Deleting 3D Objects in Augmented Reality using RGBD-SLAM

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Augmented Reality

- Adding virtual objects to real world
- Interferes with real objects

What if we want to replace objects?

Time to change the sofa. Hmm, But how would the new ones look?

Motivation

Deleting existing objects from scene

Inserting new objects in scene

Challenges

Problem: In order to remove an object realistically, you need information from another viewpoint to fill it up

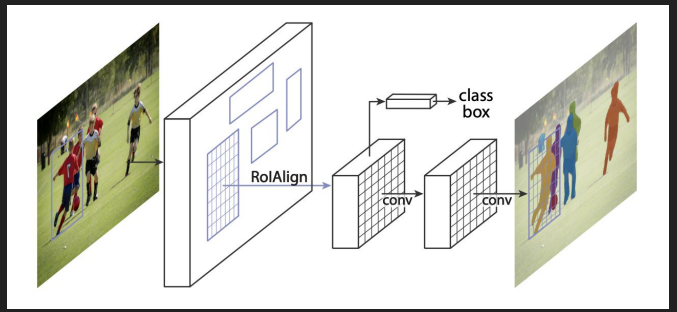
Solution: Use SLAM to generate a 3D map

Issue: Classical SLAM algorithms give only a geometric map, but we need semantic information to recognize the object

MASK FUSION

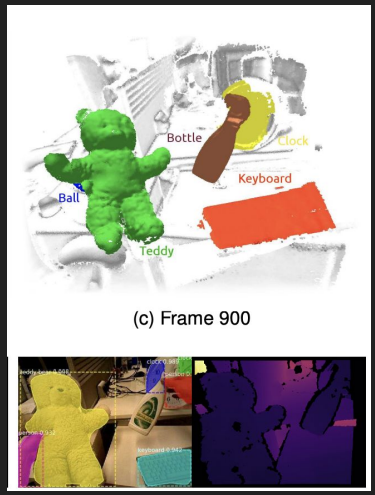
Mask RCNN on images to detect and segment objects (instance segmentation)

RGBD based SLAM gives a geometric map



Mask RCNN - instance segmentation

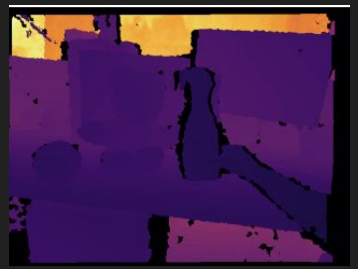
RGBD SLAM - point cloud map



Map with semantic information

MASK FUSION

RGB image

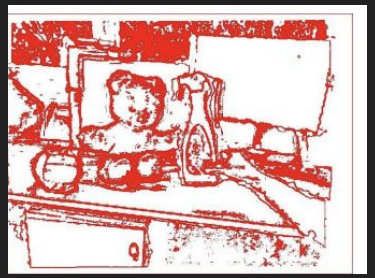


Depth map

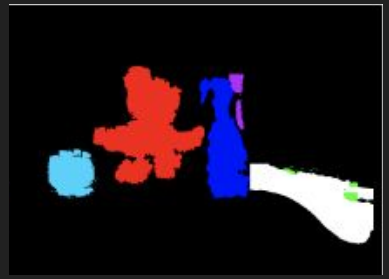
Instance Segmentation (Mask-RCNN)

Geometric segmentation

Imprecise boundaries



Over segments



Combined segmentation

Reconstructed objects with semantic information

Approach

- Mask Fusion to build map without the object
- Mask-RCNN to segment object in the image
- Render image from map to fill up background information
- Fill-up holes with inpainting algorithms

Data Collection

- RGBD sequence from multiple viewpoints
- Objects labeled in COCO

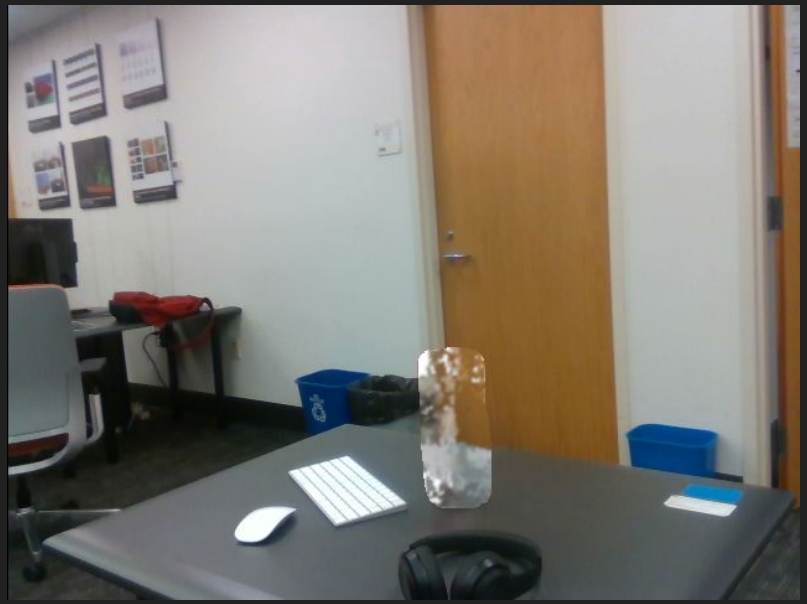
Intel Realsense

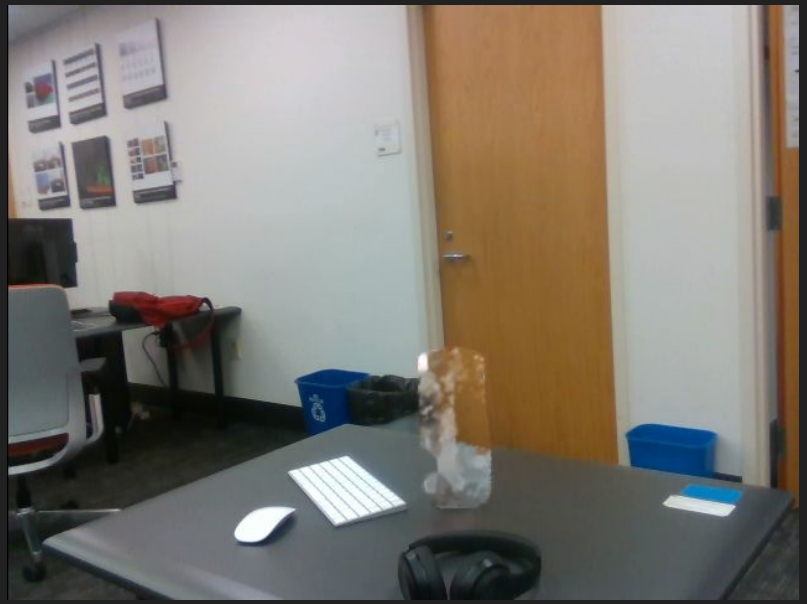
INPAINTING

- Classical inpainting techniques
- Current techniques use generative models

RESULTS

RESULTS





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- ElasticFusion: Real-Time Dense SLAM and Light Source Estimation, T. Whelan, R. F. Salas-Moreno, B. Glocker, A. J. Davison and S. Leutenegger, IJRR '16
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