

Supplementary Material for the Paper “Estimating the Aspect Layout of Object Categories”

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We present detailed experimental results in this supplementary material for our paper “Estimating the Aspect Layout of Object Categories”.

1. 3DObject Dataset

Fig. 1 shows the viewpoint confusion matrices of the eight categories in the 3DObject dataset obtained by our Aspect Layout Model (ALM). The viewpoint accuracy is computed among all the true positive detections. To see how the viewpoint estimation is related to detection, we report viewpoint accuracy as a function of recall. We plot the accuracy-recall curves for the eight categories in the 3DObject dataset in Fig. 2, where we compare our full model with our root model and DPM [1]. The area under the accuracy-recall curve is used as a quantitative measure for viewpoint estimation. Our full model achieves the best overall performance among the three models. Detailed detection results on the 3DObject dataset are presented in Table 1. Some aspect layout estimation results of the eight categories obtained by our full model are shown in Fig. 7-14.

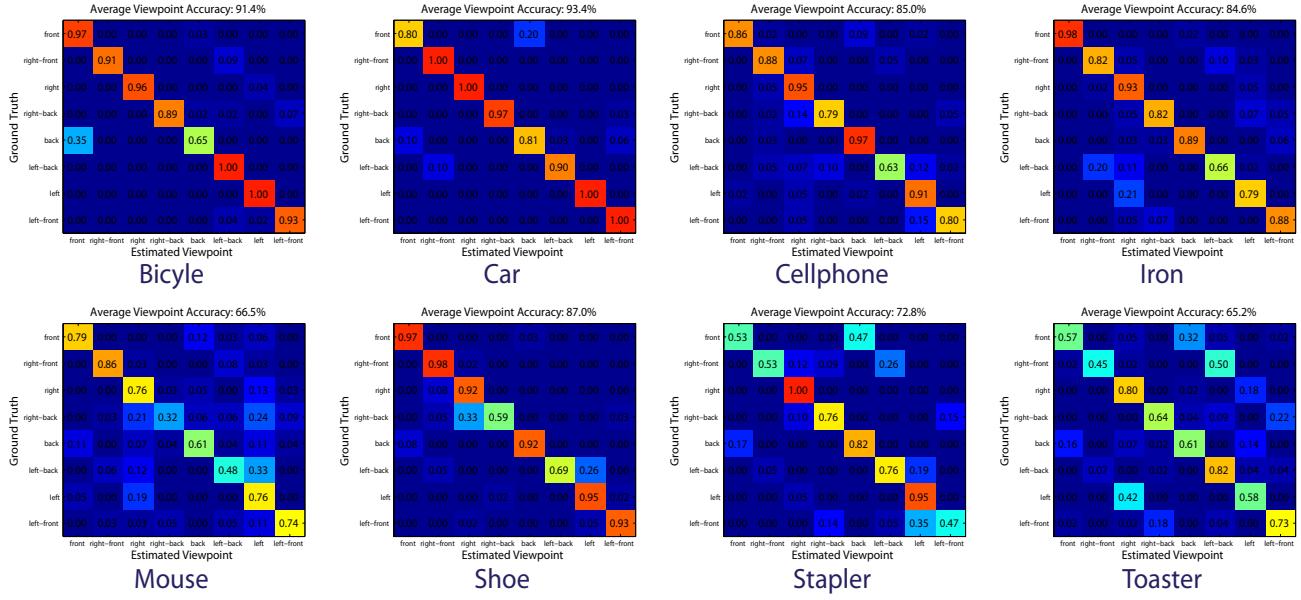


Figure 1. Viewpoint confusion matrices of the eight categories in the 3DObject Dataset.

Table 1. Average precision on the 3DObject dataset and the ImageNet dataset.

Category	Bicycle	Car	Cellphone	Iron	Mouse	Shoe	Stapler	Toaster	Mean	Bed	Chair	Sofa	Table	Mean
DPM [1]	95.1	98.2	73.1	83.1	64.0	95.7	65.0	96.7	83.9	94.0	95.4	97.6	95.1	95.5
ALM Root	93.5	99.5	77.4	75.8	48.8	85.6	73.4	96.5	81.3	83.5	78.4	93.7	81.2	84.2
ALM Full	93.0	98.4	79.2	80.7	50.7	84.2	70.5	97.4	81.8	89.4	89.3	92.8	90.1	90.4

