1 Location Specific Unary Prior

In the main text we argue that a more direct approach using a location specific prior on the occupancy state of a voxel is less powerful than our proposed prior on normal directions. In this section we illustrate this. We derived a unary prior for each voxel based on the frequency that the voxel was occupied in the training data. Knowing the occupancy state of each voxel we can directly compute the empirical occupancy probability. The unary prior is then given by the negative log-likelihood ratio

\[ -\log \left( \frac{P(\text{occupied})}{P(\text{free space})} \right) \]  

(1)

In Fig. 1 we illustrate the results using the unary prior with different strengths. Note, while using the unary prior with a low weight the bottom part of the bottle contains the indentation as present on the actual bottle that is reconstructed. The indentation gradually disappears while increasing the weight of the prior. Looking at the top of the bottle even with the highest weight for the unary prior the reconstruction is still not smooth, while we already smoothed away the indentation on the lower part. In the case of utilizing our proposed shape prior using the surface normals we reconstruct a smooth top of the bottle while at the same time the indentation of the bottom part is still present.
Figure 1: Row 1: From left to right, cropped input image, cropped input depth map, without shape prior, our proposed shape prior using normals. Row 2: Unary prior with weight 1, 2, 3 and 4.