

Additional Details

A. Baselines and All Results

Below, figures 7 and 8 show results of ablations and baselines for all scenes.

B. Likelihood Results

We consider an alternative analysis of the experiment data presented in Section V-F. Given that we model scenes by sampling shapes in a particle filter, we consider the likelihood of the ground truth scene given the particles. Since a particle filter models discrete samples, none of which will exactly match the ground truth, we apply a kernel to our particles in workspace. Specifically, we apply a non-normalized kernel based on the Chamfer Distance between two shapes s_1, s_2 :

$$k(s_1, s_2) = \frac{1}{CD(s_1, s_2)} \quad (5)$$

The (non-normalized) likelihood of a particular scene occupancy s under the belief of n particles Φ is then

$$p(s|\Phi) = \sum_{\phi \in \Phi} \frac{1}{n} k(f_{dec}(\phi), s) \quad (6)$$

where $f_{dec}(\phi)$ decodes all latent shape vectors $\psi \in \phi$ into a scene.

We plot the likelihood of the true scene in Fig. 9 and Fig. 10 and find similar trends as in Section V-F. The magnitude of the likelihood is not meaningful, however the relatively likelihoods between the methods are. Initially methods perform similarly, except VAE.GAN which is either better or worse than other methods. With contact and freespace observations, our proposed CLASP with PSSNet tends to increase the likelihood of the ground truth scene, while VAE.GAN tends to decrease the likelihood.

