Interactive4D:
Interactive 4D LiDAR Segmentation

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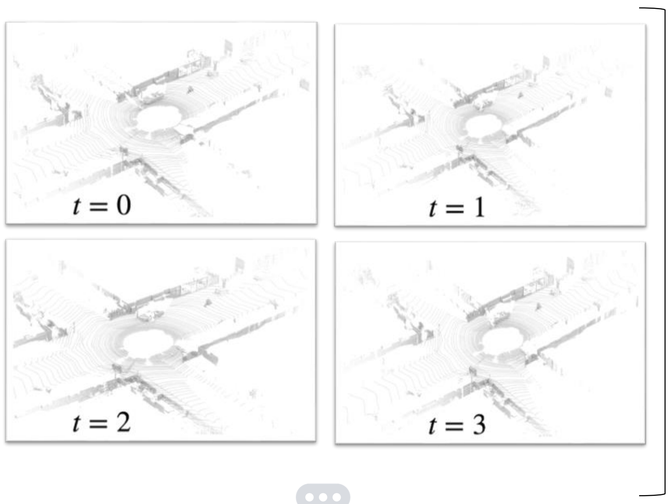
Project Page

Let's interactively segment multiple objects on multiple scans simultaneously!

Task

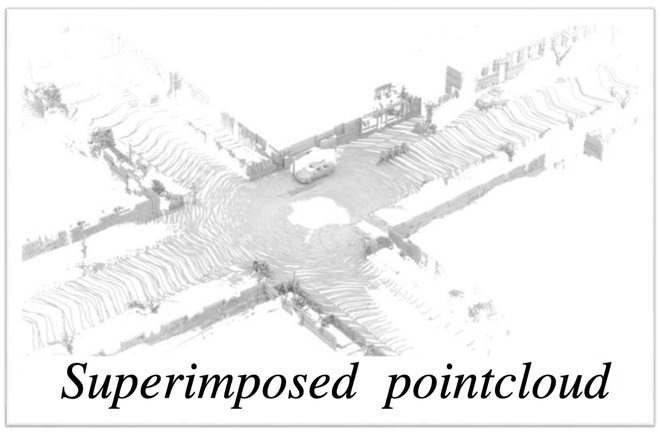
Goal

Annotate 3D LiDAR Point Clouds with consistent instance IDs

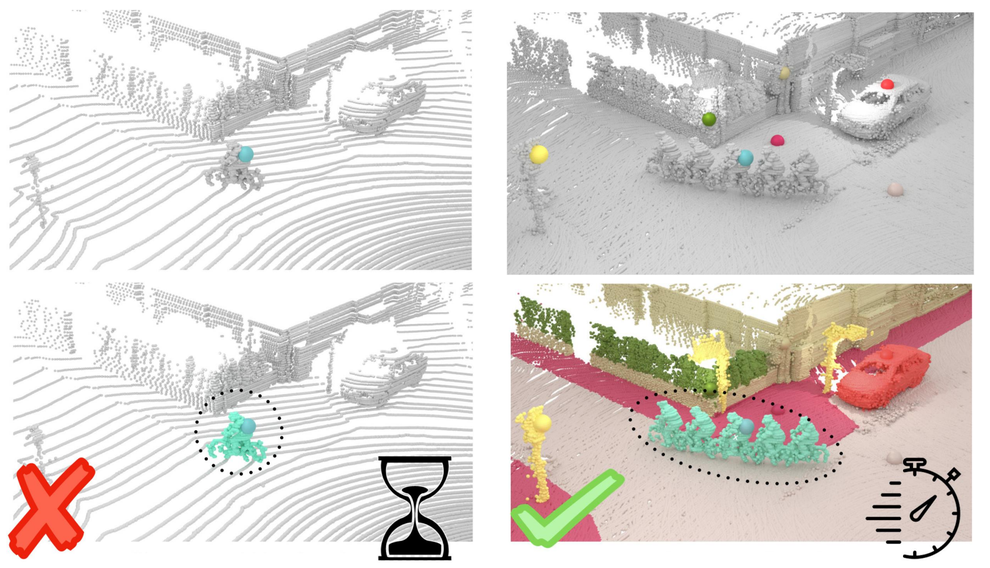


Core Idea

Leverage known vehicle positions to create **spatio-temporal** point cloud, avoid repetitive annotation