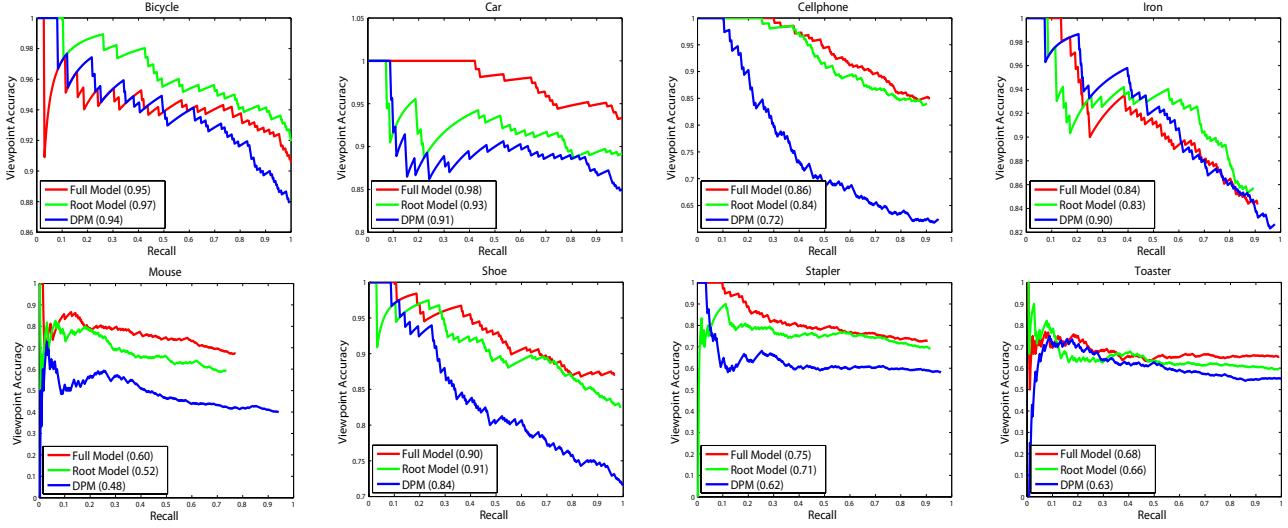


Figure 2. Viewpoint accuracy-recall curves for the eight categories in the 3DObject dataset.

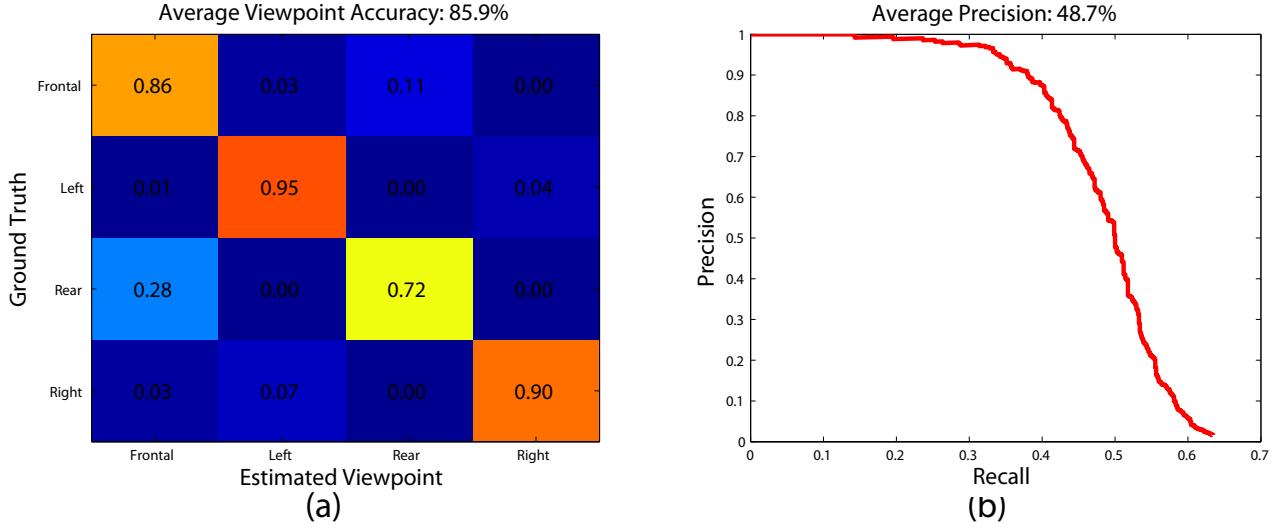


Figure 3. (a) Viewpoint confusion matrix of ALM on the VOC2006 Car dataset. (b) Precision-recall curve of ALM on the VOC2006 Car dataset.

2. VOC2006 Car Dataset

We show the viewpoint confusion matrix and the precision-recall curve of ALM on the VOC2006 Car Dataset in Fig. 3.

3. EPFL Car Dataset

The histograms of azimuth errors in degree of ALM and DPM on the EPFL Car dataset are show in Fig. 4(a), from which we can see clearly that ALM obtains better viewpoint estimation than DPM on the EPFL Car dataset. The viewpoint confusion matrix of ALM on the EPFL Car dataset is show in Fig. 4(b).

4. ImageNet Dataset

We show ALM's viewpoint confusion matrices for 3 views of the four categories in the ImageNet dataset in Fig. 5, and the viewpoint confusion matrices for 7 views in Fig. 6. Detailed detection results on the ImageNet dataset are also presented in Table 1. Some aspect layout estimation results of the four categories are show in Fig.15-18.