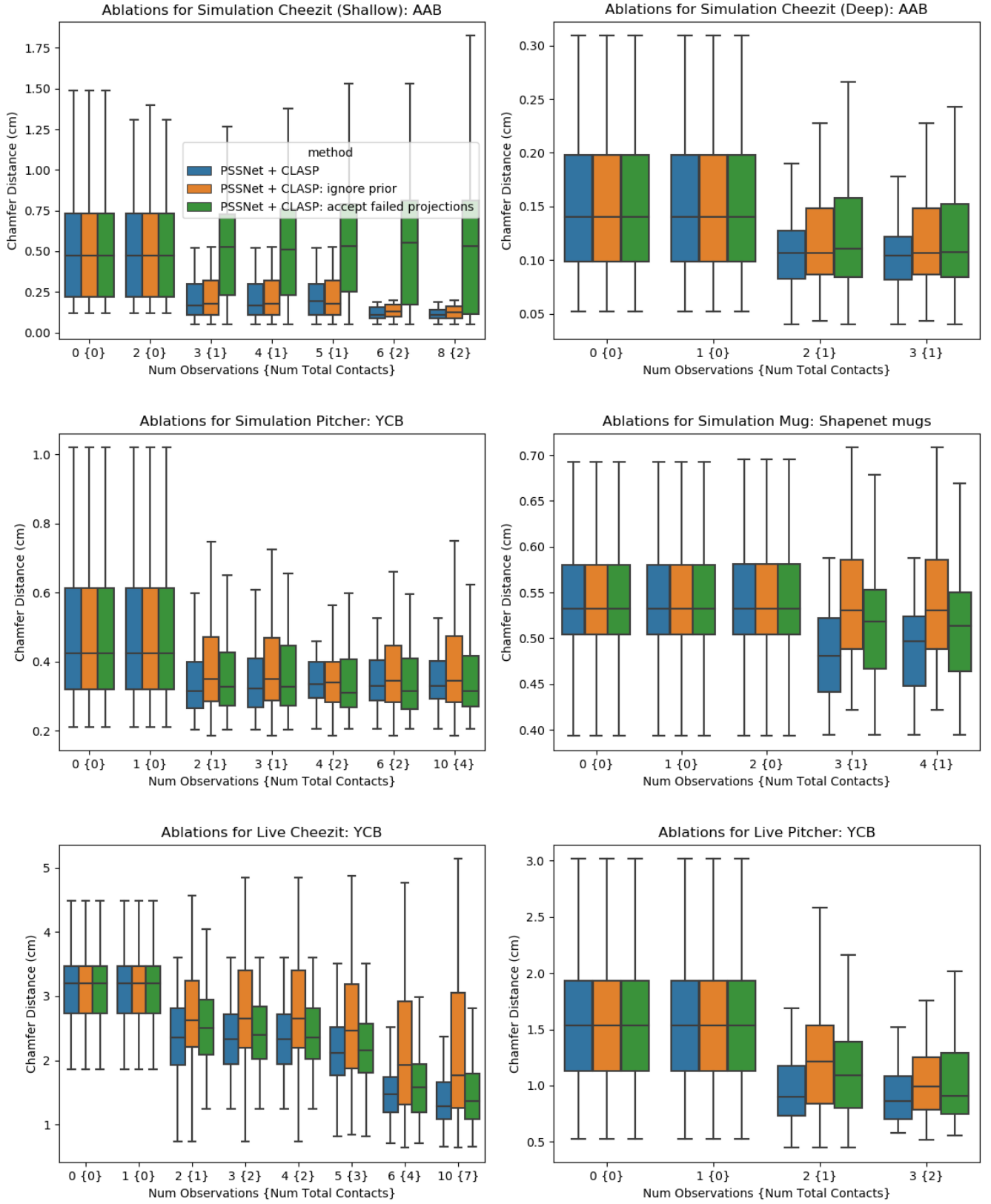


Fig. 7. Ablation boxplots showing the Chamfer Distance from sampled particles to ground truth. The mean, middle quartiles (boxed colored region), and outer quartiles excluding outliers are shown. .

