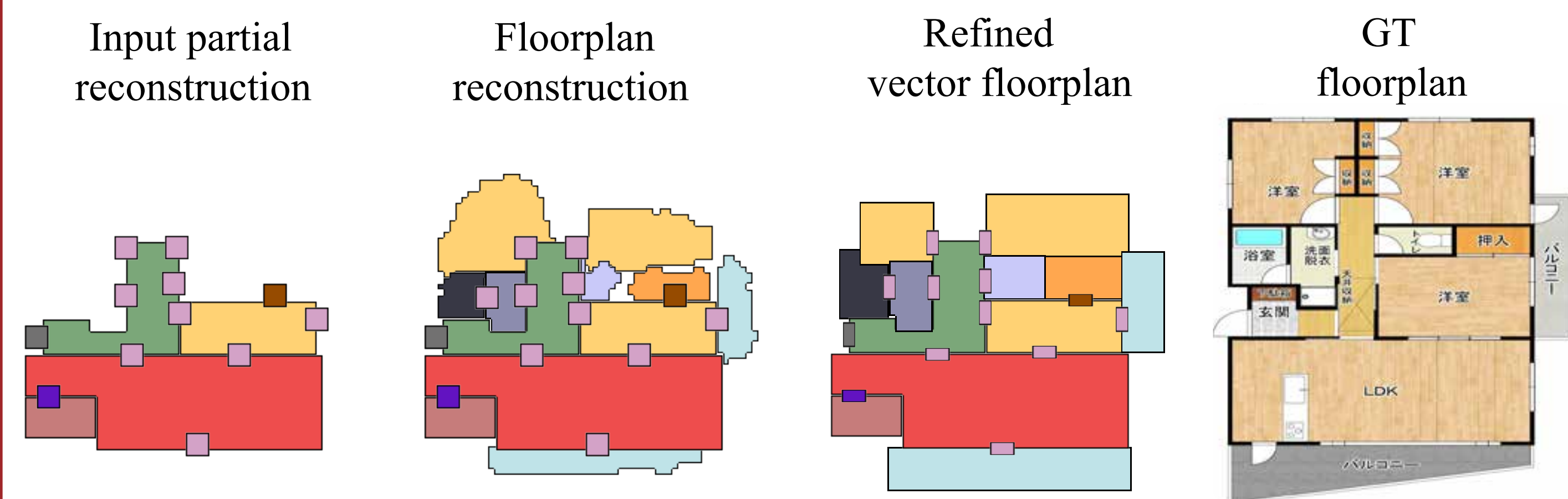


## Introduction

## Motivation:

- Introduce a novel floorplan restoration task where the objective is to restore a complete floorplan, including invisible architectural structures, from a partial floorplan inferred from panorama images.
- Propose and evaluate a neural architecture that encodes partial floorplans and recovers entire floorplans, even hallucinating invisible rooms and doors, thus showcasing its effectiveness over existing techniques.



