

Volumetric Instance-Aware Semantic Mapping and 3D Object Discovery

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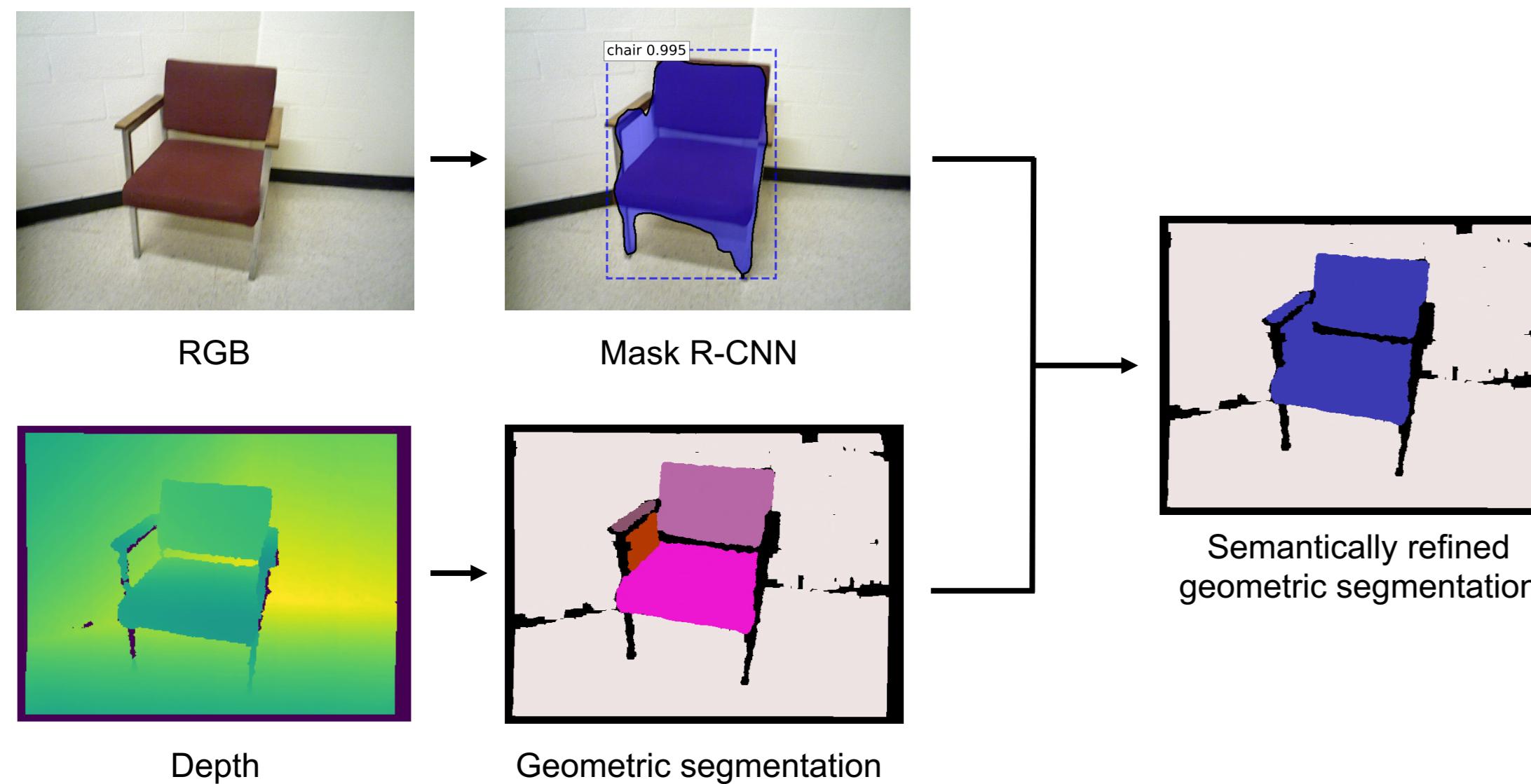
1 Introduction