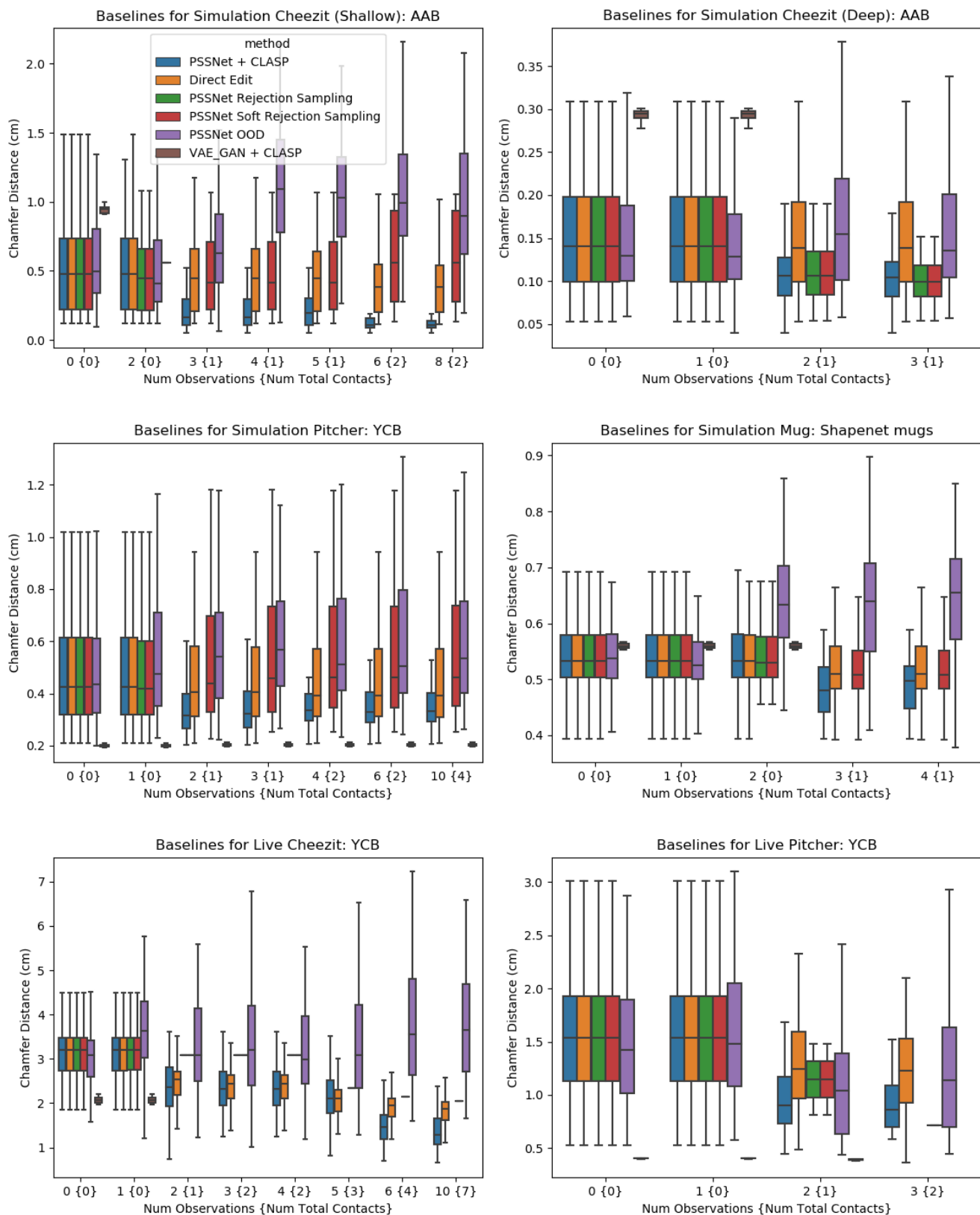


Fig. 8. Baseline boxplots showing the Chamfer Distance from sampled particles to ground truth. The mean, middle quartiles (boxed colored region), and outer quartiles excluding outliers are shown. Rejection Sampling and VAE.GAN occasionally produced no valid shapes, in which case no box is displayed.

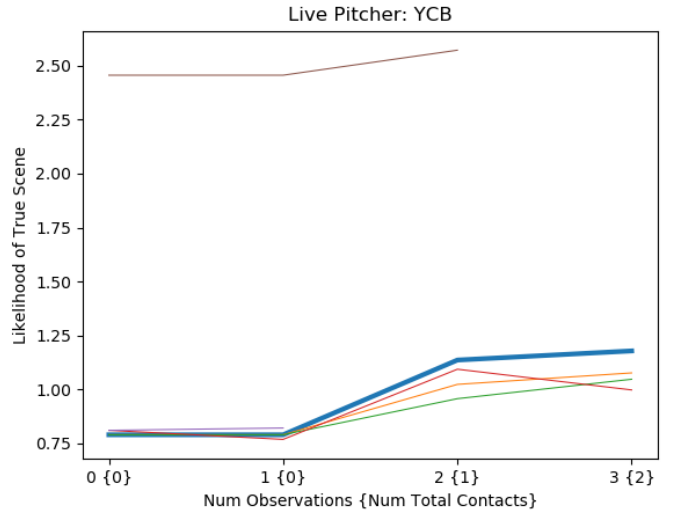
