

## Object-Aware Guidance: Choosing Objects Within a Scene

Object-Aware Guidance alternates between selecting an object to scan and selecting a view around that object in an indoor scene [1]. RGB-D SLAM supplies acquired geometry, while retrieved database shapes guide segmentation, recognition and further scanning. The object is an internally selected temporary goal, rather than a requested instance supplied by a user.

### Object choice and local view choice

The system uses object recognition to decide which object merits further observation. For that object, it samples sixteen surrounding viewpoints and scores visible, unobserved voxels by conditional information gain under retrieved shape hypotheses. Surrounding geometry affects occlusion and feasibility: occluded viewpoints and viewpoints inside other objects are removed, and robot motion uses collision-free path planning. The scene therefore matters even when the current scanning goal is local to one object.

Figure 1 separates choosing an object from choosing its next observation.

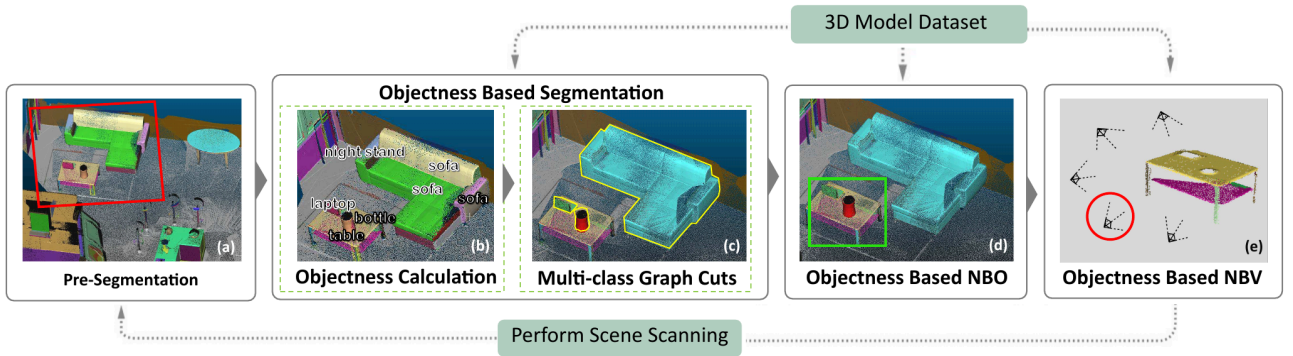


Figure 1: Object-Aware Guidance combines database-assisted segmentation, object choice and local viewpoint choice in a repeated scanning loop. Reproduced from [1, Fig. 3], with surrounding whitespace removed.

### Evidence and limits

Evaluation includes synthetic/scanned indoor scenes and real robot scans, with recognition and coverage outcomes. The benchmark categories are represented in the shape database, and overly crowded scenes are excluded. Recognized objects can be replaced with retrieved models. The resulting scene thus combines observations with shape priors; it is not a measurement-only reconstruction of every object’s fine geometry.

### Consequence for ARIA-NBV

This is an earlier precedent for object-focused NBV within a broader scene. It complements Instance-NBV’s explicit requested-instance conditioning and distinguishes hierarchical object choice from pose choice. Its information objective and database completion differ from predicting target reconstruction-error reduction. Hierarchical target-to-pose selection remains a possible future extension of ARIA-NBV, not a prerequisite for the current finite-candidate study.

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## Bibliography

- [1] L. Liu *et al.*, “Object-Aware Guidance for Autonomous Scene Reconstruction,” *ACM Transactions on Graphics*, vol. 37, no. 4, 2018, doi: 10.1145/3197517.3201295.