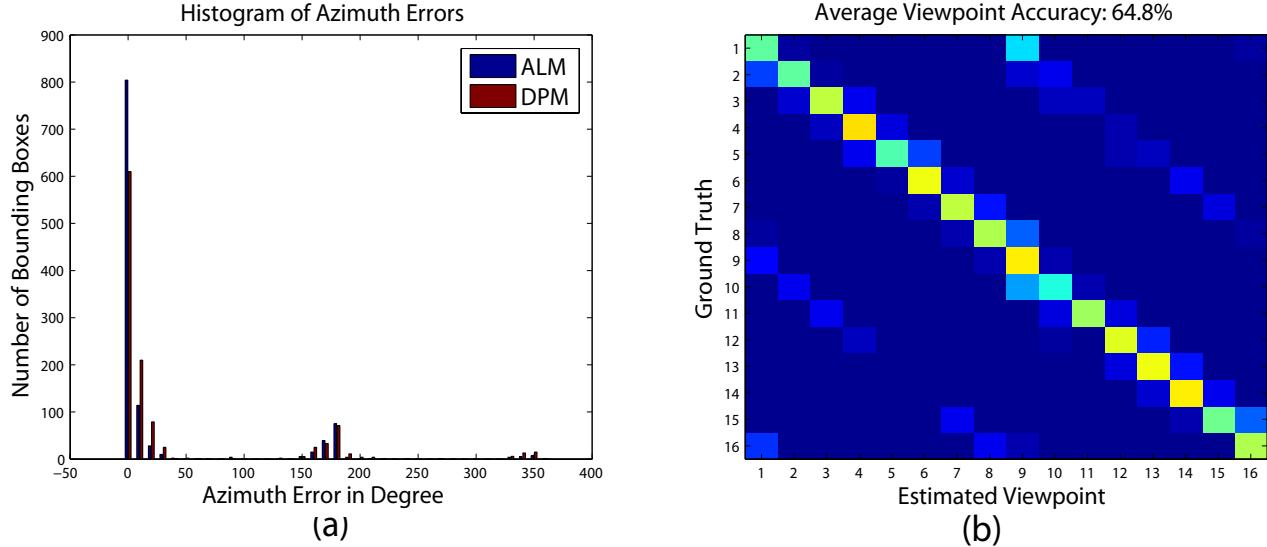


Figure 4. (a) Histograms of azimuth errors in degree of ALM and DPM on the EPFL Car dataset. (b) Viewpoint confusion matrix of 16 views of ALM on the EPFL Car dataset.

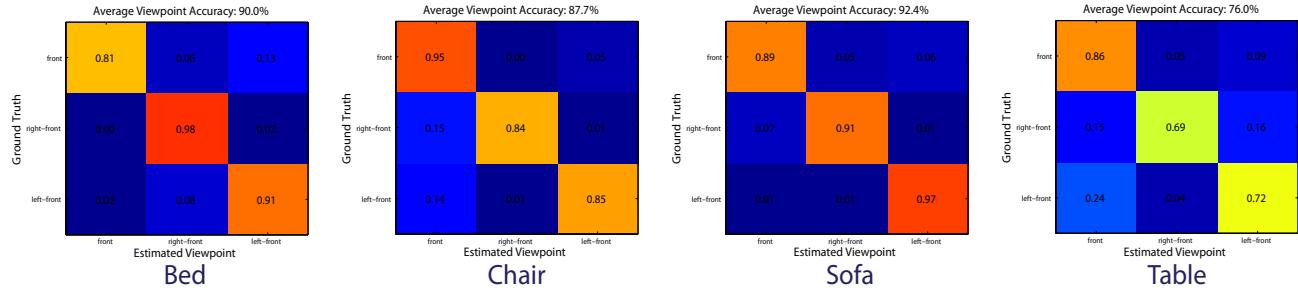


Figure 5. Viewpoint confusion matrices of 3 views of ALM on the four categories in the ImageNet dataset.

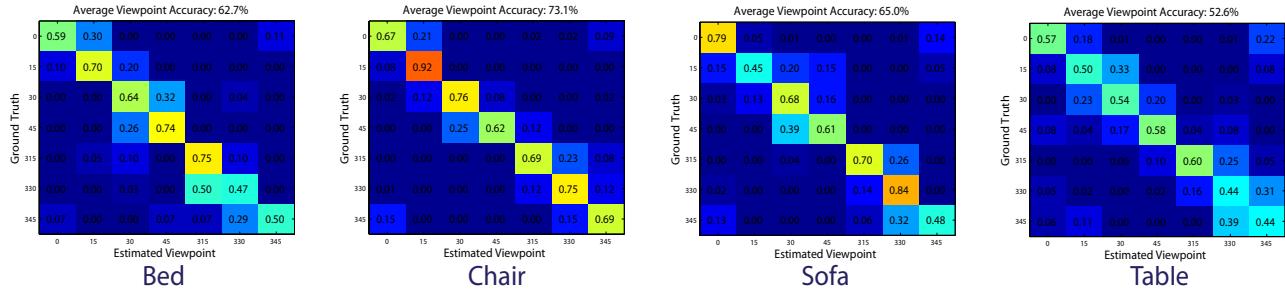


Figure 6. Viewpoint confusion matrices of 7 views of ALM on the four categories in the ImageNet dataset.

References

- [1] P. F. Felzenszwalb, R. B. Girshick, D. McAllester, and D. Ramanan. Object detection with discriminatively trained part-based models. *TPAMI*, 2010.

