Boundary Cues for 3D Object Shape Recovery

Supplemental file

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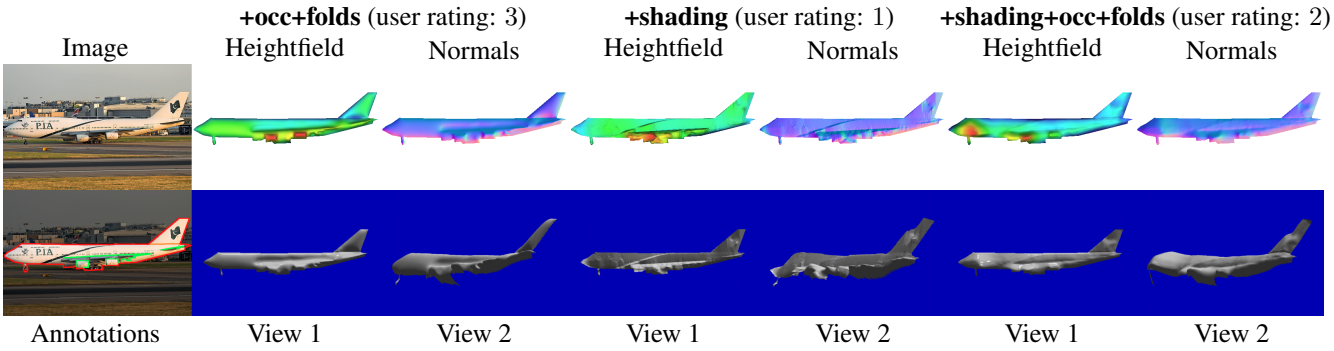
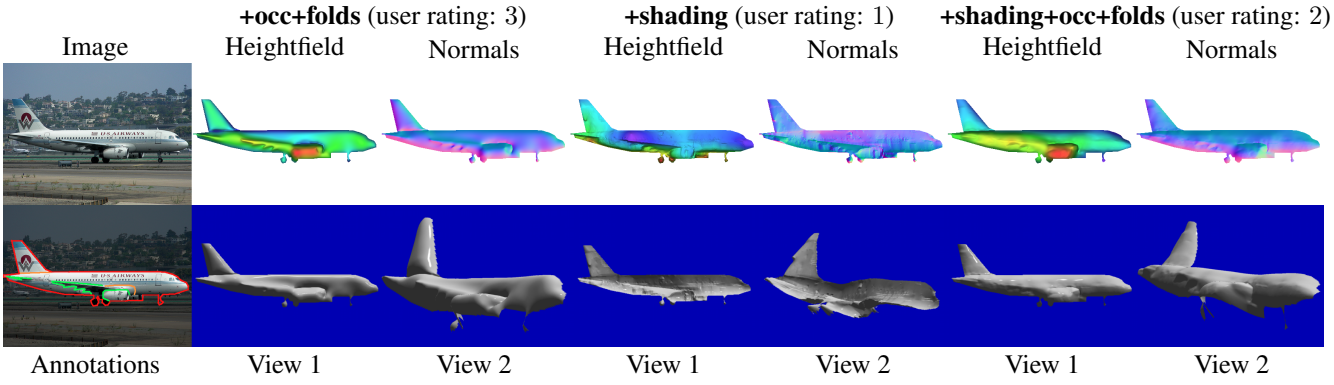
In this document, we provide many more examples of the annotations and reconstructions used in our quality studies and recognition tasks. We used 17 of the 20 classes from the PASCAL VOC dataset. For each of the 17 shape classes (e.g. aeroplane, bird, boat, etc.), we show two of the 10 results, including annotations, heightfield, surface normals, and the 3D surface relit from different viewpoints. We also include user rating scores of surface quality and per-class average ratings (Fig 1) for further evaluation. We show results for the three *overall* highest scoring algorithms: **+occ+folds** (all geometric cues, no shading cues), **+shading** (only silhouette cue and shading cues), **+shading+occ+folds** (all geometric cues and shading cues).

Below are results from the *aeroplane* category. Here, we label each image in the figure individually, but exclude these labels for visibility in the remaining figures (all results displayed in the same order throughout this document). Heightfields are visualized such that red is closest to the camera and blue is farthest away, and the surface normal maps are rendered by mapping $(r, g, b) = (n_x + 1, n_y + 1, n_z + 1)/2$, where (r, g, b) is the pixel value, and (n_x, n_y, n_z) is a surface normal. Views 1 and 2 are rendered by shading a slightly specular surface with a point light from a head-on view (View 1), and from a view with significant rotation (View 2, 45° right and down). User ratings are on a 5-point scale, where 5 is "very good" and 1 is "very poor."

