

DIAM: Drone-based Indoor Accessibility Mapping W

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Introduction

Indoor mapping data is crucial for navigation and accessibility, yet such data are widely lacking due to the manual labor and expense of data collection, especially for larger indoor spaces. In this demo paper, we introduce **Drone-based Indoor Accessibility Mapping (DIAM)**, a drone-based indoor scanning system that efficiently produces 3D reconstructions of indoor spaces with automatically recognized and located accessibility features/barriers such as stairs, elevators, and doors automatically. With DIAM, our goal is to scan indoor spaces quickly and generate a precise, detailed, and visual 3D indoor accessibility map.

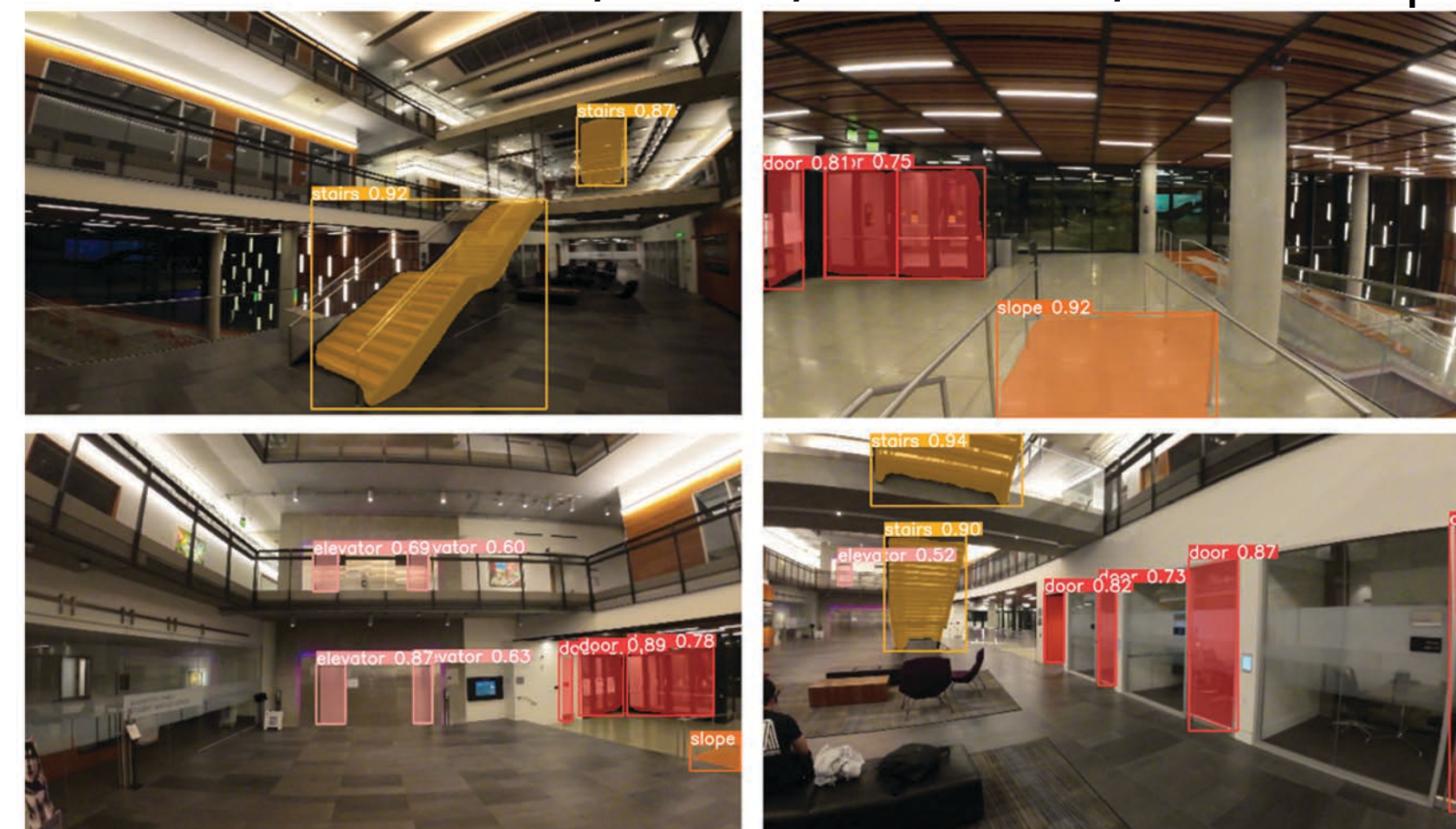
Fly & Reconstruction

We use a DJI Avata drone (\$759) to rapidly capture indoor space. When flying, we use the wide angle camera setting and capture videos at 4k 30FPS. In our experience, a 300 square meter 6-story atrium space takes 4 minutes.