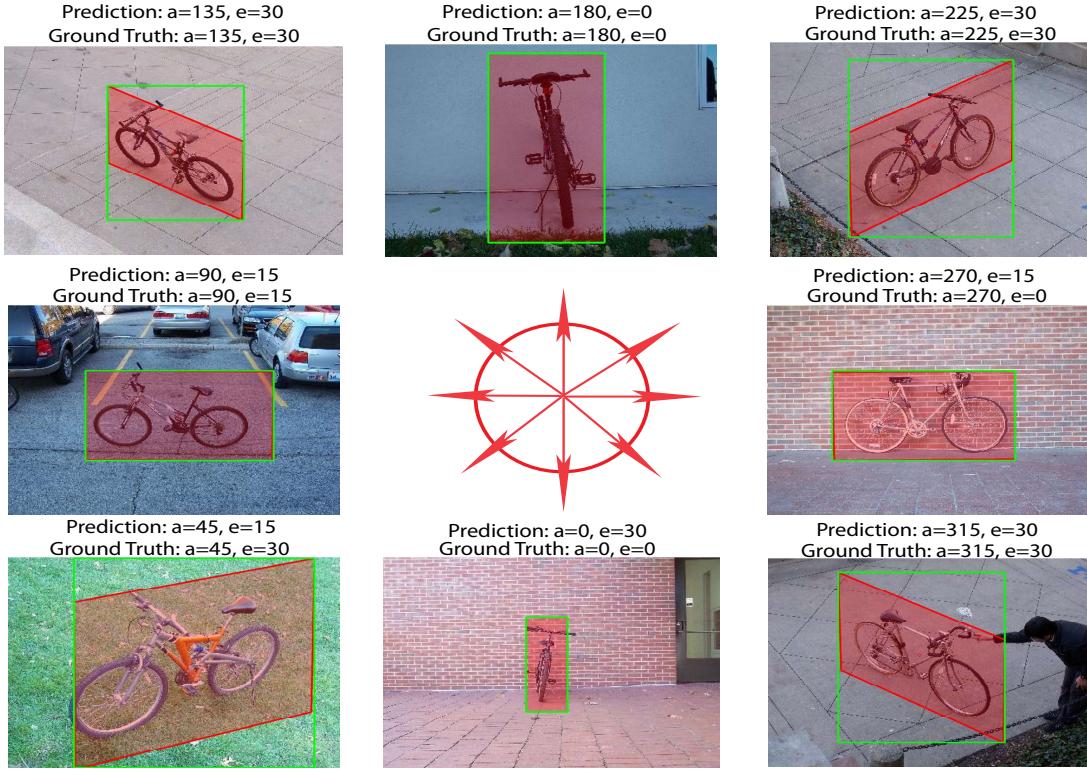


Figure 7. Aspect layout estimation results on the Bicycle category in the 3DObject dataset.

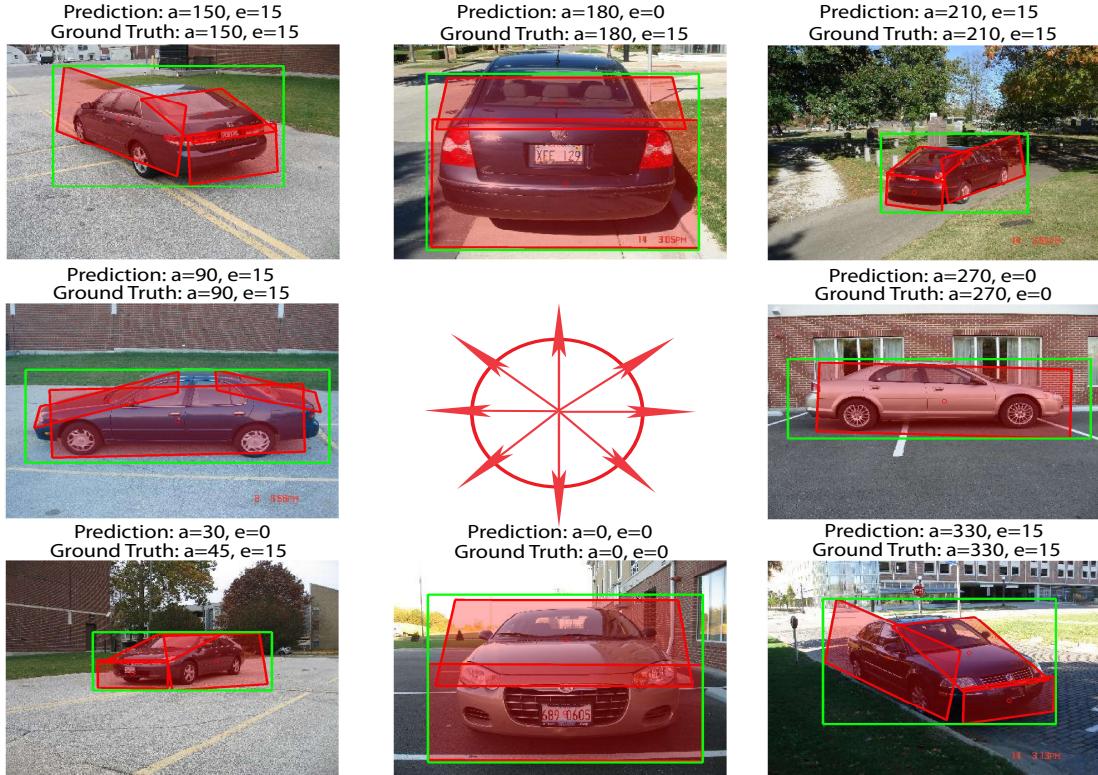


Figure 8. Aspect layout estimation results on the Car category in the 3DObject dataset.

