

Motivation

Goal: Given a visual image, localize within an existing map.

Robust visual localization under a wide range of viewing conditions is a fundamental problem in computer vision.

Handling the difficult cases of this problem is challenging due to:

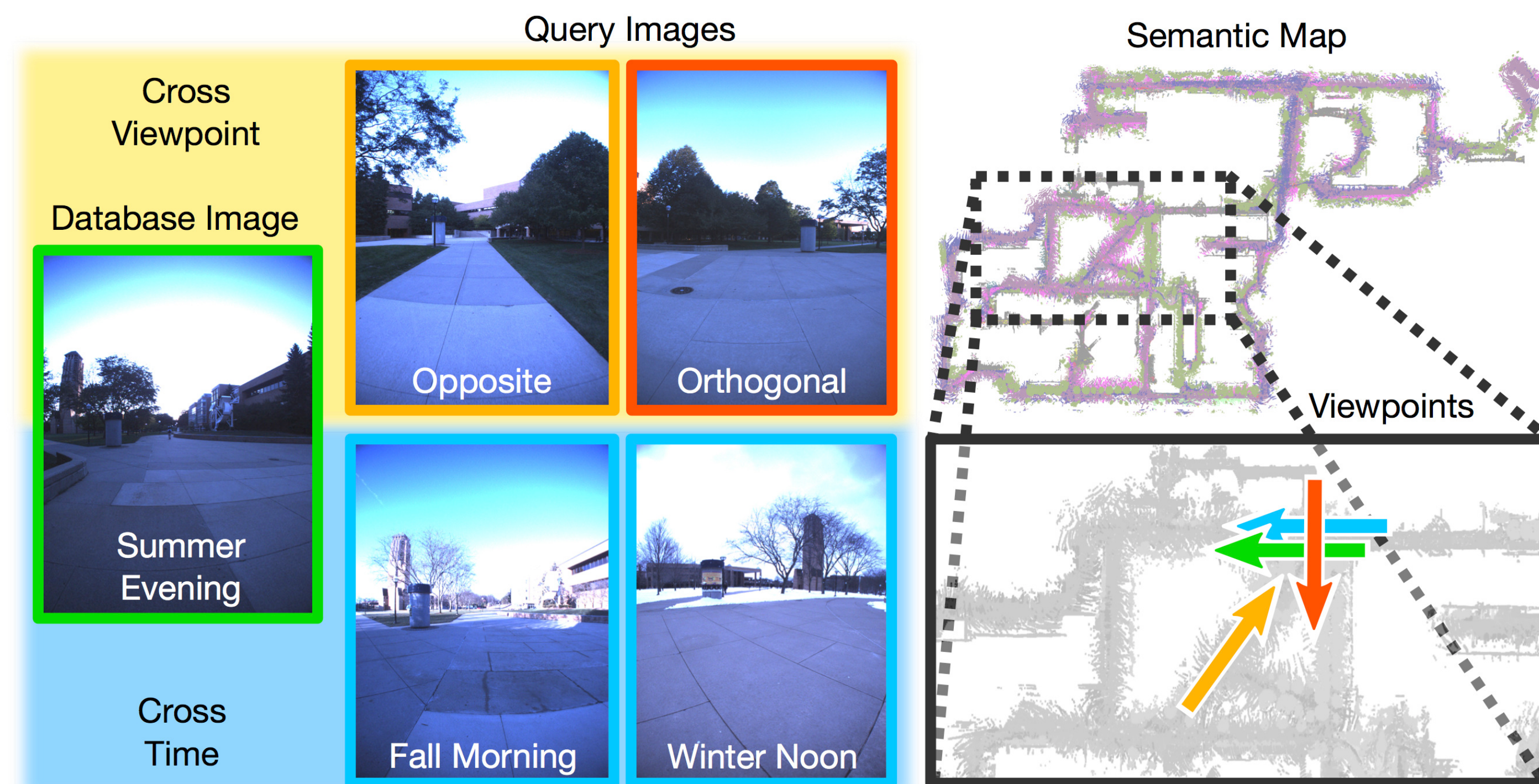
- Viewpoint changes
- Illumination changes
- Geometry changes

High practical relevance for life-long localization in:

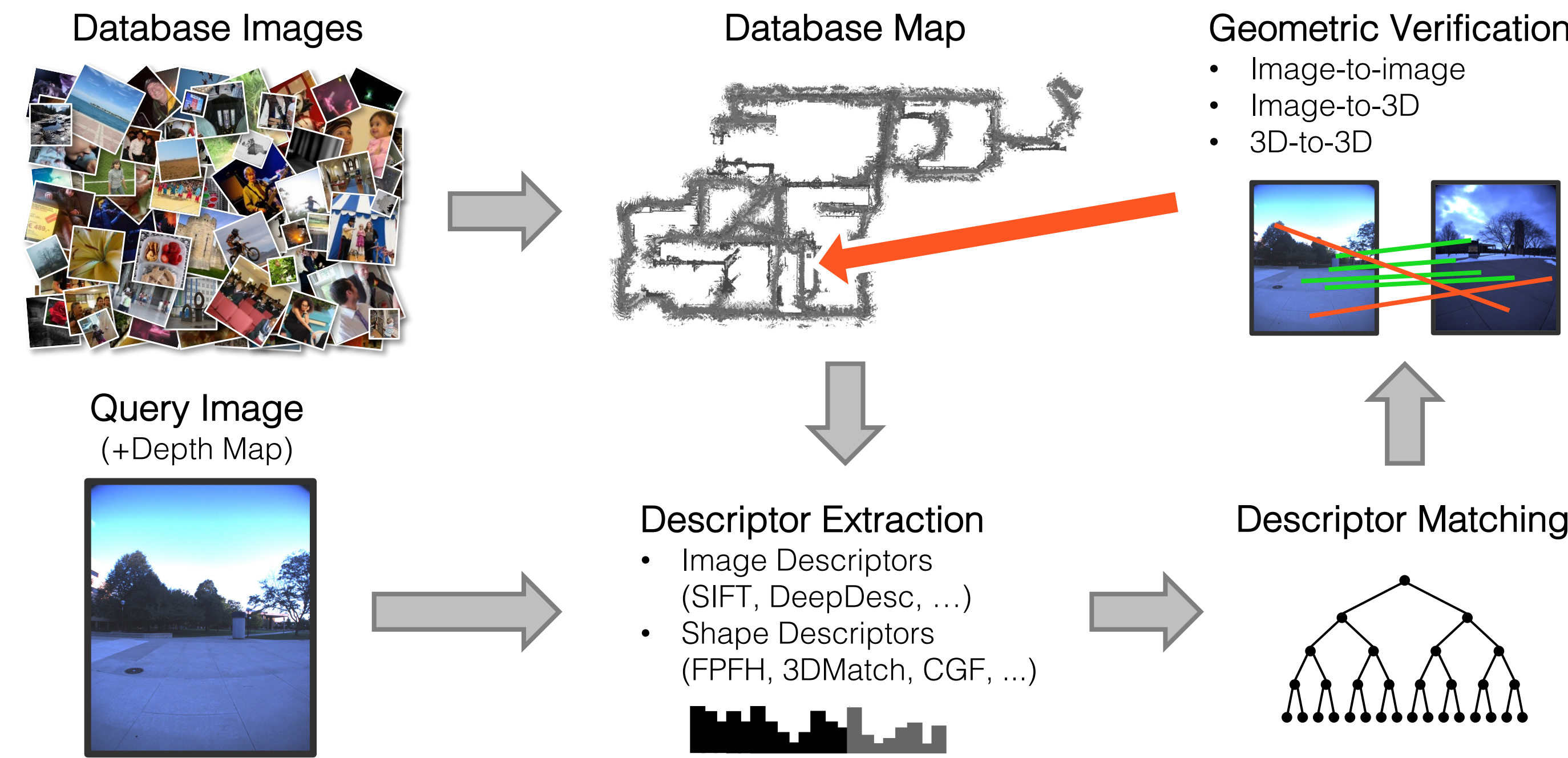
- AR/VR applications
- Autonomous robots

Contributions

- Generative descriptor learning on 3D semantic scene completion task
- Joint geometric / semantic descriptors and 3D semantic alignment
- Robust localization under extreme viewpoint / illumination changes