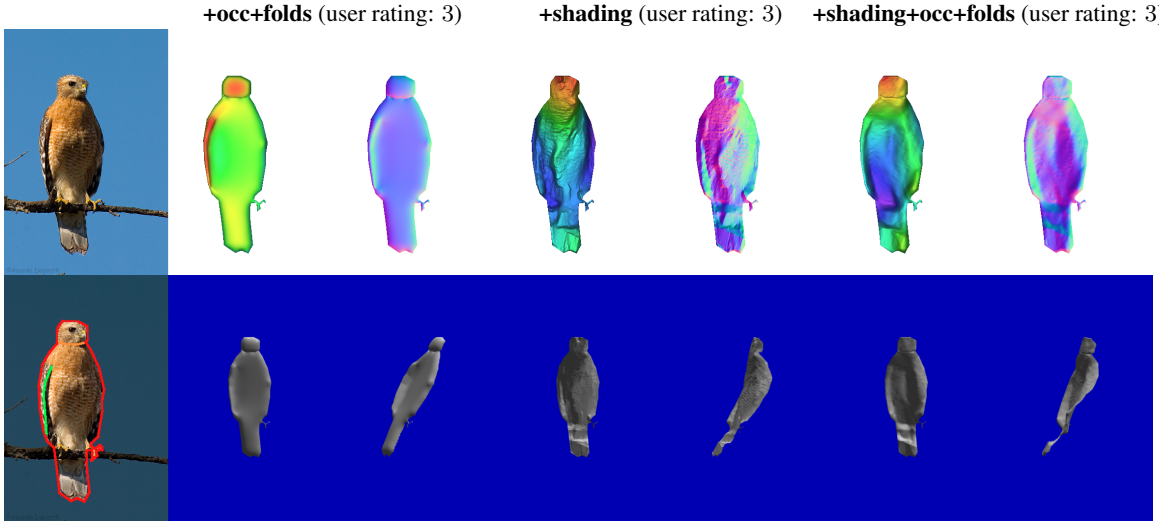
aeroplane



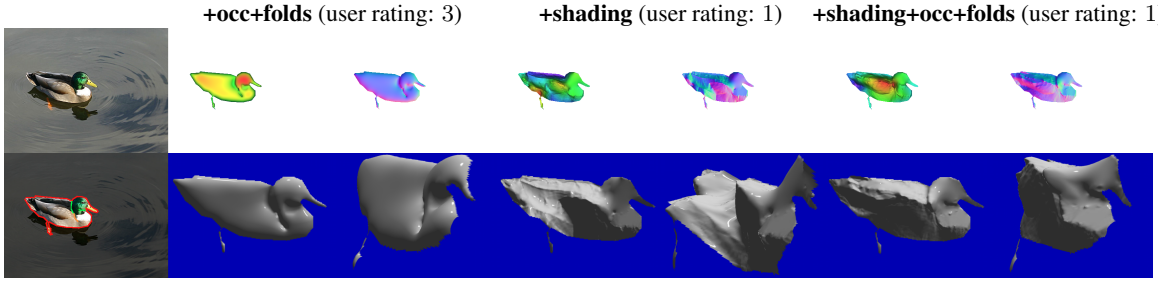


bird

+occ+folds (user rating: 3) **+shading** (user rating: 3) **+shading+occ+folds** (user rating: 3)



+occ+folds (user rating: 3) **+shading** (user rating: 1) **+shading+occ+folds** (user rating: 1)



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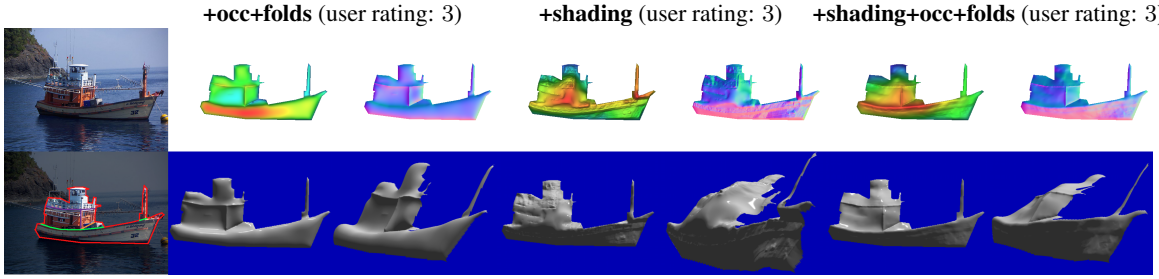
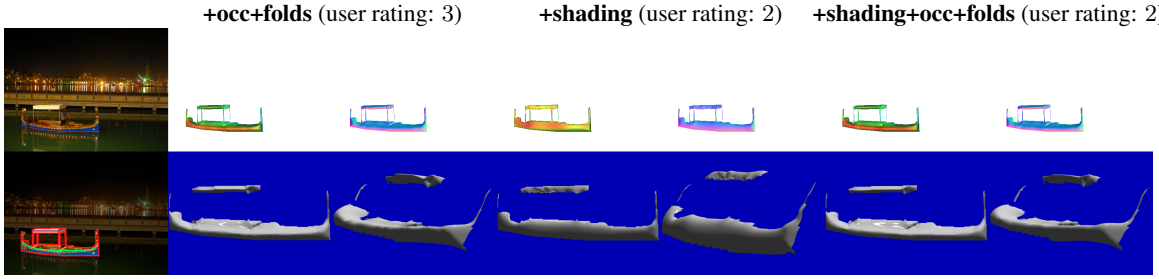
boat

+occ+folds (user rating: 3) **+shading** (user rating: 3) **+shading+occ+folds** (user rating: 3)

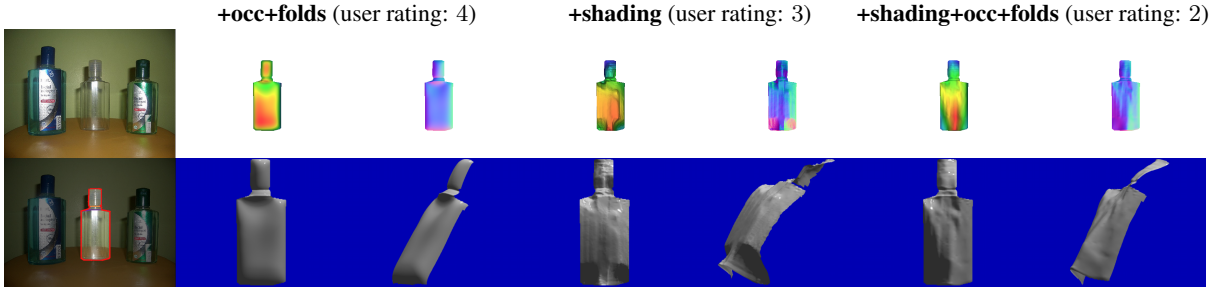


+occ+folds (user rating: 3) **+shading** (user rating: 2) **+shading+occ+folds** (user rating: 2)

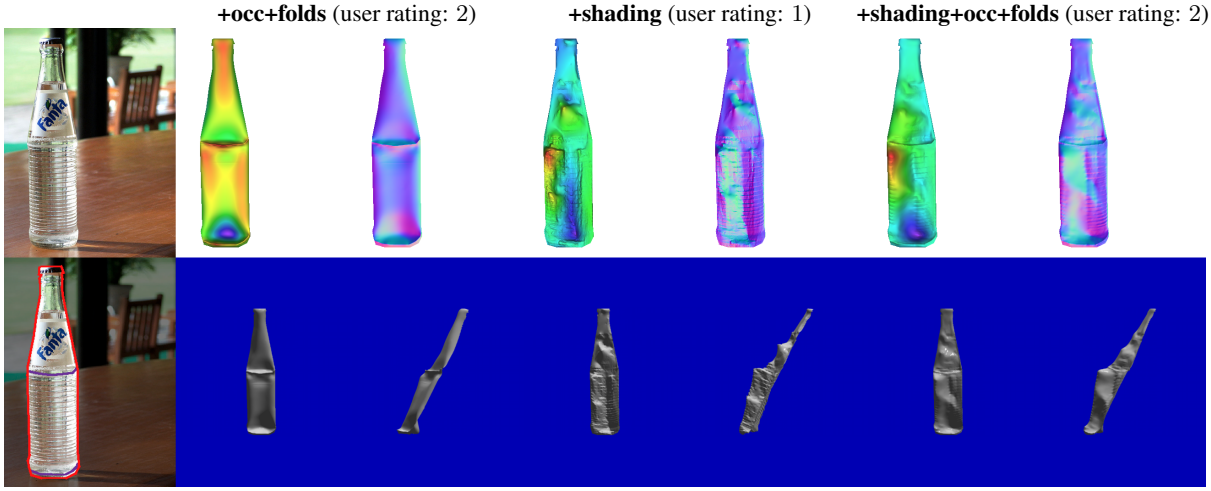


bottle

+occ+folds (user rating: 4) **+shading** (user rating: 3) **+shading+occ+folds** (user rating: 2)