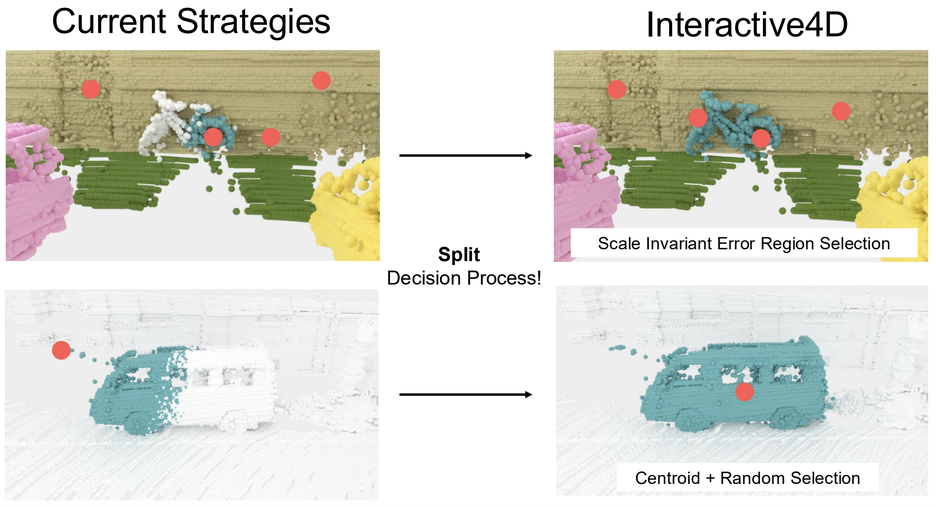


Motivation



- **Holistic** segmentation
- Segment both ***things*** **and** ***stuff***
- **Minimizing** human effort
- **Consistent IDs** for **tracking**

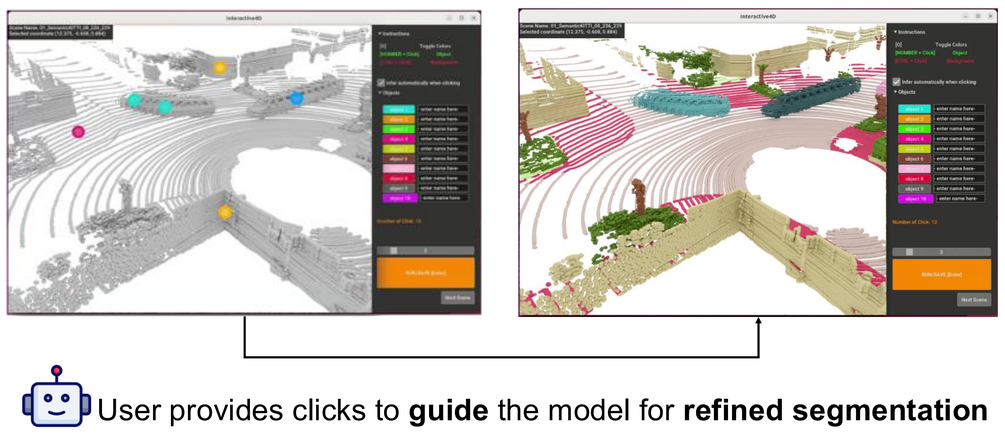
Click Simulation



- ✗ **Single-object** interactive segmentation
- ✗ Designed for **dense environments**
- ✗ **Bias** towards **larger objects**
- ✗ **Non-informative initial** clicks
- ✗ Computationally **expensive**

