Connecting the Dots: Floorplan Reconstruction Using Two-Level Queries

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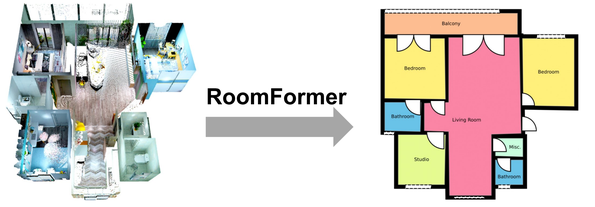
JUNE 18-22, 2023 CVPR VANCOUVER, CANADA

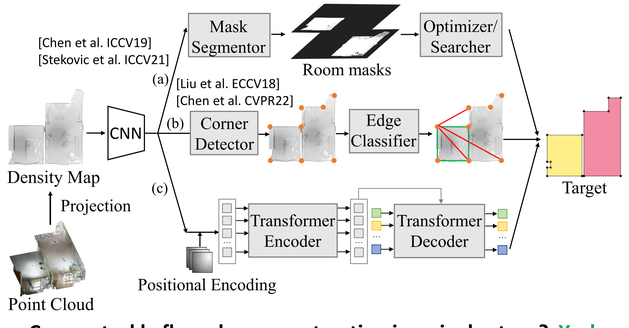
Paper, code, video are available at https://ywyue.github.io/RoomFormer/

1. Task: 2D Floorplans from 3D Scans



Input: 3D Scan **Output:** Semantic Floorplan

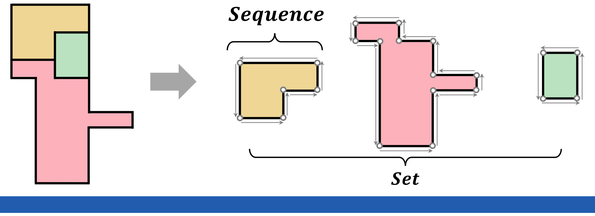
2. Motivation



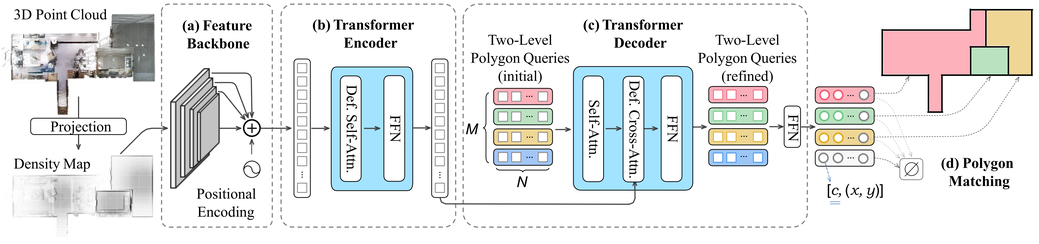
Can we tackle floorplan reconstruction in a single stage? Yes!

3. Core Idea

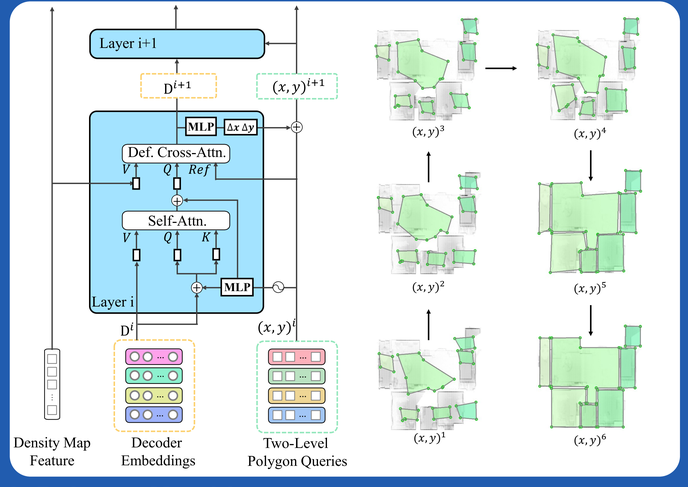
Formulate floorplan reconstruction as a direct set prediction problem of polygons.



4. Overall Architecture



5. Modeling Floorplan As Two-level Queries



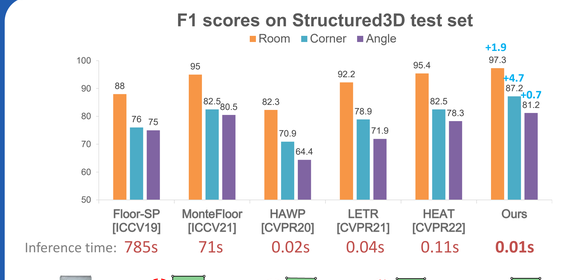
6. Polygon Matching

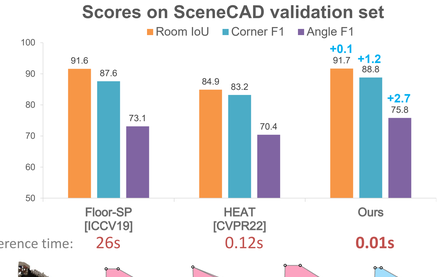
Match the fixed-number predictions with the arbitrary-number ground truth

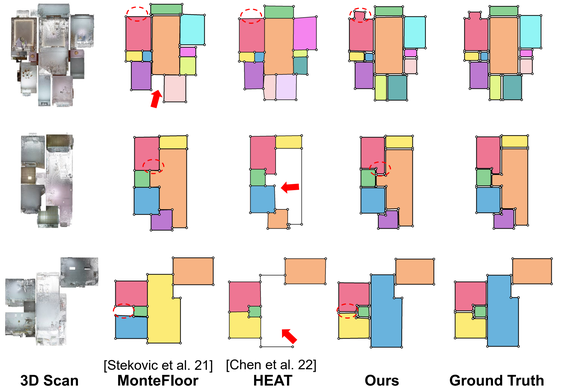
$$\hat{\sigma} = \sum_{m=1}^{M} \arg\min_{\sigma} \mathcal{D}(V_m, \hat{V}_{\sigma(m)}) \qquad \mathcal{D}(V_m, \hat{V}_{\sigma(m)}) = \lambda_{\text{cls}}\mathcal{D}(c, \hat{c}) + \lambda_{\text{coord}}\mathcal{D}(p, \hat{p})$$

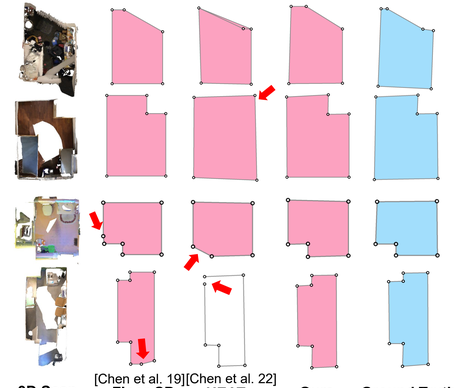
Loss: $$\mathcal{L} = \sum_{m=1}^{M} (\lambda_{\text{cls}}\mathcal{L}_{\text{cls}}^{m} + \lambda_{\text{coord}}\mathcal{L}_{\text{coord}}^{m} + \lambda_{\text{ras}}\mathcal{L}_{\text{ras}}^{m})$$

7. Comparison with State-of-the-art Methods









8. Towards Semantically-Rich Floorplans