+occ+folds (user rating: 2) **+shading** (user rating: 1) **+shading+occ+folds** (user rating: 2)



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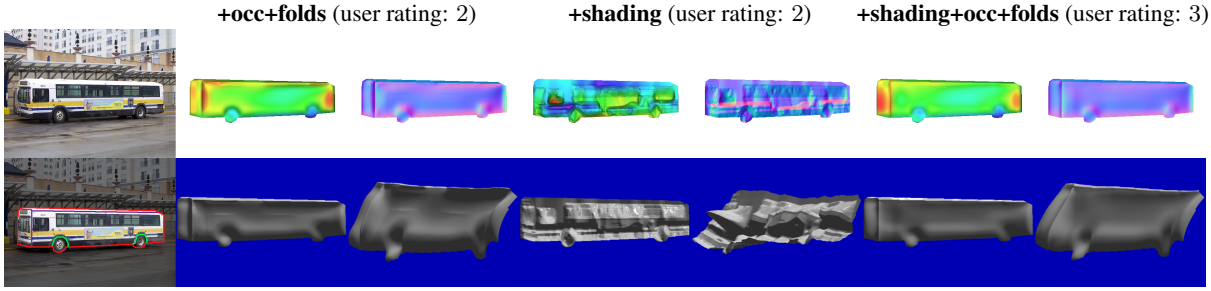
bus

+occ+folds (user rating: 2) **+shading** (user rating: 2) **+shading+occ+folds** (user rating: 3)



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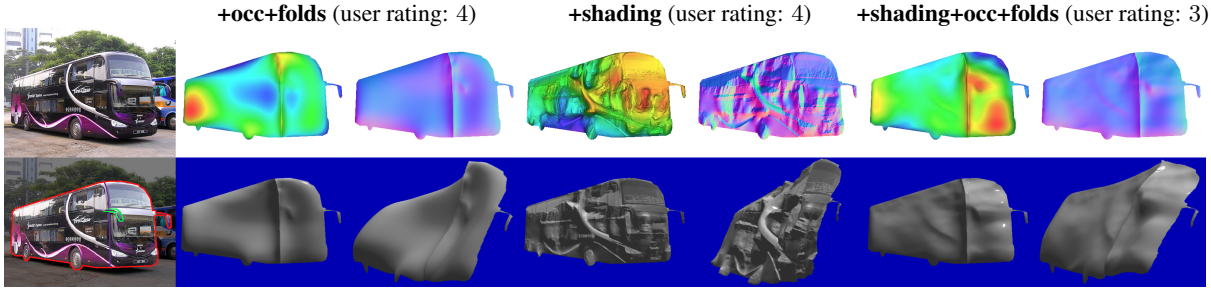
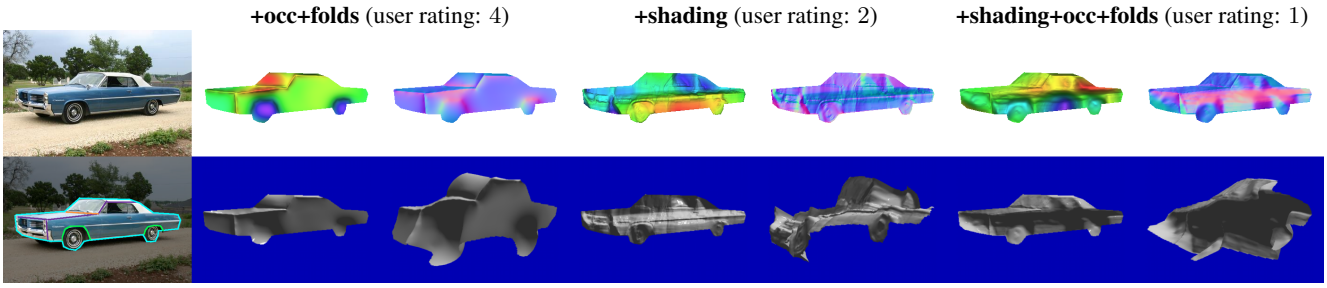


car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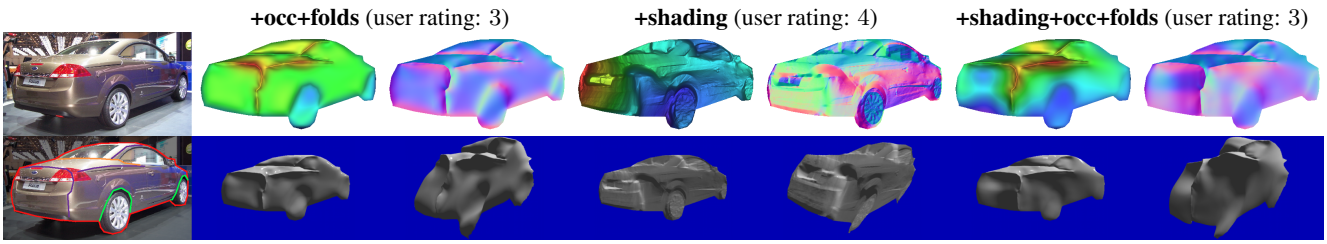
+shading (user rating: 2)
+shading+occ+folds (user rating: 1)


+occ+folds (user rating: 3)
+shading (user rating: 4)
+shading+occ+folds (user rating: 3)