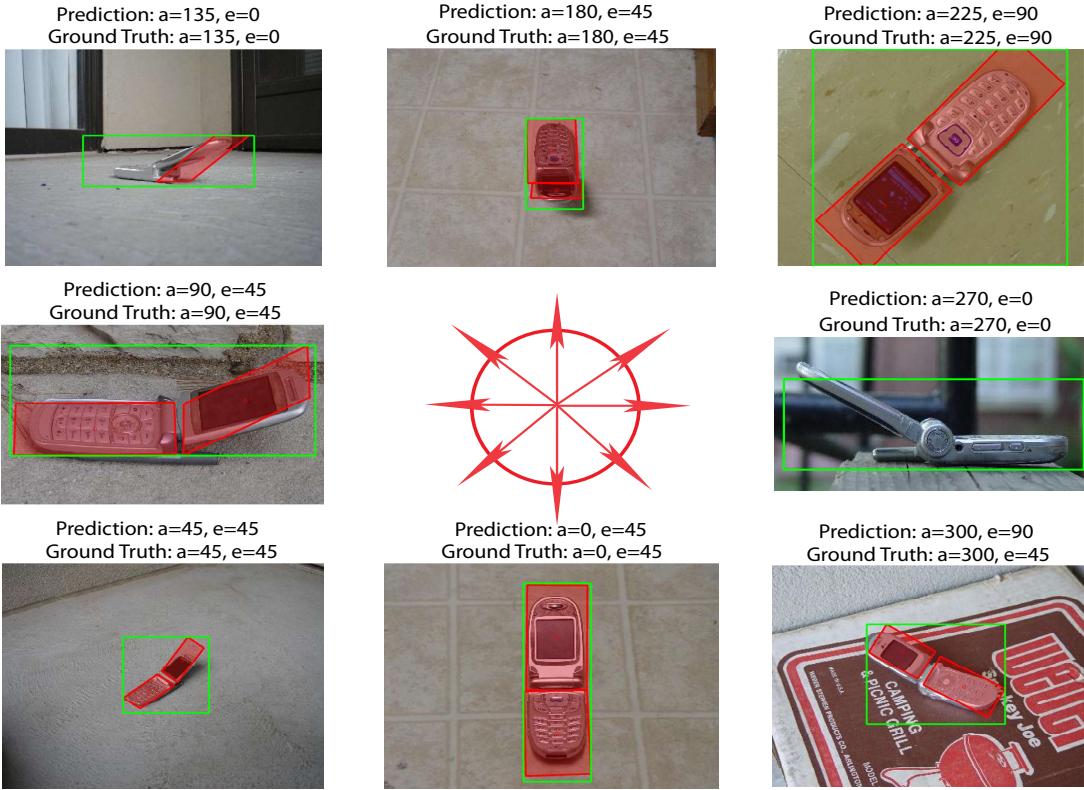


Figure 9. Aspect layout estimation results on the Cellphone category in the 3DObject dataset.

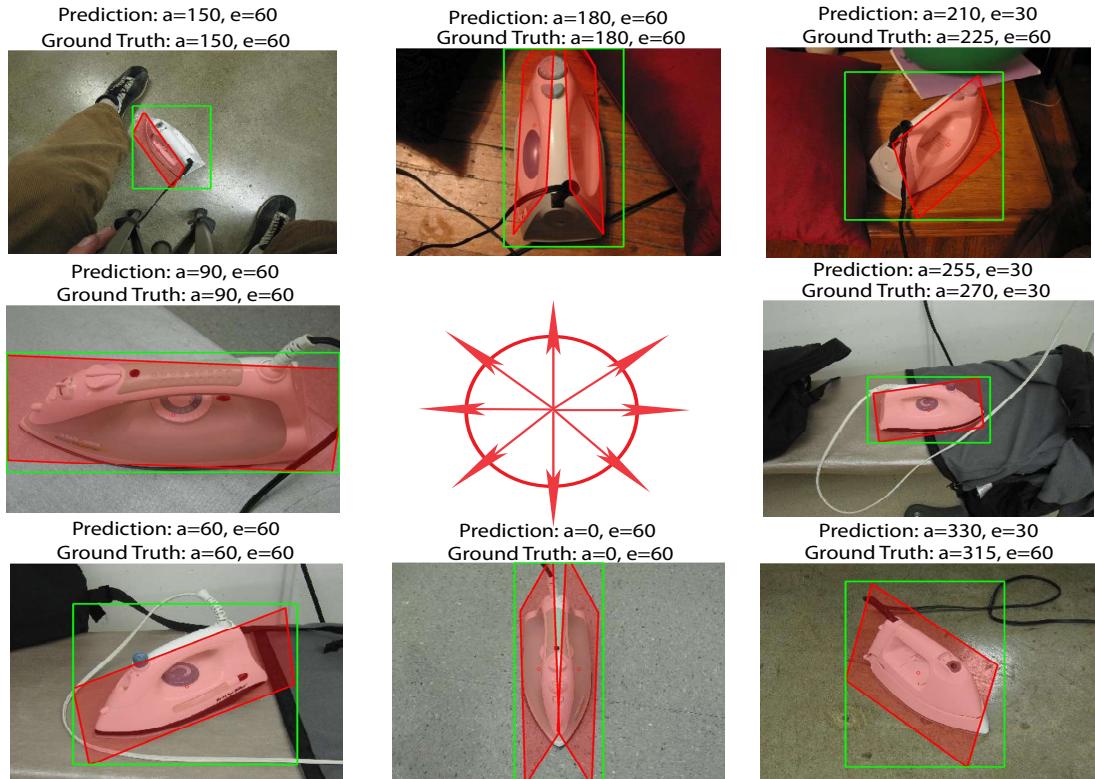


Figure 10. Aspect layout estimation results on the Iron category in the 3DObject dataset.