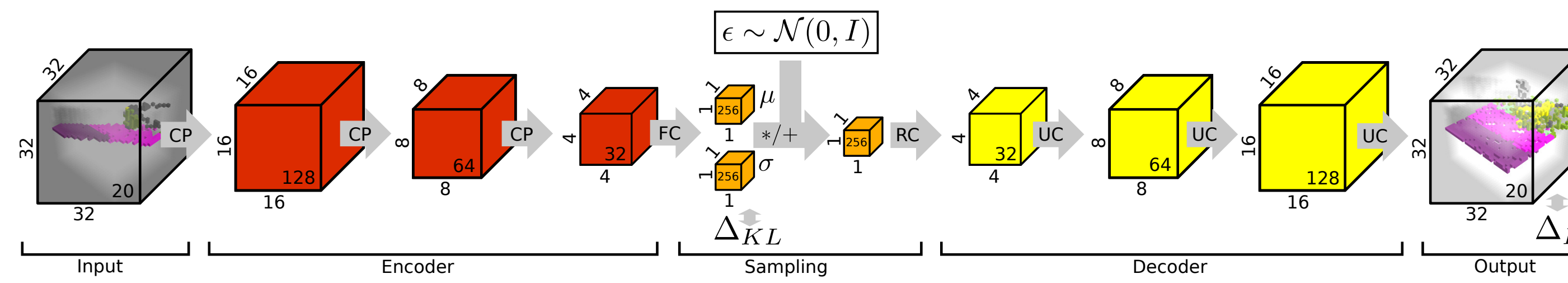
Traditional Methods



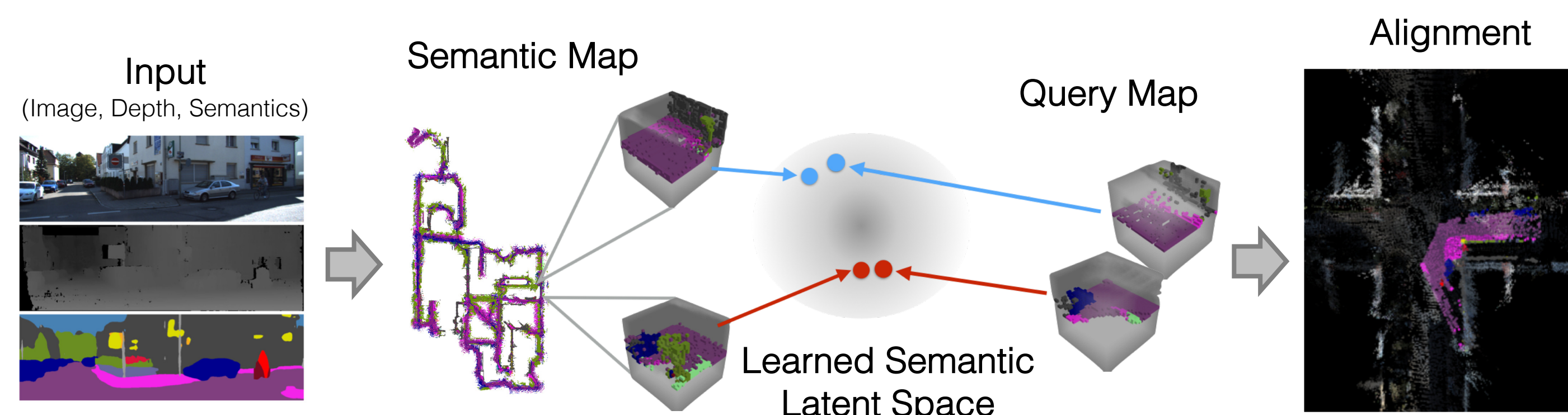
Proposed System

Generative descriptor learning