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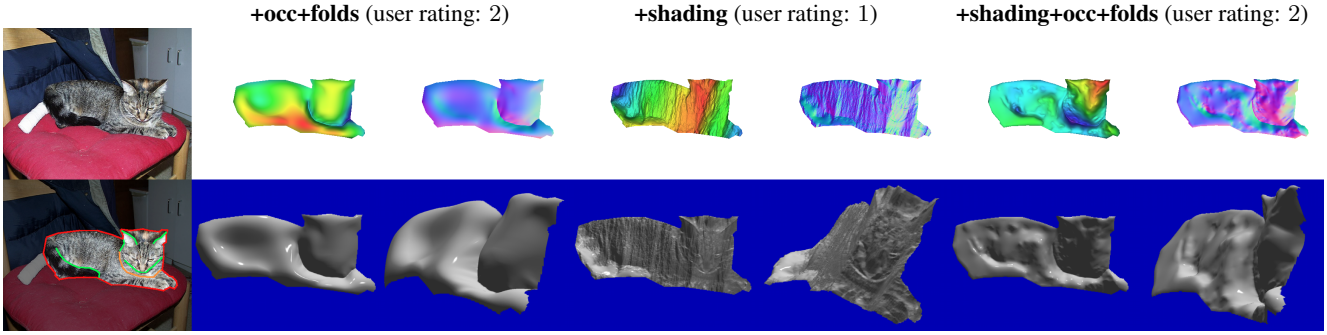
cat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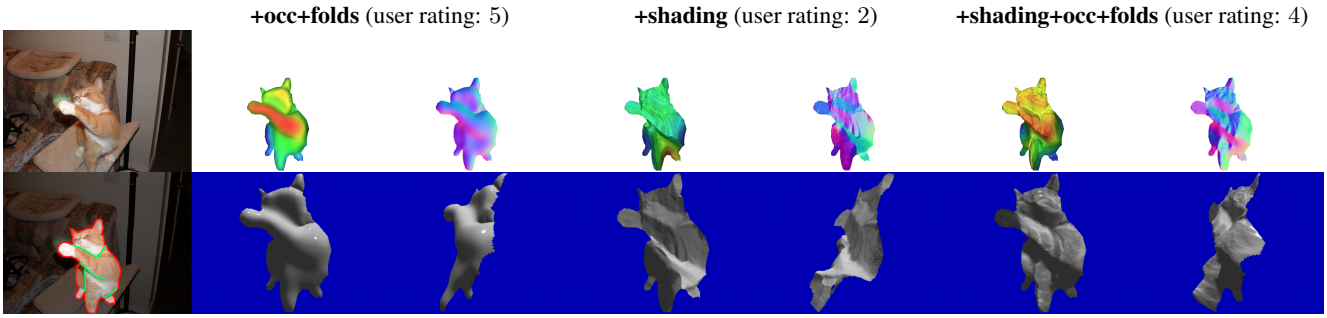
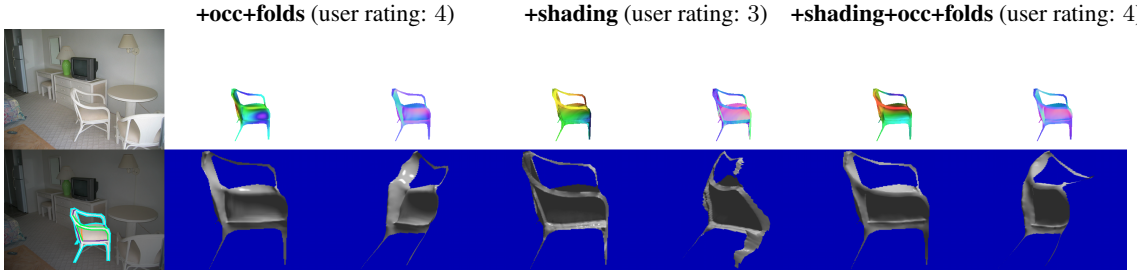
+shading (user rating: 1)
+shading+occ+folds (user rating: 2)

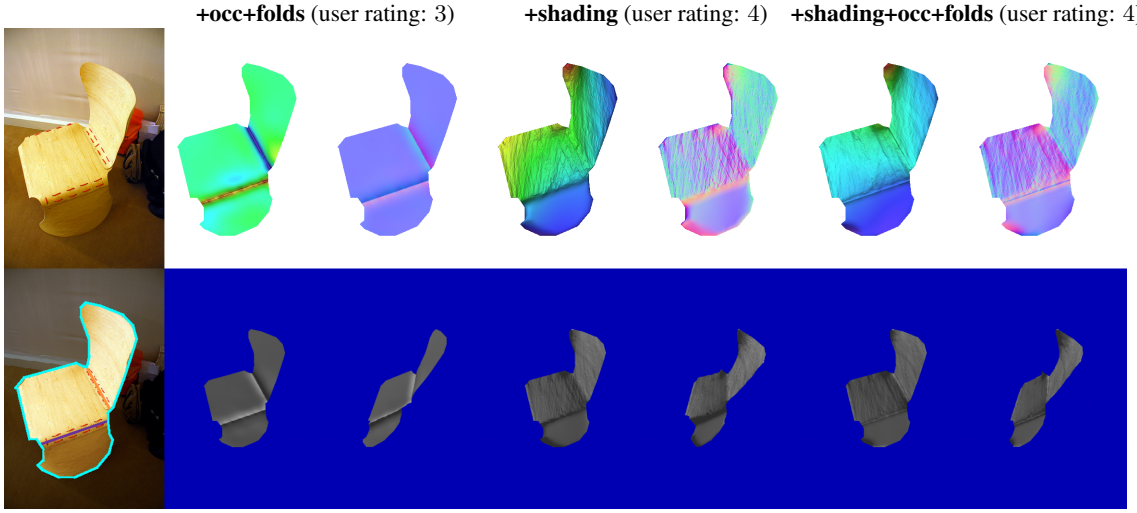

+occ+folds (user rating: 5)
+shading (user rating: 2)
+shading+occ+folds (user rating: 4)

chair

+occ+folds (user rating: 4) **+shading** (user rating: 3) **+shading+occ+folds** (user rating: 4)

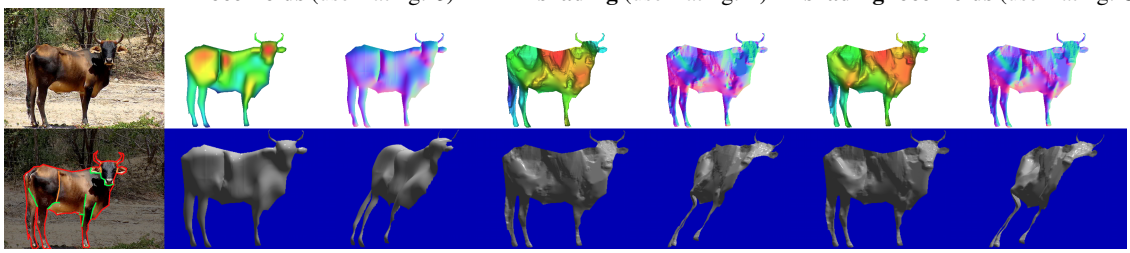


+occ+folds (user rating: 3) **+shading** (user rating: 4) **+shading+occ+folds** (user rating: 4)

