

3D Topologically-Aware Semantic Scene reconstruction and depth map / wireframe / Point-Cloud from single RGB panorama scene (or Two views)

Computer Vision (CS6350)

TPA - 11

1. Problem Statement

The purpose of this project is to develop algorithms capable of three-dimensional topologically-aware semantic Scene Reconstruction from a single panorama scene (constructed from a set of frames) and its corresponding semantic segmentation mask. The basic steps of a typical 3D reconstruction process using depth map are: predicting the depth map (disparity map), estimating depth of (visually) salient landmarks, tessellation to create a wireframe representation and finally rendering (preferably use OpenGL) preserving structures of the objects present in the image (topologically-aware) [11] with semantic colors of the various classes in the segmentation mask of the panorama. Depending on the model used, alternative methods can be adopted.

2. Input

- A panorama scene (or a pair of stereo frames)
- Segmentation mask of the panorama (or separately for both frames)

See examples in the following:



Figure 1 :Input scene (not Panorama) of a room



Figure 2: Input Scene (Panorama) of outdoor (OAT,IIT M)

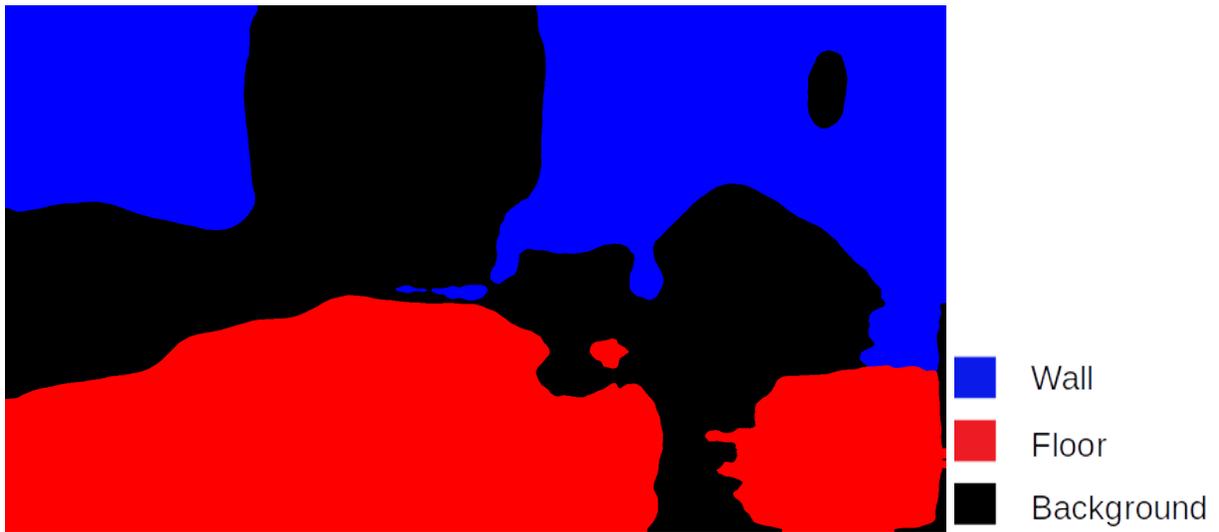


Figure 3 : Segmentation mask of figure 1



Figure 4: input[12]

3. Datasets

- KITTI Dataset

link

[-http://www.cvlibs.net/datasets/kitti/eval_object.php?obj_benchmark=3d](http://www.cvlibs.net/datasets/kitti/eval_object.php?obj_benchmark=3d)

- NYU Depth v2 Dataset link - https://cs.nyu.edu/~silberman/datasets/nyu_depth_v2.html
- SapeNet Dataset link - <https://www.shapenet.org/>
Caution/Warning: Semantic scene Reconstruction from pan-video may be considered more challenging than from arbitrary (not perfect) stereo ; the former may get you more marks.
- PIX 3D [13]: <http://pix3d.csail.mit.edu/>
- CUB-200-2011 [14]: http://www.vision.caltech.edu/datasets/cub_200_2011/

4. Output

- Depth Map ,Wireframe with semantic segmentation colors , Rendered 3D semantic scene with novel views



Figure 5: Depth map of figure 1



Figure 6: 3D Scene reconstruction of figure 1

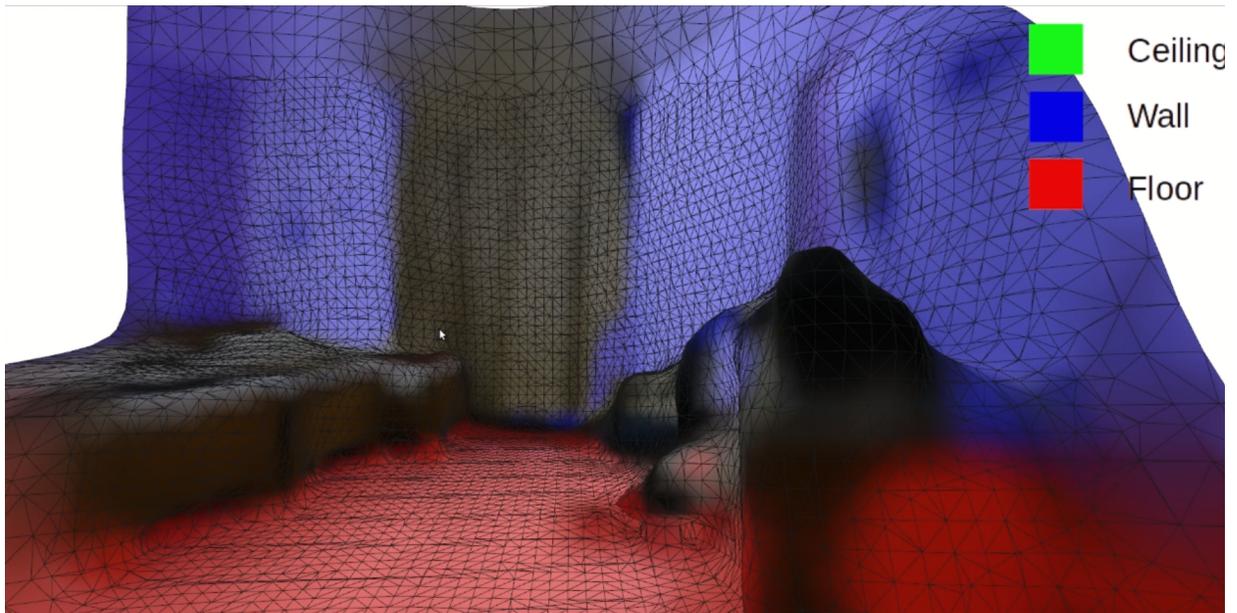


Figure 7: Semantic 3D wireframe of figure 1



Figure 8: 3D Semantic rendered Scene of figure 1



Figure 9: 3D reconstruction of figure 4

5. References

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