Goal: Build a map of the environment that encodes knowledge about the individual objects in the scene during online RGB-D scanning

Contribution: Incrementally fuse per-frame results of a combined geometric-semantic 2D segmentation into a global 3D reconstruction

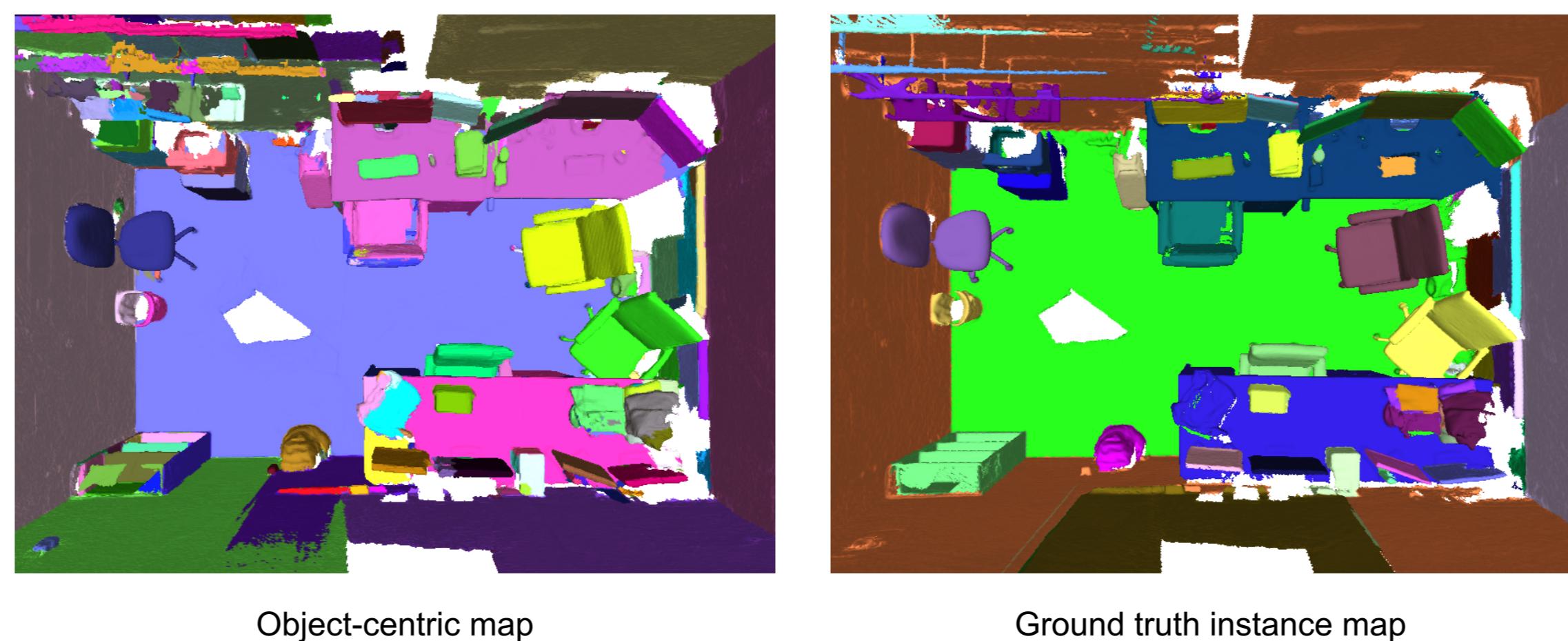
2 Method

1. Augment the output of a geometric depth segmentation with instance-aware semantic predictions from the RGB image

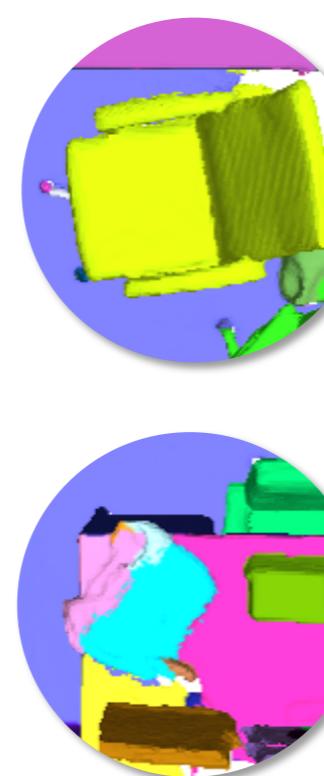


2. Match the detected segments and their comprising instances to the ones already stored in the global map via ray casting