- Semantic scene completion as auxiliary task

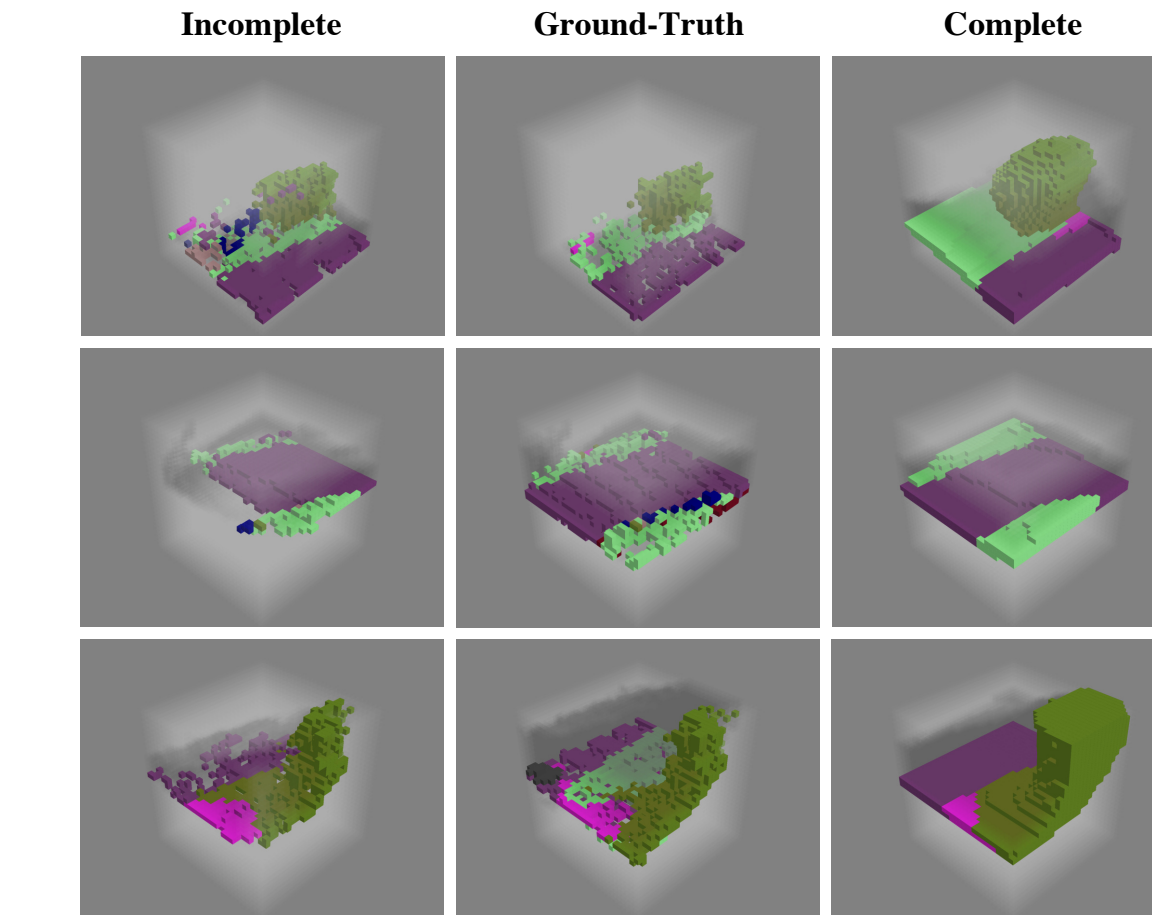


Joint geometric and semantic matching and alignment