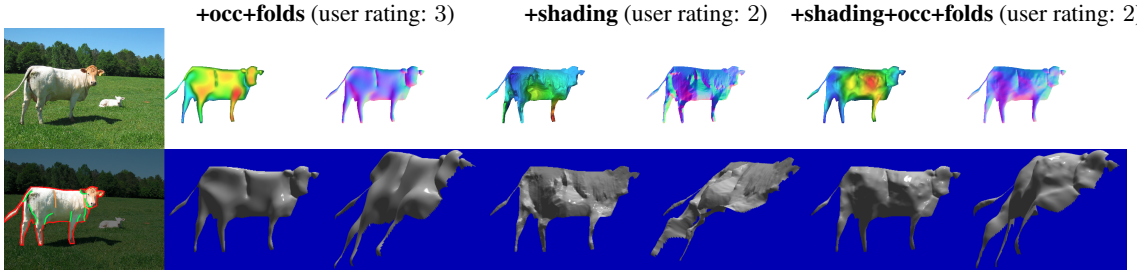


COW

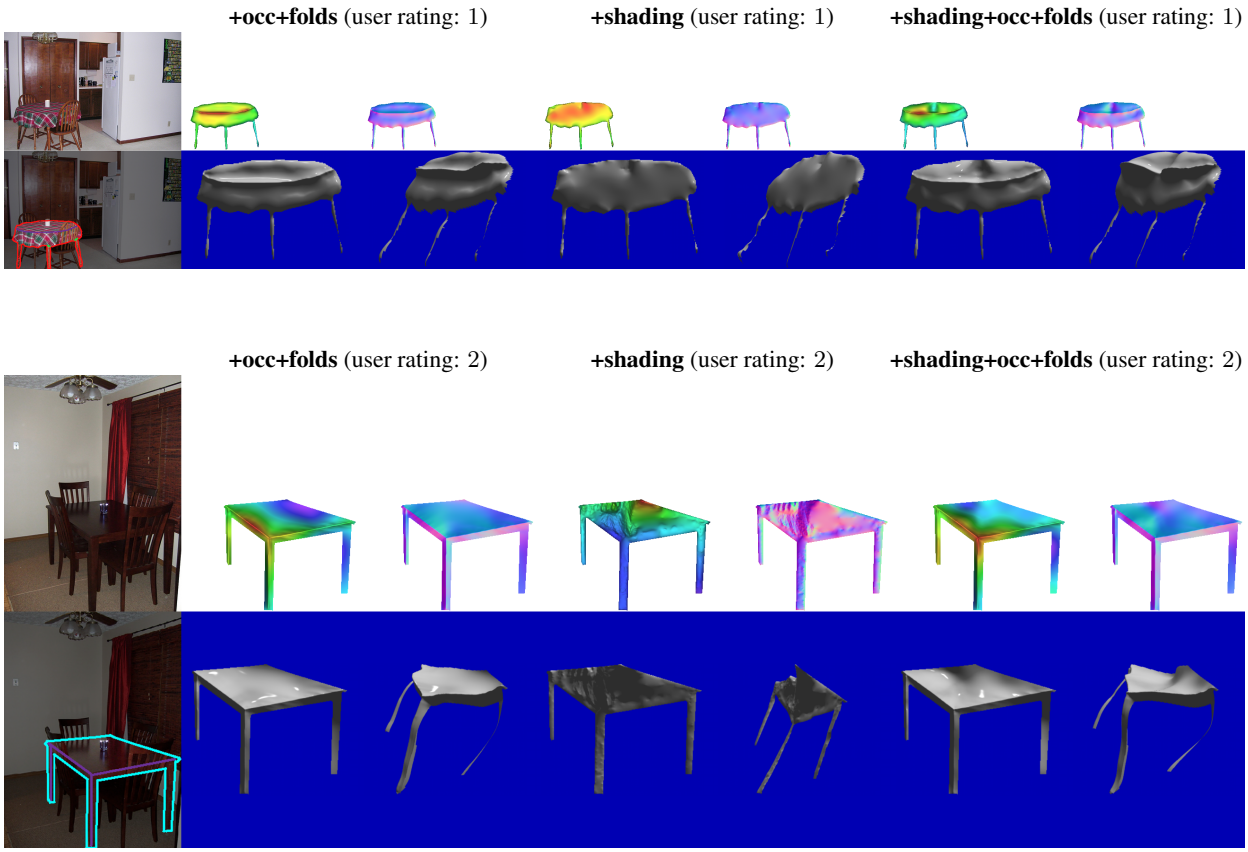
+occ+folds (user rating: 5) **+shading** (user rating: 4) **+shading+occ+folds** (user rating: 3)



+occ+folds (user rating: 3) **+shading** (user rating: 2) **+shading+occ+folds** (user rating: 2)



diningtable



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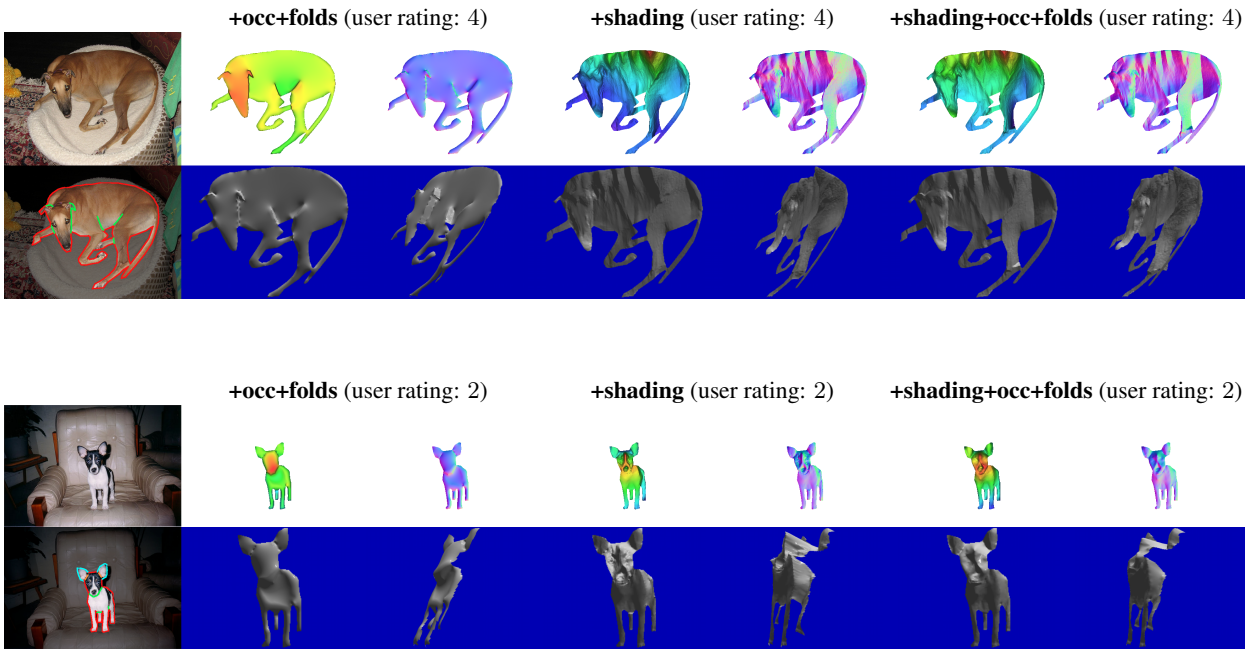
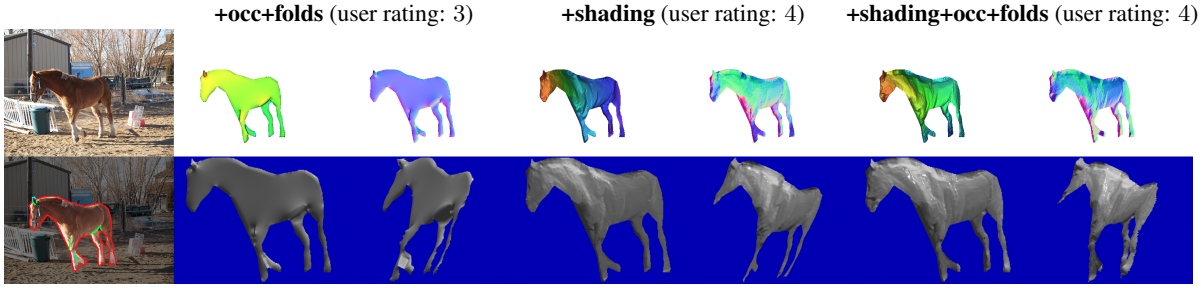
dog