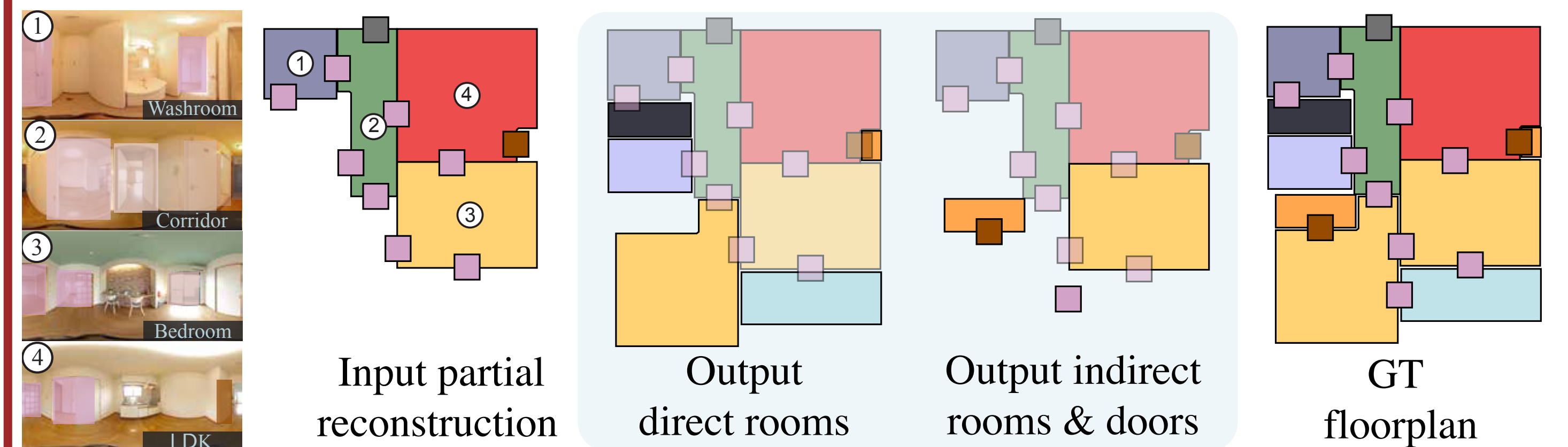
## Room and Door Categories.

**Visible rooms and doors:** Rooms available as input.

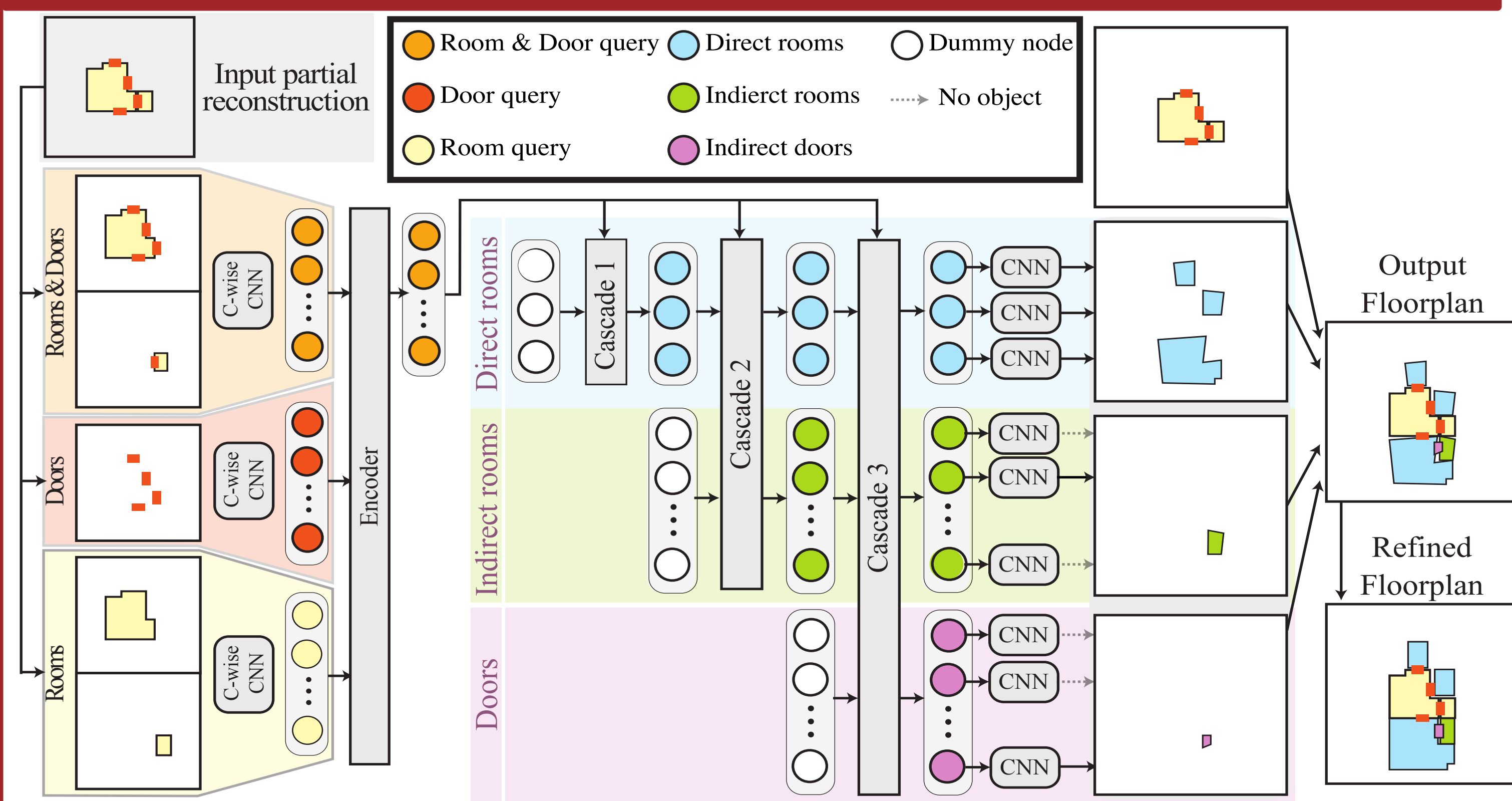
**Invisible direct rooms:** Rooms that are connect to the Visible rooms by visible doors or any other connection such as openings or frames. First cascaded decoder predict them