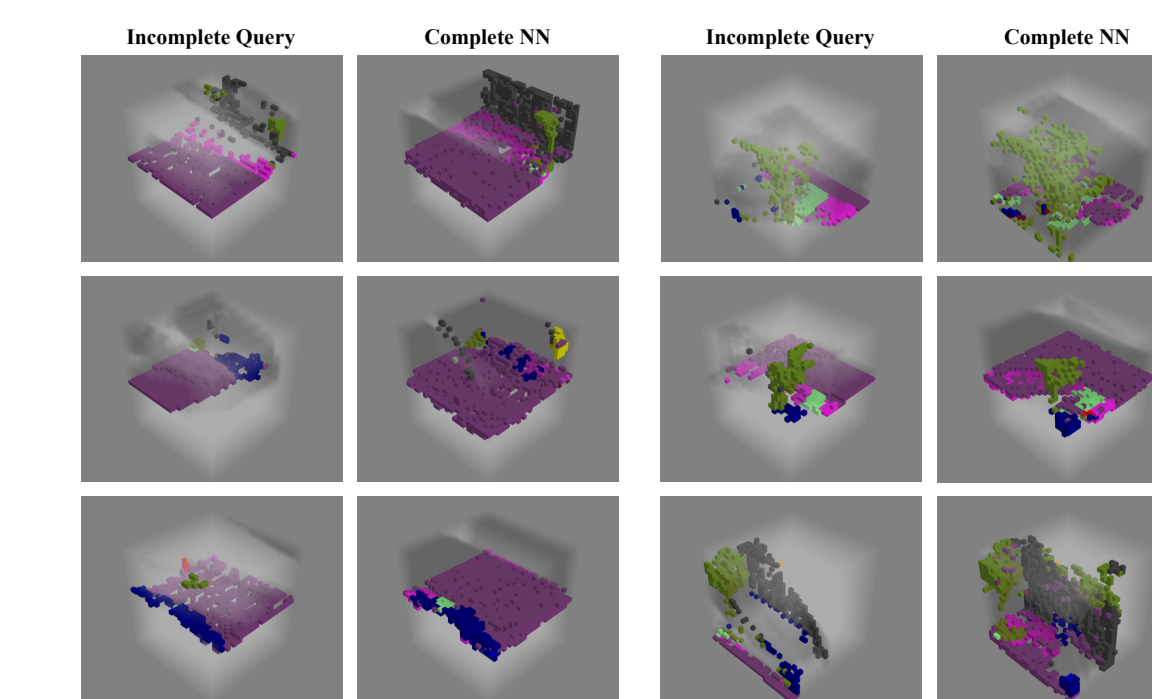


Results

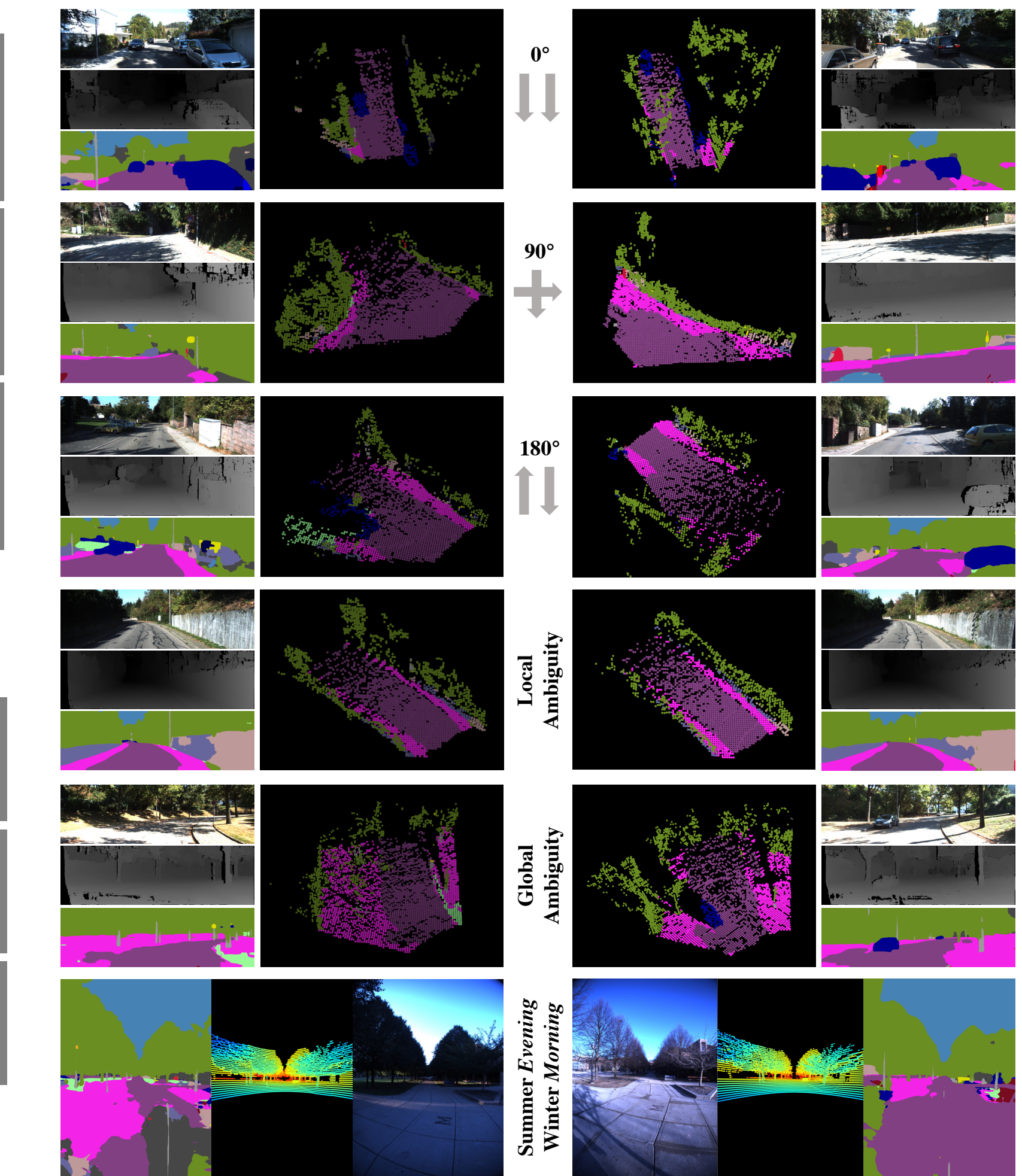
Semantic scene completion



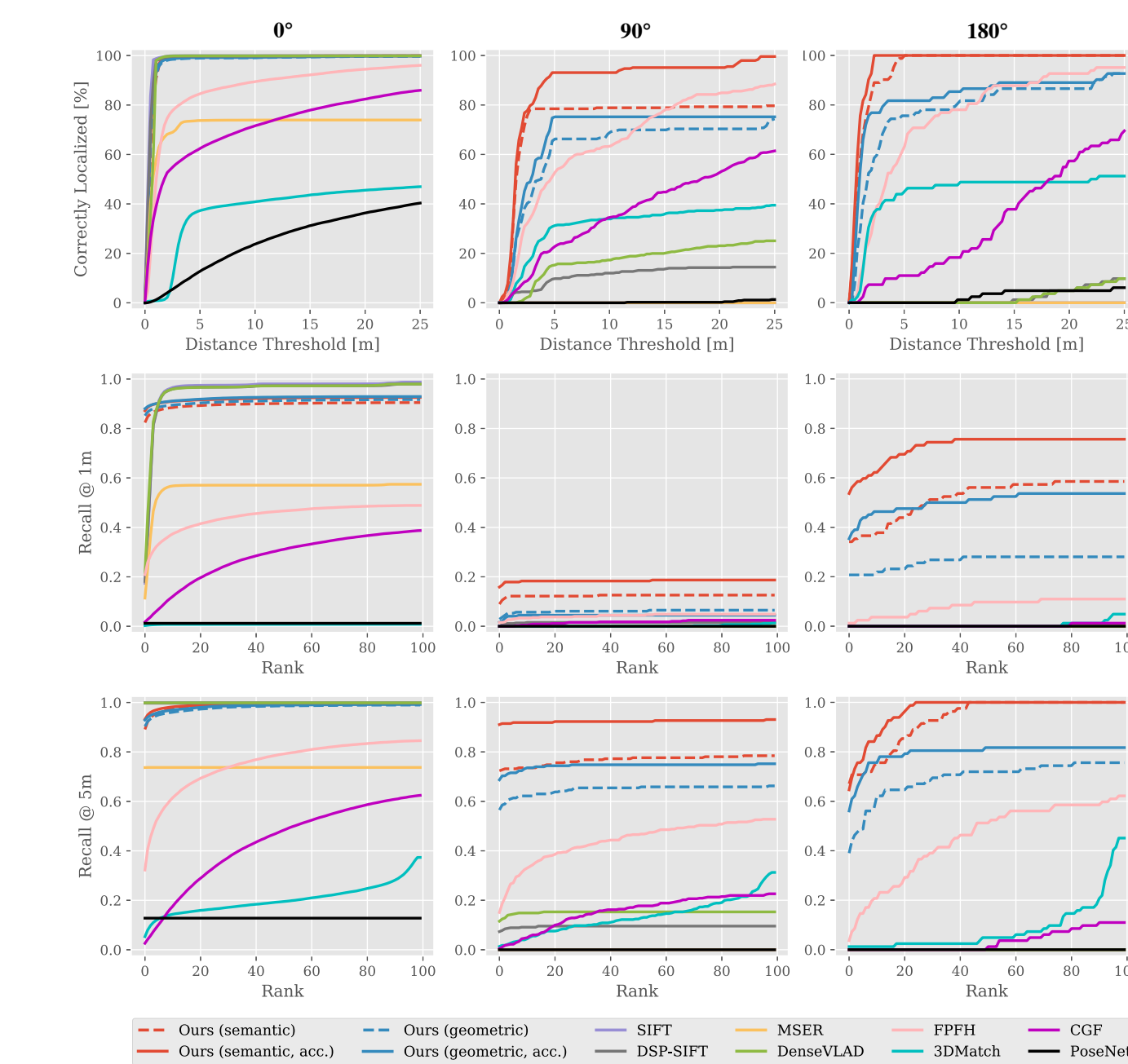
Matched nearest neighbors



Localization scenarios



Cross-viewpoint localization (KITTI odometry sequences)



Cross-season localization (NCLT campus sequences)