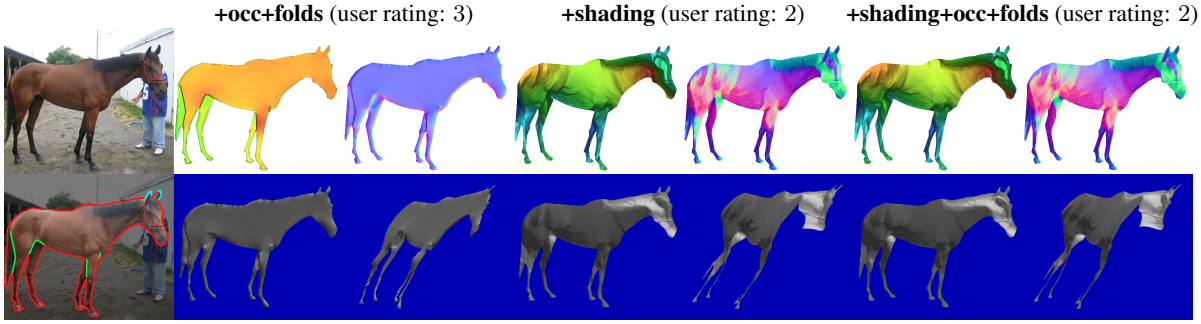


horse

+occ+folds (user rating: 3) **+shading** (user rating: 4) **+shading+occ+folds** (user rating: 4)



+occ+folds (user rating: 3) **+shading** (user rating: 2) **+shading+occ+folds** (user rating: 2)



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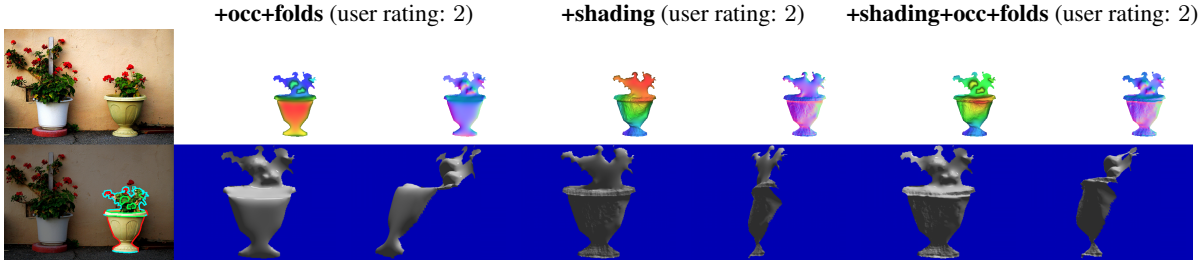
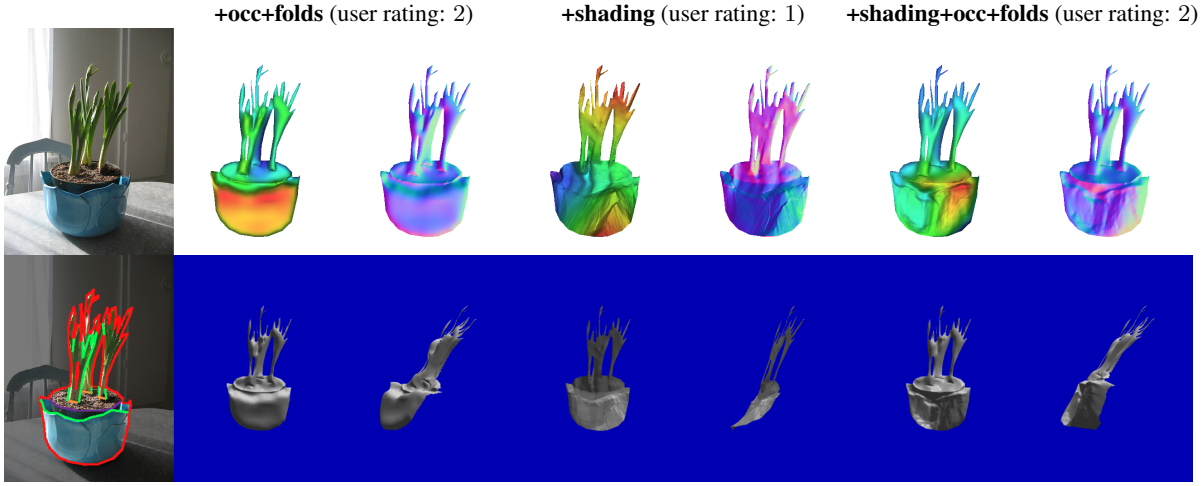
pottedplant

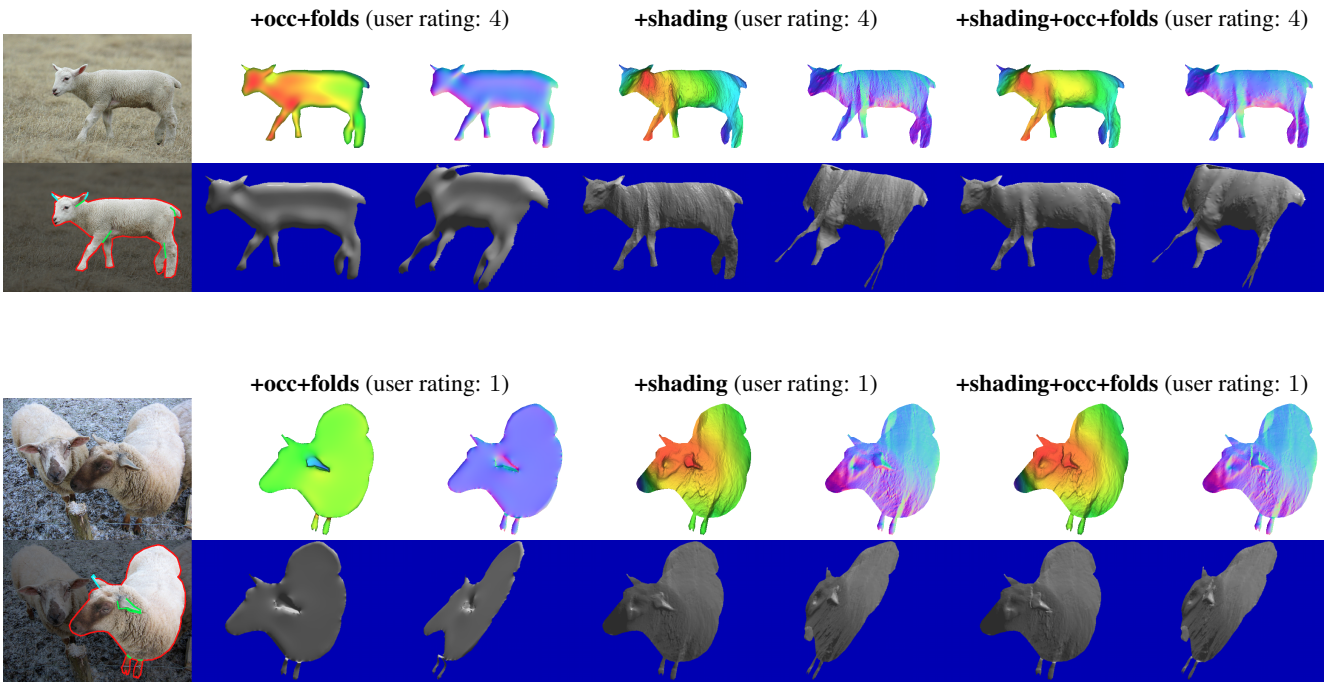
+occ+folds (user rating: 2) **+shading** (user rating: 2) **+shading+occ+folds** (user rating: 2)



