Clemson University
ECE 4130: Computer Vision
Lab 8: Range Image Segmentation
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Due: December 3, 2020

Purpose:
In this lab, the purpose is to segment a range image based upon surface normals. The student was to use a PPM image called chair-range.ppm and C code regarding conversion of pixels into 3D coordinates and Region Grow (code segments were provided by Dr. Hoover). The segmentation process used the image grid for grouping of pixels, but used the 3D coordinates for calculating the surface normals for region predicates.

Results:

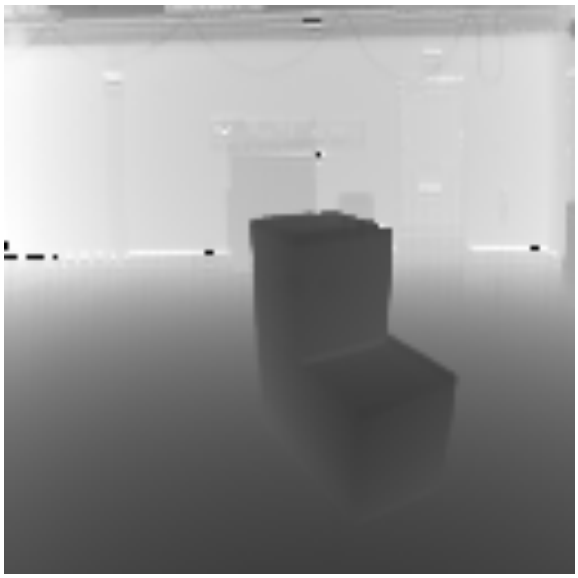

Figure 1: Original Image

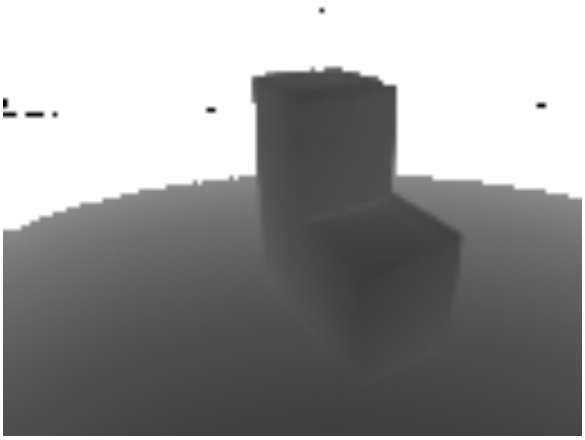

Figure 2: Threshold Image at 137

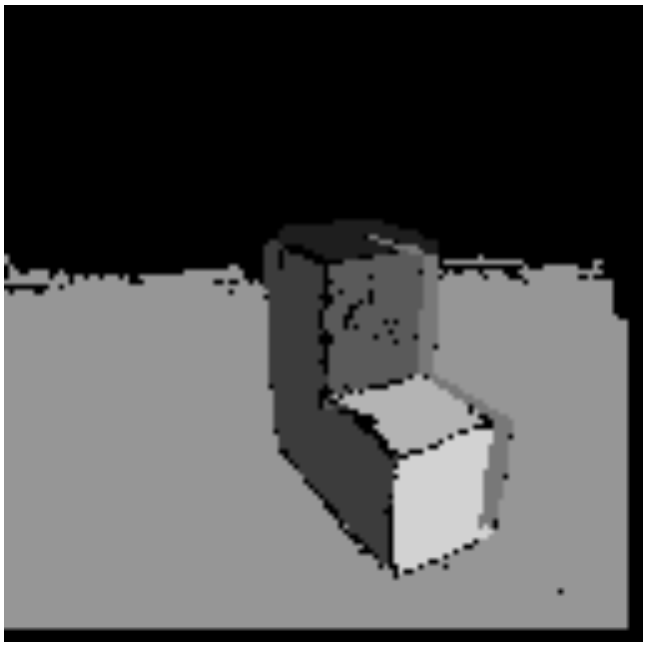

Figure 3: Final Image (with angular threshold at 0.65)

Table 1: Final Results

Region	Number of Pixels	X Coordinate	Y Coordinate	Z Coordinate
1	163	-7.982108	333.774397	-58.479712
2	744	-52.121289	1.215533	-8.658612
3	454	2.596830	-2.493379	-4.463689
4	205	104.818369	-2.562562	-27.820564
5	6773	-1.565296	28.785097	-8.828300
6	243	-1.227892	8.642128	-2.347285
7	415	2.830629	-1.639295	-4.864602

Conclusion:

I first put a threshold of 137 on the original image to get the background to be subtracted out. I them worked on getting the 3D coordinates of the picture using the code provided by Dr. Hoover. Surface normals were obtained by calculating the cross product of (B – X) x (A – X), where A and B are both 3D coordinates of those pixels. The distance chosen between pixels for cross products were of value of 3. I then performed region growing on the image (code provided by Dr. Hoover) were I calculated the new surface normal for each seed pixel of a 5x5 window. I used an angular threshold of 0.65.