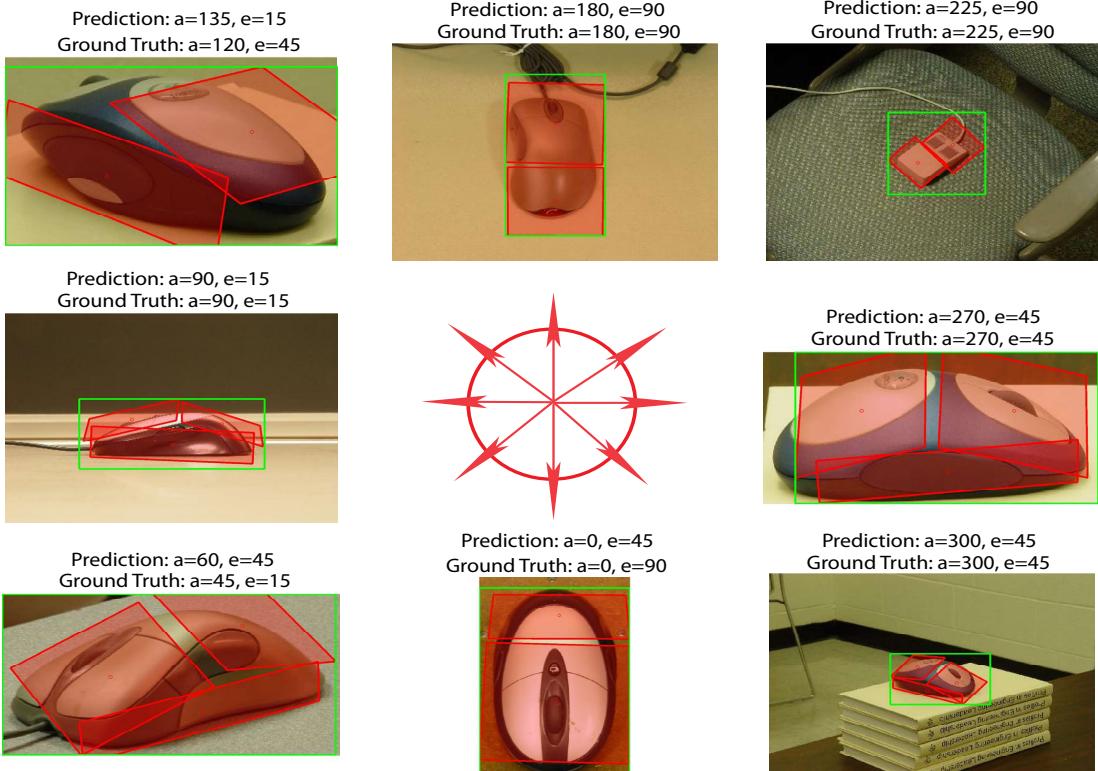


Figure 11. Aspect layout estimation results on the Mouse category in the 3DObject dataset.

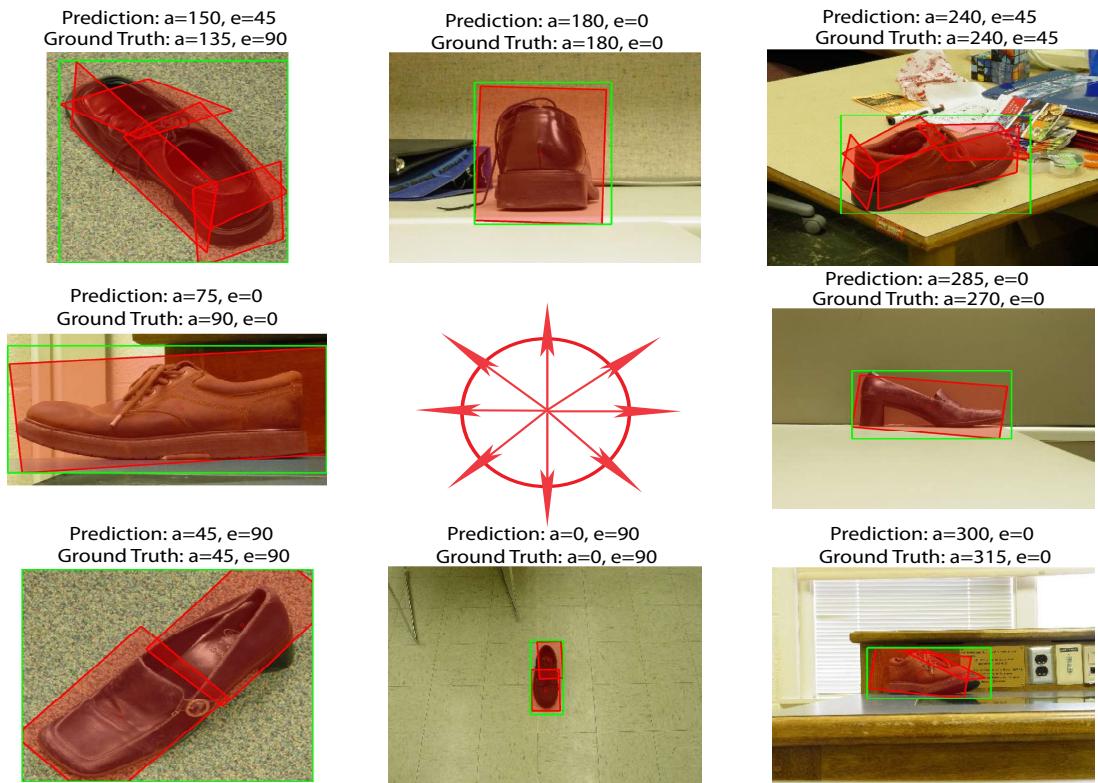


Figure 12. Aspect layout estimation results on the Shoe category in the 3DObject dataset.