+occ+folds (user rating: 2) **+shading** (user rating: 1) **+shading+occ+folds** (user rating: 2)



sheep


+occ+folds (user rating: 4)
+shading (user rating: 4)
+shading+occ+folds (user rating: 4)
+occ+folds (user rating: 1)
+shading (user rating: 1)
+shading+occ+folds (user rating: 1)

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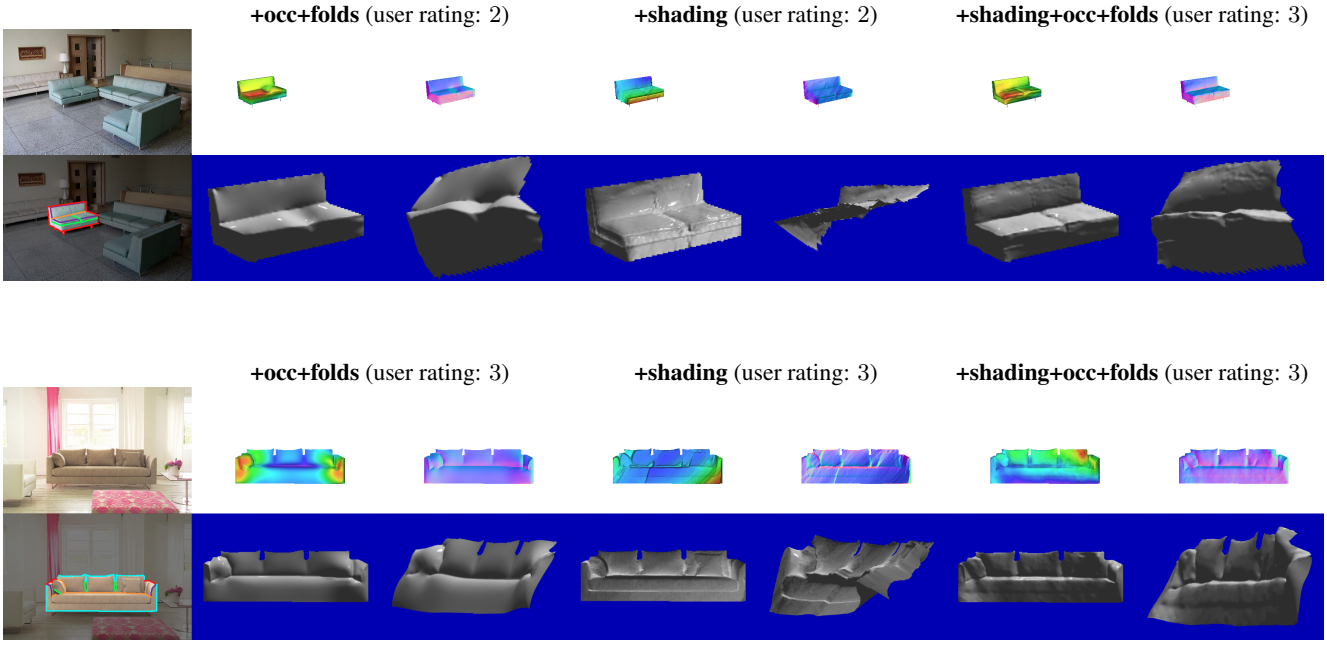
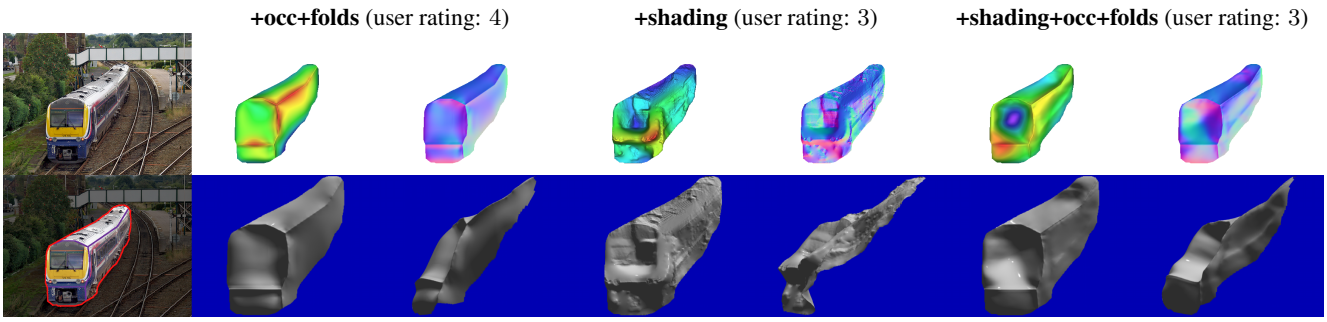
sofa