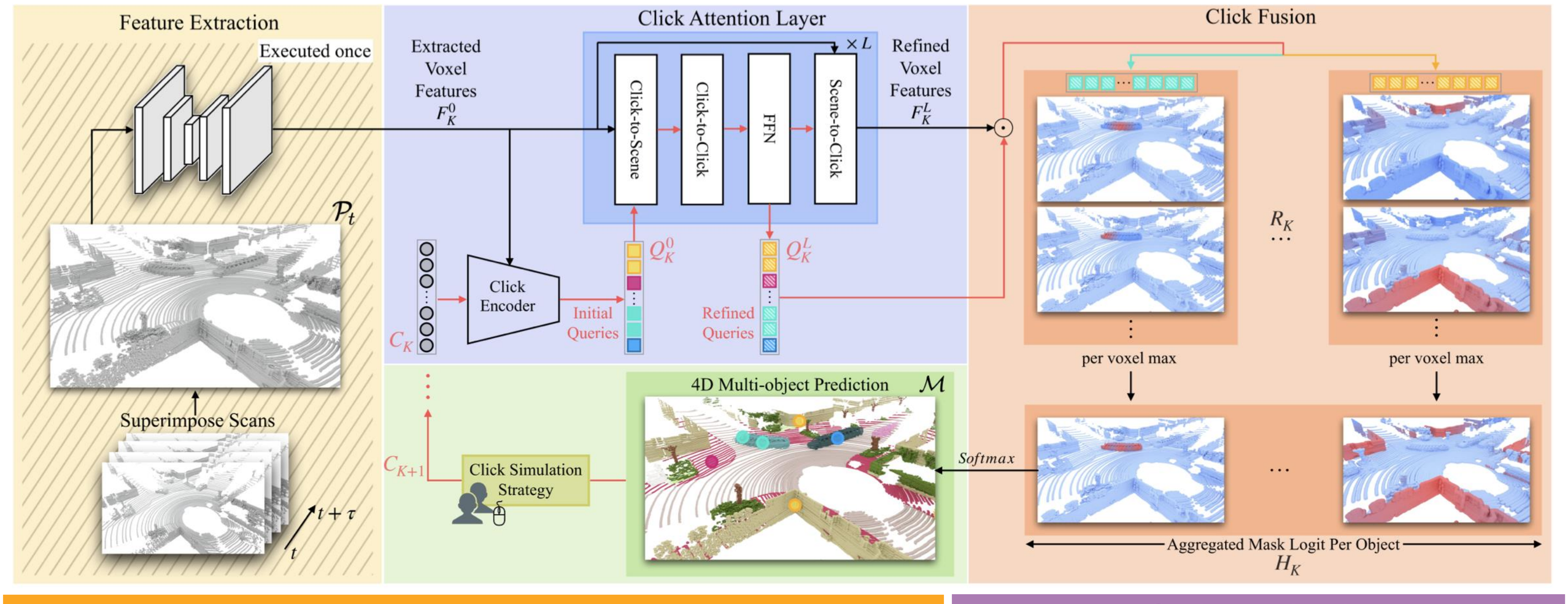
- ✓ **Multi-object** interactive segmentation
- ✓ **Scale-invariant**
- ✓ Includes randomness for **robustness**

User Interface

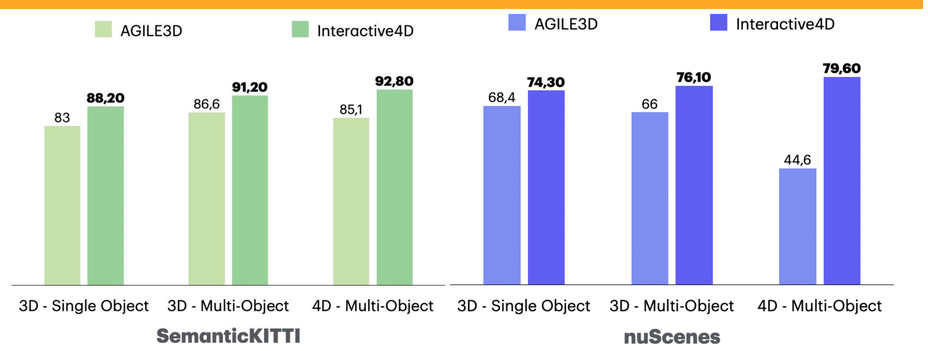


User provides clicks to **guide** the model for **refined segmentation**

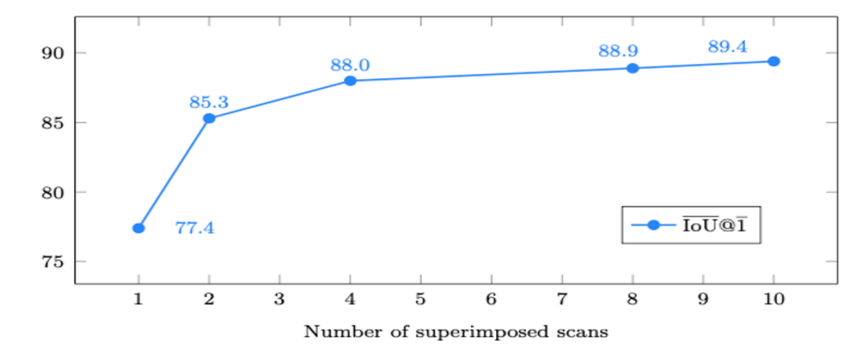
Model



Quantitative Results



Interactive4D **outperforms** AGILE3D **by a large margin** on in-distribution interactive LiDAR segmentation (SemanticKITTI) and zero-shot interactive LiDAR segmentation (nuScenes) **for all three evaluation setups!**



Superimposing more scans increases the segmentation accuracy of Interactive4D, **especially at lower click counts!**

Qualitative Results