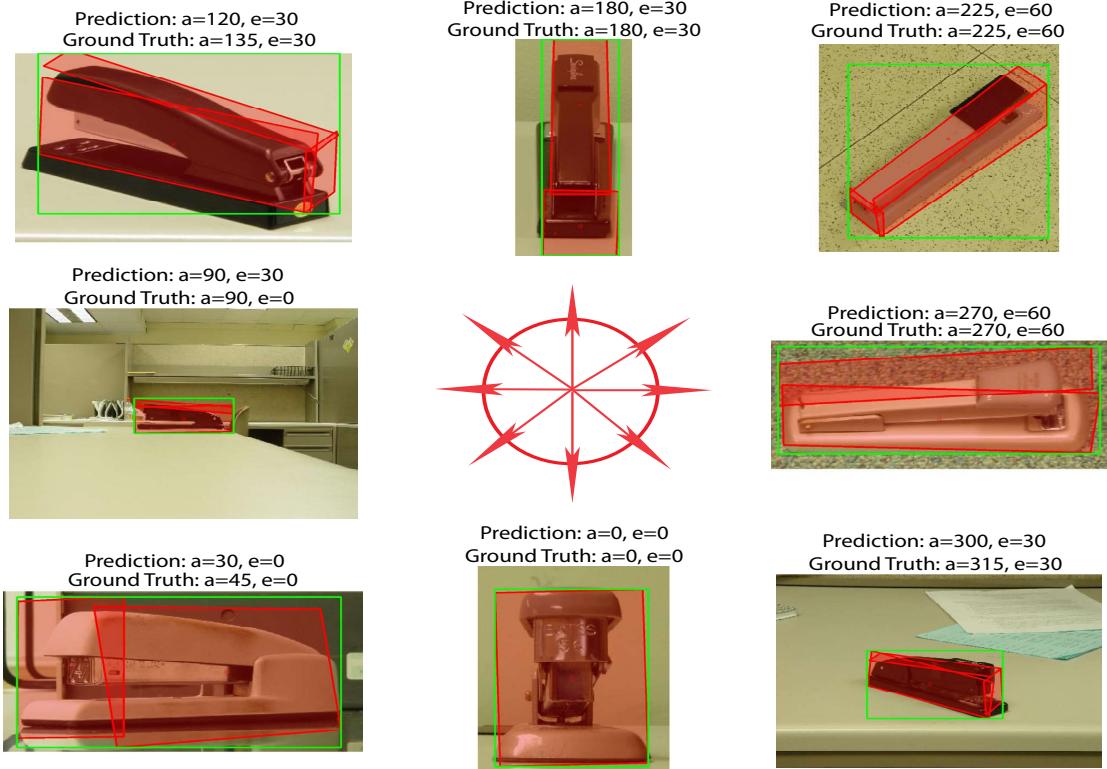


Figure 13. Aspect layout estimation results on the Stapler category in the 3DObject dataset.

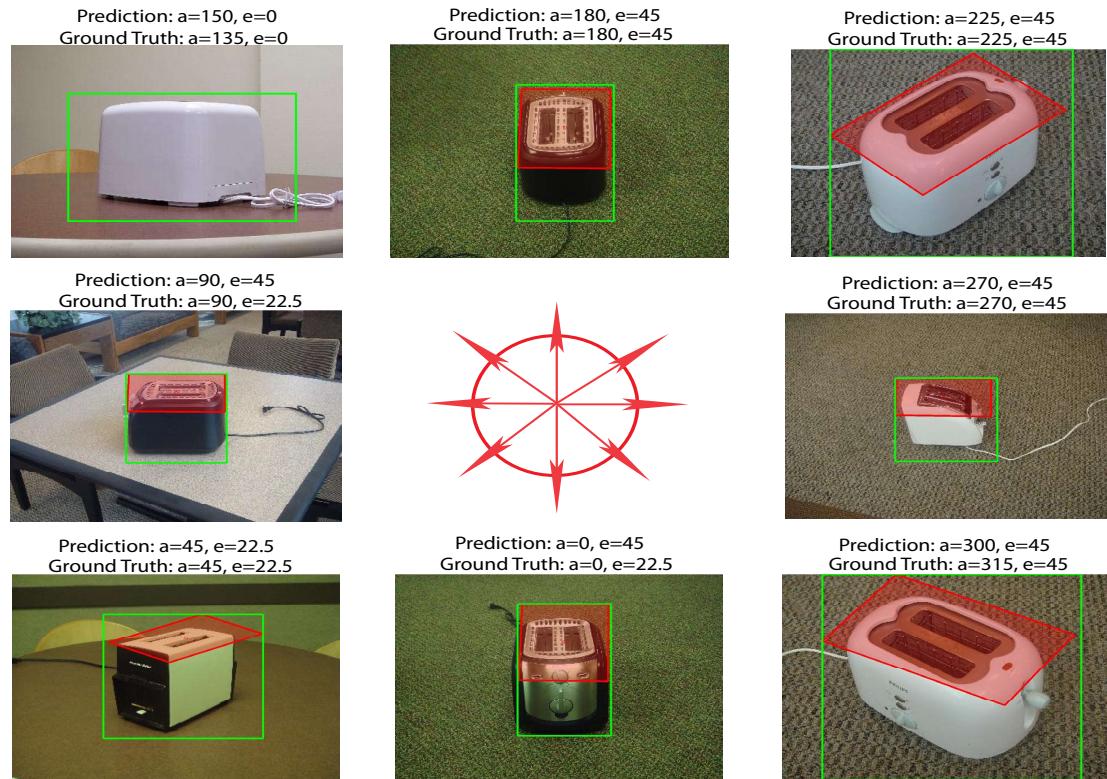


Figure 14. Aspect layout estimation results on the Toaster category in the 3DObject dataset.

