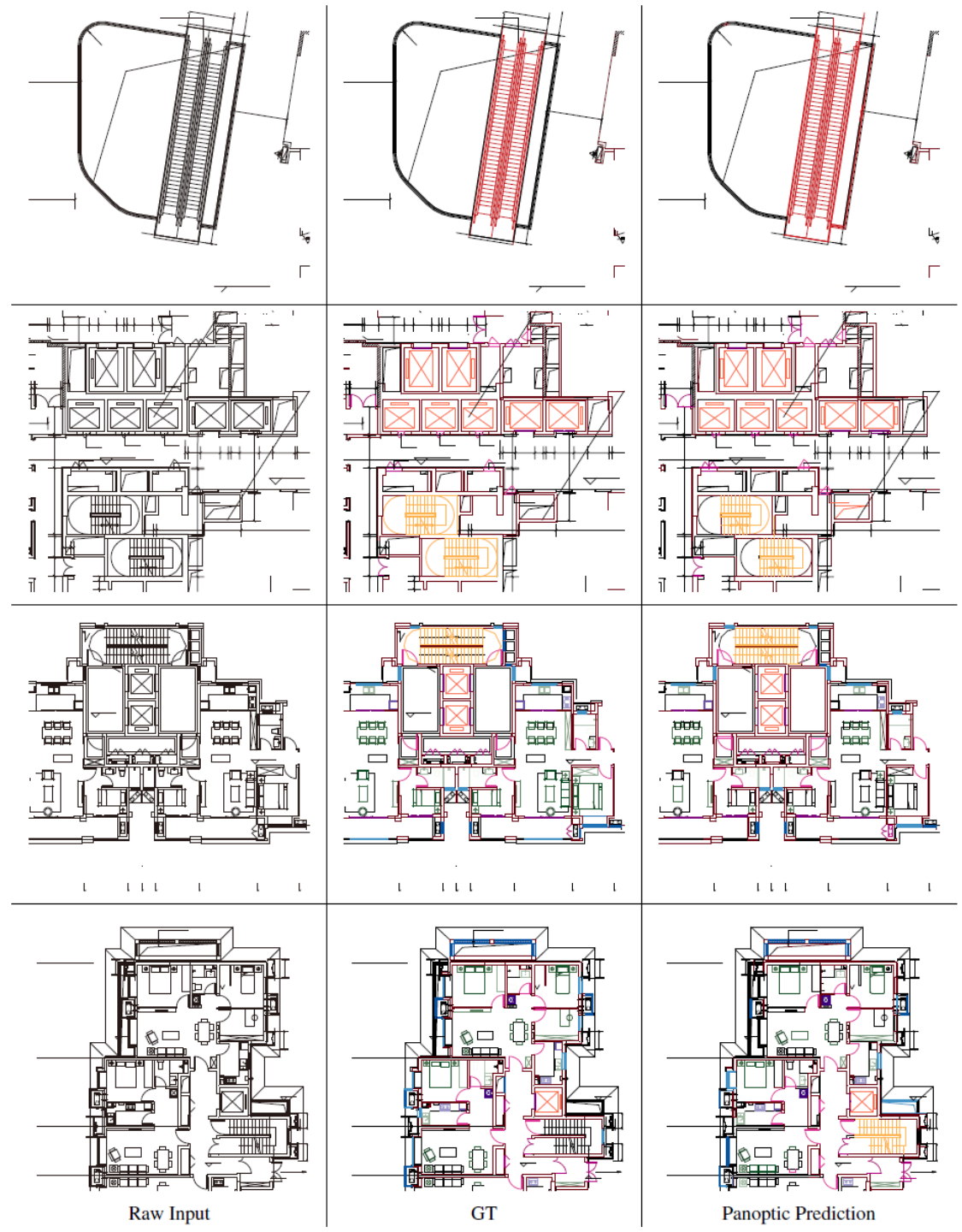
Categories	F1	Weighted F1
HRNetsV2 W18 [42]	0.656	0.683
HRNetsV2 W48 [42]	0.666	0.693
DeepLabv3+ R50 [5]	0.680	0.705
DeepLabv3+ R101 [5]	0.688	0.714
Ours	**0.806**	**0.798**

Categories	Door	Window	Stair	Appliance	Furniture	Equipment	Wall	Parking lot
HRNetsV2 W18 [42]	0.821	0.620	0.845	0.597	0.726	0.880	0.620	0.610
HRNetsV2 W48 [42]	0.811	0.640	0.847	0.651	0.754	0.889	0.624	0.577
DeepLabv3+ R50 [5]	0.828	0.659	0.856	0.684	0.763	0.895	0.630	0.664
DeepLabv3+ R101 [5]	0.837	0.666	0.852	0.725	**0.780**	0.895	0.634	**0.669**
Ours	**0.848**	**0.709**	**0.857**	**0.769**	0.764	**0.926**	**0.814**	0.539



(a) Input floor plan

(b) GT (L) and prediction (R)



Raw Input

GT

Panoptic Prediction

Thank You