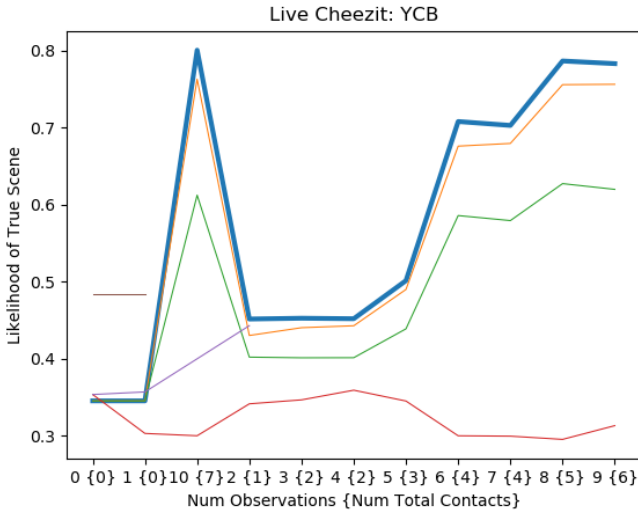
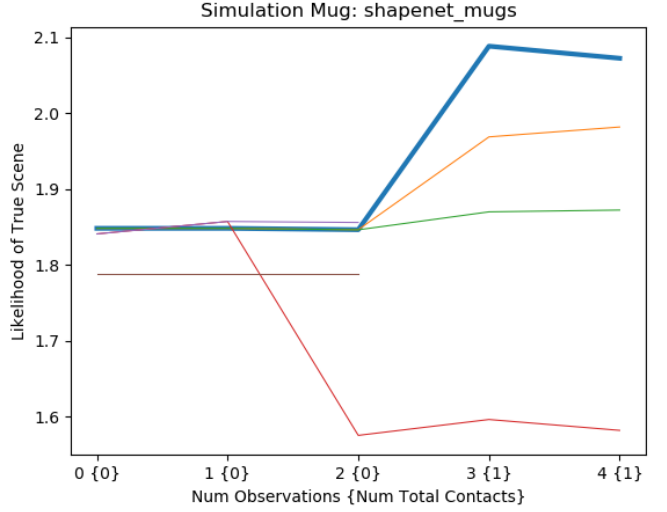
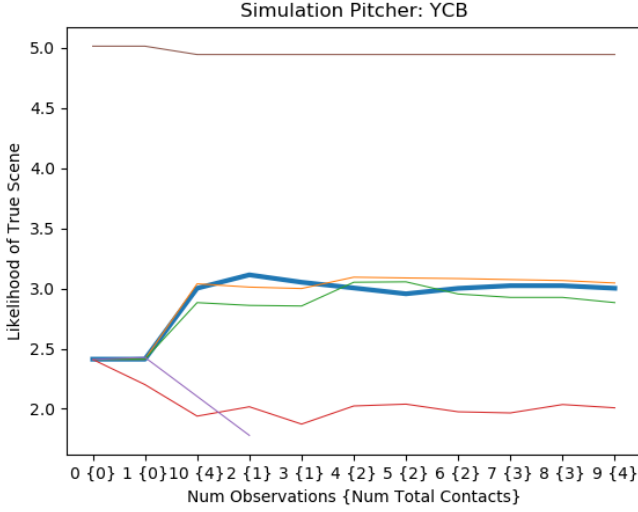
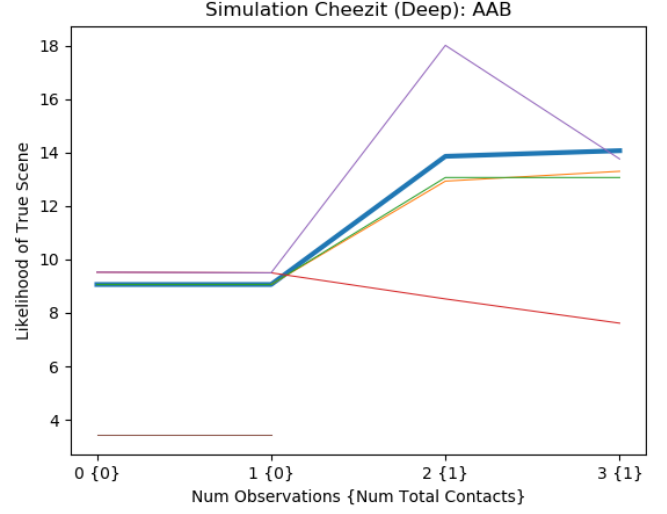
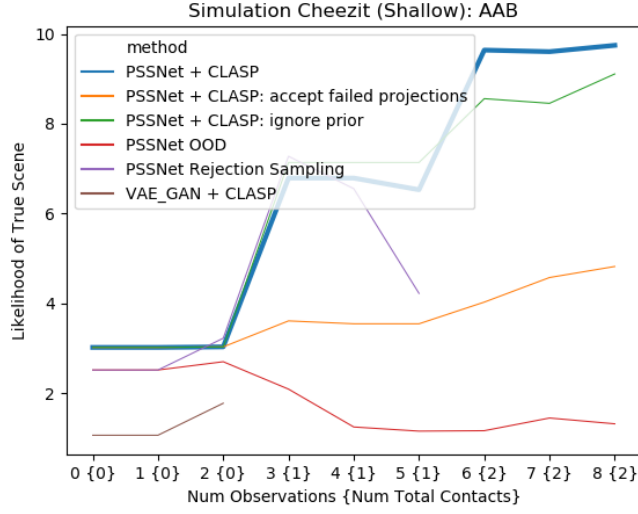


Fig. 9. Plots of likelihoods of CLASP and baselines under the particle filter belief and kernel function.

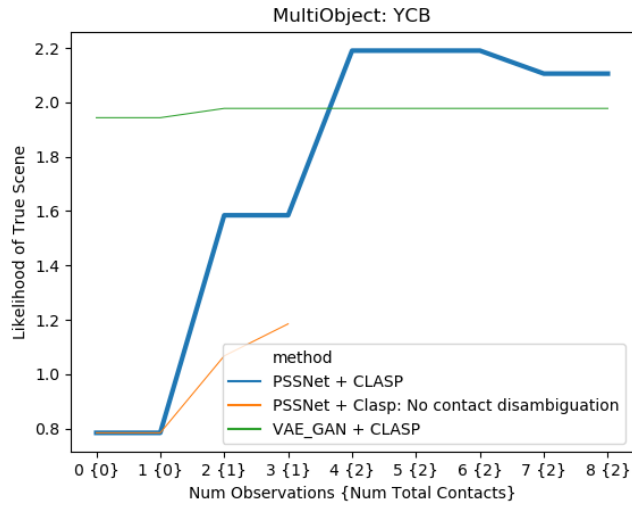


Fig. 10. Likelihood of CLASP and baselines for the multiobject scene