**Invisible indirect room:** Rooms that don't have a door directly connect them to the input (visible rooms). Second cascaded decoder predict them.

**Invisible doors:** Any door that is not provided in input, third cascaded decoder predict them.



## Method



The neural architecture employs a CNN/Transformer encoder and cascading Transformer decoders to transform a partial reconstruction into a refined vector-graphics floorplan.

**Visible Room/Door Encoder:**

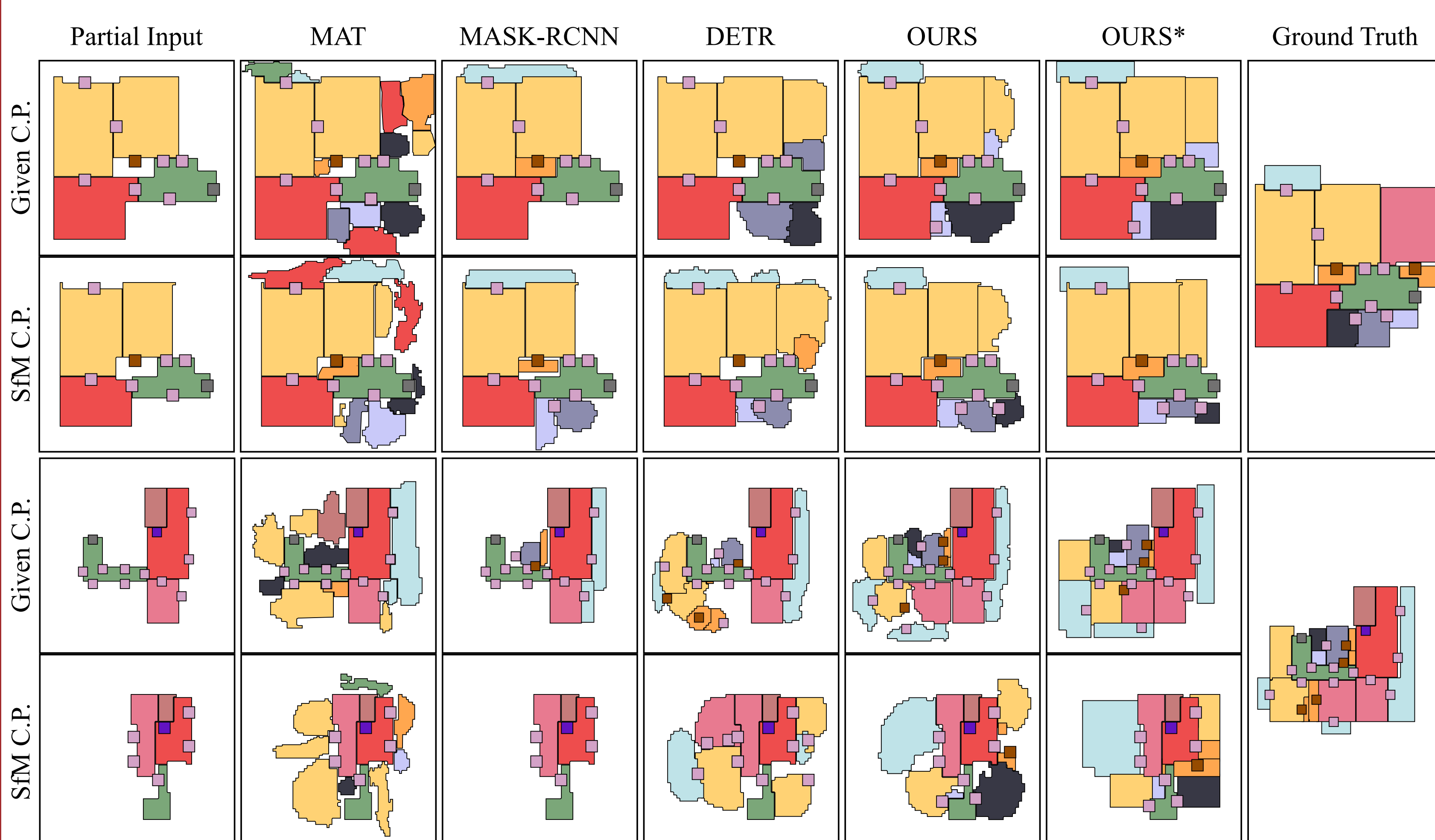
Extract features from visible room/doors (partial input floorplan)

