SUN3D: A Database of Big Spaces Reconstructed using SfM and Object Labels

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Motivation
Existing scene datasets contain only a limited set of views of a place, and they lack representations of complete 3D spaces. We introduce SUN3D, a large-scale RGB-D video database with camera poses and object labels, capturing the full 3D extent of big spaces.

The tasks that go into creating such a dataset are difficult in isolation:
- Labeling videos is painstaking
- SfM is unreliable for large spaces. But if we combine them together, we make the dataset construction task easier.
We use 3D to make object annotation easier, and we use object labels to correct large camera pose errors.

“Data-driven” Brute-force SfM
- Use conservative loop closing (high precision and low recall)
- Capture video in many passes, and loop closing succeeds.

Multi-view Object Annotation

Data & Source Code Available
http://sun3d.cs.princeton.edu

SUN3D Data:
- RGB-D Video for Big Spaces
- Camera Poses
- Refined Depth Maps
- Object Labels (in progress)
- Point Cloud

Source Code:
- Automatic RGB-D SfM
- Generalized Bundle Adjustment
- TSDF Depth Improvement
- Online Annotation Tool
- IO functions to read SUN3D

References