+occ+folds (user rating: 2)
+shading (user rating: 2)
+shading+occ+folds (user rating: 3)
+occ+folds (user rating: 3)
+shading (user rating: 3)
+shading+occ+folds (user rating: 3)

train



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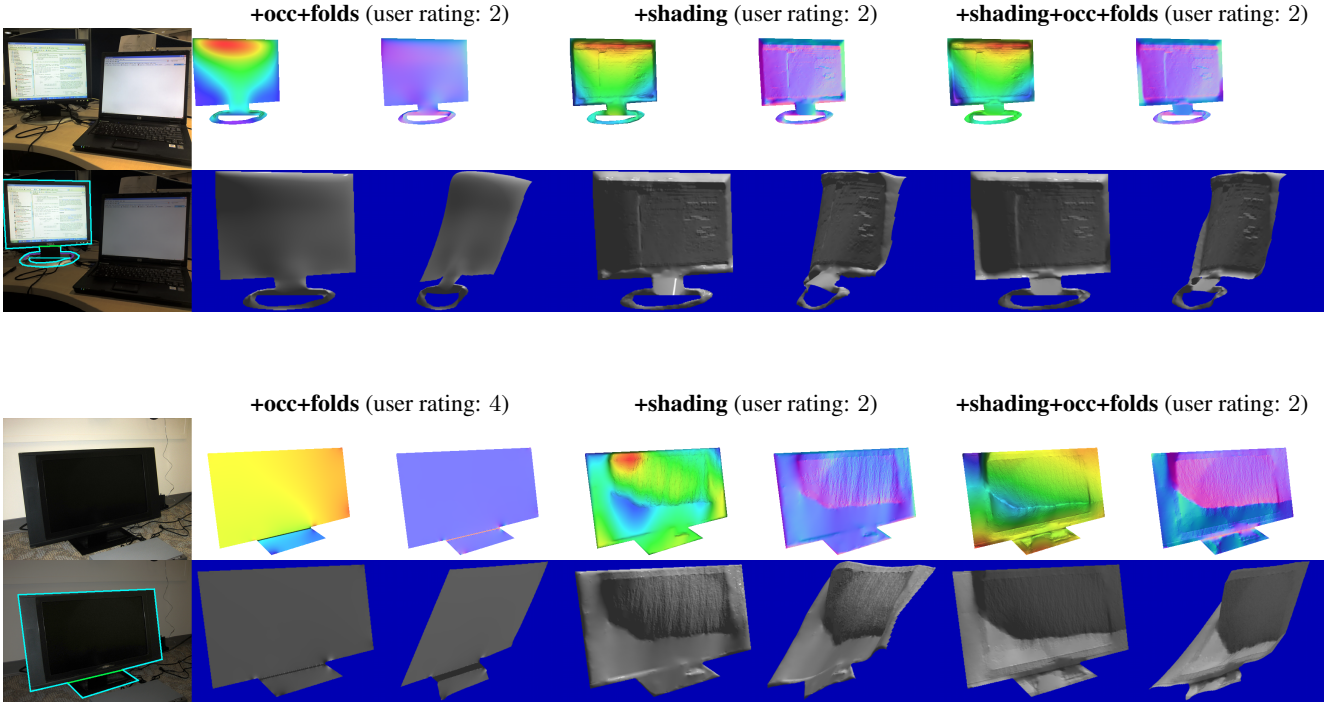
tvmonitor



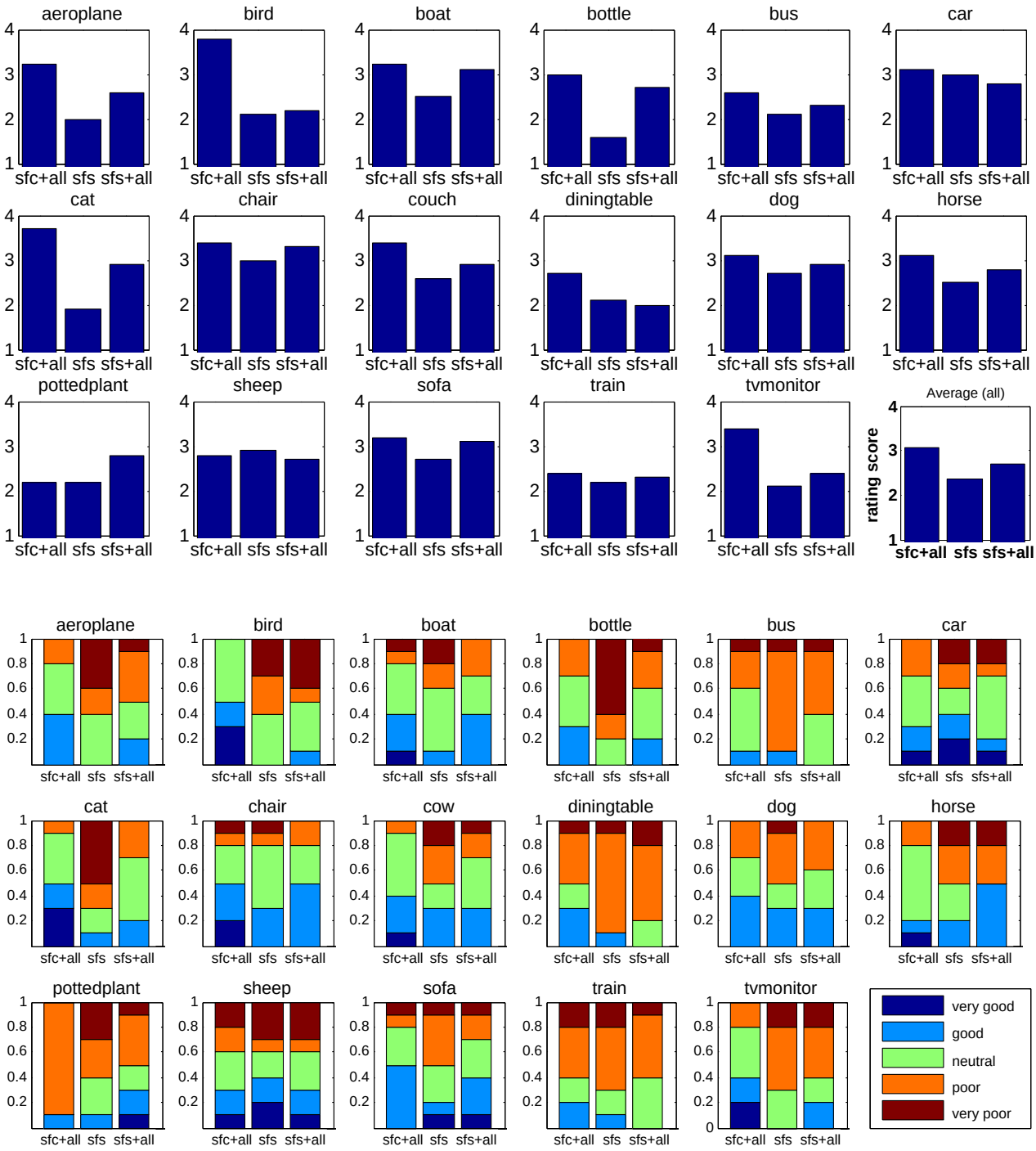


Figure 1. Average ratings for each of the 17 classes used in our experiments (top) on a 5 point scale (5 is best). The bottom plots show the percentage of times users ranked a given example as "very good," "good," etc. Larger dark and light blue bars thus indicate higher-rated results. Notation: sfc+all = +occ+folds; sfs = +shading, sfs+all = +shading+occ+folds.