**Cascaded Decoder:**

Three cascaded transformers, where each process both encoder and last transformer output as input and restore direct invisible rooms, indirect visible rooms and doors sequentially.

## Experiments

## Quantitative Results



## Quantitative Results on Ricoh dataset

Method	Rooms			Doors		
	Pre.	Rec.	F1	Pre.	Rec.	F1
MAT	20.3	43.2	27.6	10.6	11.3	11.0
Mrcnn	38.1	24.2	29.6	12.0	13.4	12.7
H-PP	33.7	33.1	33.4	10.3	9.9	10.1
DETR	30.6	47.3	37.1	13.0	13.5	13.2
Ours	49.2	50.8	50.0	20.2	19.3	19.7
Ours*	56.2	53.1	54.6	21.0	20.4	21.1

## Quantitative Results on RPLAN dataset

Method	Rooms			Doors		
	Pre.	Rec.	F1	Pre.	Rec.	F1
MAT	43.5	52.4	47.5	10.1	13.5	11.5
Mrcnn	46.4	37.6	41.5	11.5	10.3	10.8
House-GAN++	47.6	45.3	46.4	15.8	12.7	14.0
DETR	50.5	52.1	51.3	15.4	16.3	15.8
Ours	64.7	51.3	57.2	20.8	18.7	19.1
Ours*	65.8	53.0	58.7	22.9	22.3	22.6

## Discussion and future work

- ✓ New Task has been introduced
- ✓ Possible end to end neural architecture has been introduced
- ✓ A new dataset has been provided
- Using hidden information from panoramas.
- Improving performance on cases such as rooms with complicated shapes, or rooms that are not accessible via doors

## Related works

**Floorplan Generation:** Previous methods on floorplan are mostly need number of all the rooms in the house along with their type and room connections to generate full floorplan. [Shabani et al. 2023, Nauata et al. 2021, Hu et al. 2020].

**Image Inpainting:** State of the arts methods Li et al. (2022), Zheng et al. (2022), and Lugmayr et al. (2022) still face challenges in learning and predicting hallucinations within structured geometry.

## Acknowledgement

This research is partially supported by NSERC Discovery Grants with Accelerator Supplements and the DND/NSERC Discovery Grant Supplement, NSERC Alliance Grants, and the John R. Evans Leaders Fund (JELF). We are also thankful to RICOH for sharing the datasets.