DIAM transforms the drone-based video into image frames at 2 FPS and uses a state-of-the-art photogrammetric processing tool, **Agisoft Metashape** to perform camera pose estimation and 3D reconstruction. The reconstruction was finished with Sequential reference preselection for photo alignment and Depth Maps as source data for model building.

Facility Detection & Location

DIAM uses few-shot learning to fine-tune a YOLOV8 instance segmentation model that detects key indoor facilities like doors, stairs, elevators, and ramps.

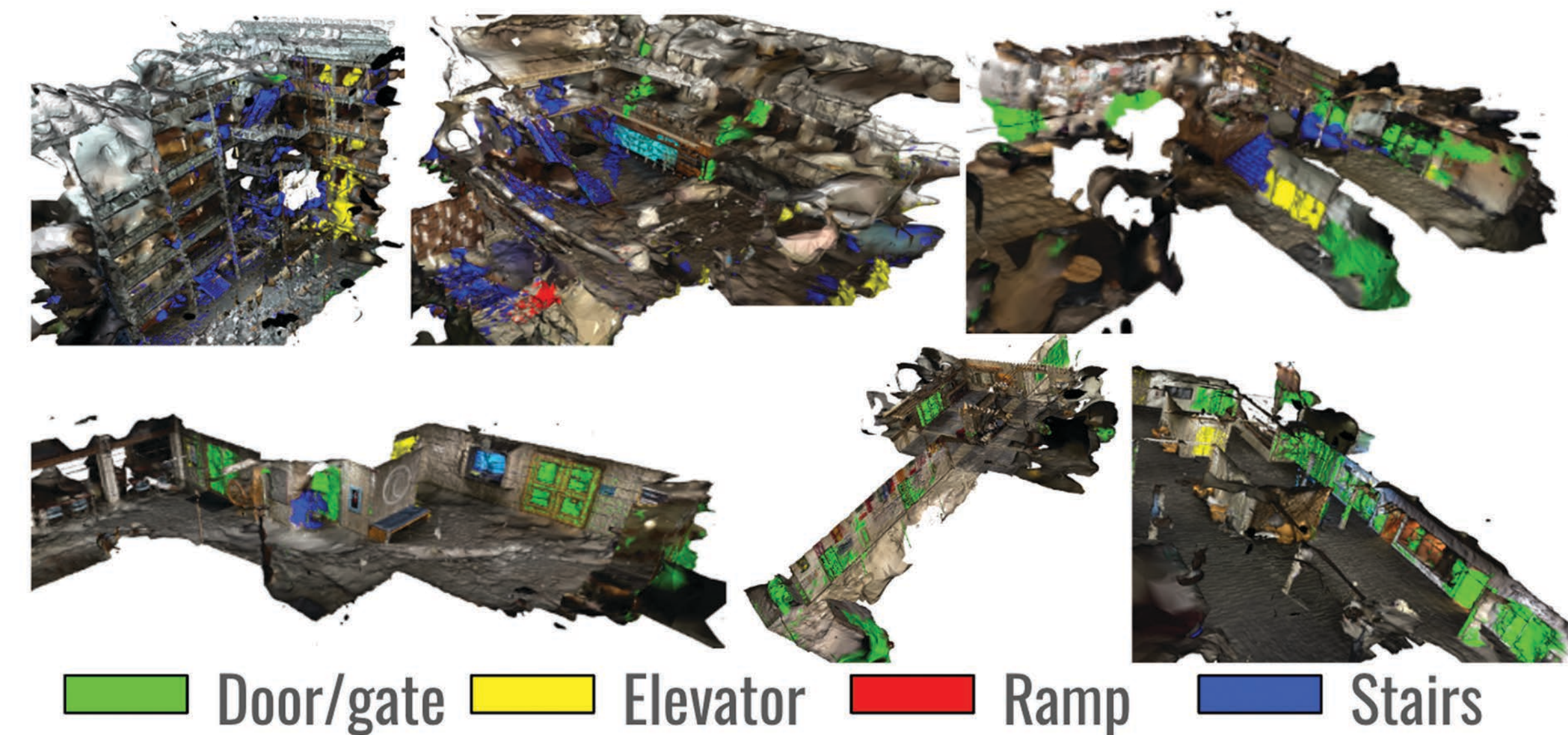


DIAM then ray trace the segmentations to 3D positions in the reconstructed model.

Estimated Camera Trajectory



Results



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