3. Update the map with segments observed in the current frame

3 Object-level map



Besides densely reconstructing the geometry of the scene and recovering the shape and pose of individual objects our framework:

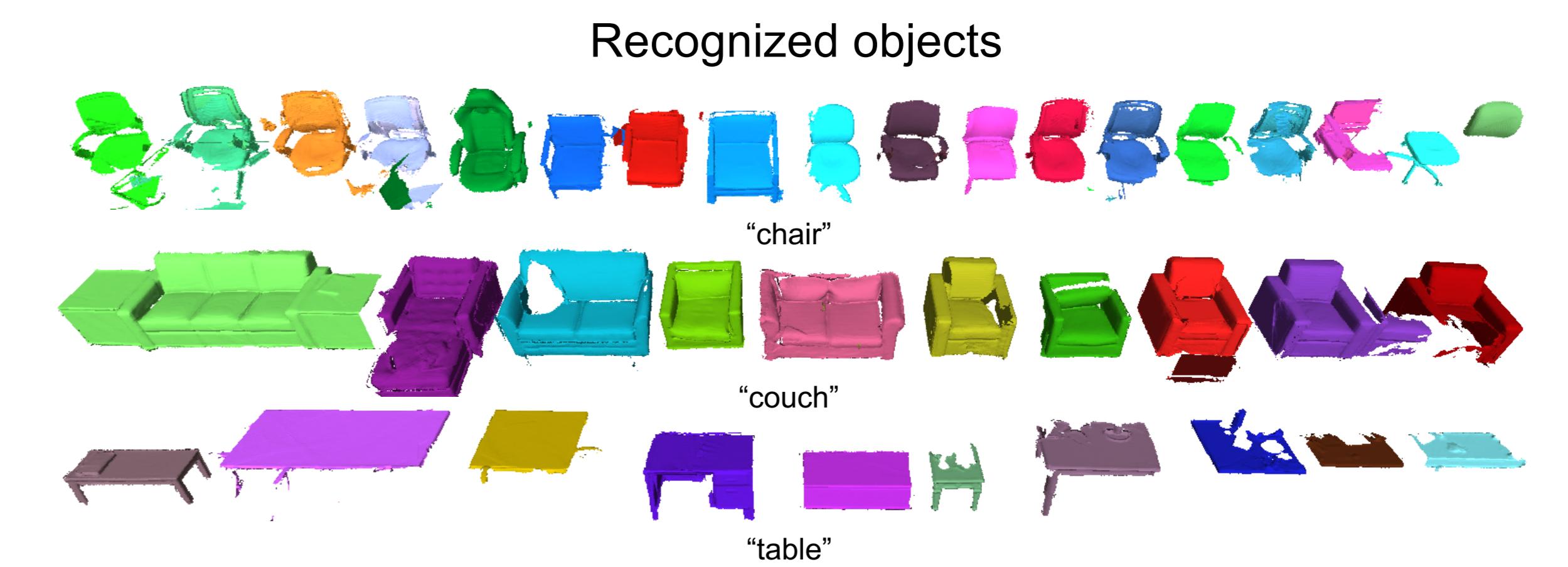


Recognized object instances maintain an associated semantic label



4 Object discovery

A selected inventory of objects detected across multiple sequences includes both recognized instances and newly discovered elements



5 Large-scale mapping

The online nature of the framework is independent of the map size