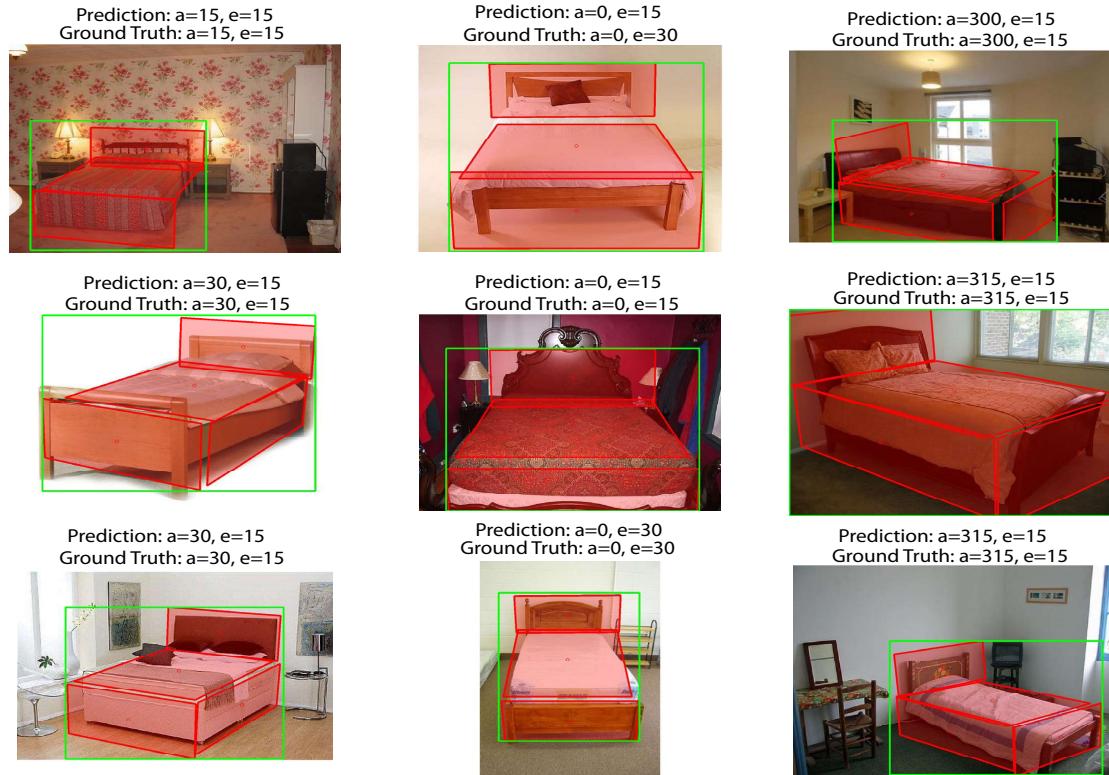


Figure 15. Aspect layout estimation results on the Bed category in the ImageNet dataset.



Figure 16. Aspect layout estimation results on the Chair category in the ImageNet dataset.



Figure 17. Aspect layout estimation results on the Sofa category in the ImageNet dataset.

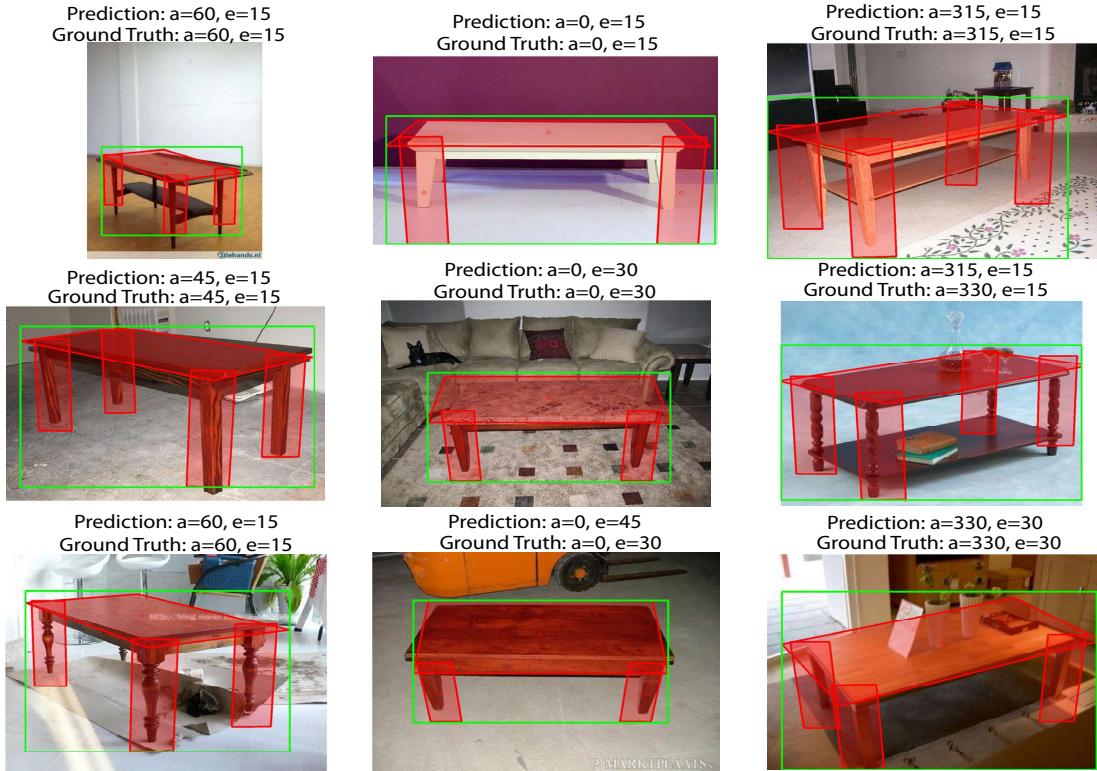


Figure 18. Aspect layout estimation results on the Table category in the ImageNet dataset.