Few-shot Shape Recognition by Learning Deep Shape-aware Features (Supplementary Materials)

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1. Additional Details for Datasets

1.1. Simple-shape Dataset

The simple-shape dataset is comprised of 25 classes, each containing 10,000 images. The dataset is divided into a training set and a test set. The training set consists of 15 classes: folding line, circle, copper, cross, curve, octagram, eight-petaled flower, ellipse, fanshaped, forbid, four-petaled flower, heartshaped, heptagon, hexagon, and line. The test set contains 10 classes: nonagon, octagon, pentagon, rectangle, square, pentagram, crutch, thirty-six-pointed star, three-triangle, and triangle. To inject variability into the dataset, the size, angle, position, and color of each shape in the images are randomized, resulting in multiple variations of each shape. To provide visualization of the dataset, Figure 1 displays some examples of the 25 shape classes in the simple-shape dataset.

1.2. Shape-AwA2

AwA2 [1] is a widely-used and representative few-shot learning dataset. In this study, we utilized a state-of-the-art salient object detector SCRN [2] to extract animal targets from the AwA2 color images, resulting in a new dataset called shape-AwA2, which consists of shape masks corresponding to each animal. Consistent with AwA2, shape-AwA2 has 50 classes with a total of 37,322 images that are further divided into training and testing sets. Specifically, the training set includes 35 classes: antelope, bat, beaver, blue whale, bobcat, buffalo, chihuahua, chimpanzee, collie, cow, dalmatian, deer, dolphin, elephant, fox, german shepherd, giant panda, giraffe, gorilla, grizzly bear, hamster, hippopotamus, horse, humpback whale, killer whale, leopard, lion, mole, moose, mouse, otter, ox, persian cat, pig, and polar bear. The testing set, on the other hand, consists of 15 clsaaes: rabbit, raccoon, rat, rhinoceros, seal, sheep, siamese cat, skunk, spider monkey, squirrel, tiger, walrus, weasel, wolf, and zebra. The presence of a foggy edge in many images within the shape-AwA2 dataset poses a challenge for shape recognition. To visualize the dataset, Figure 2 and Figure 3 show the 50 animal images in shape-AwA2.

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References

[1] Prianka Banik, Lin Li, and Xishuang Dong. A novel dataset for keypoint detection of quadruped animals from images. *arXiv preprint arXiv:2108.13958*, 2021. 1

[2] Zhe Wu, Li Su, and Qingming Huang. Stacked cross refinement network for edge-aware salient object detection. In *Proceedings of the IEEE/CVF international conference on computer vision*, pages 7264–7273, 2019. 1

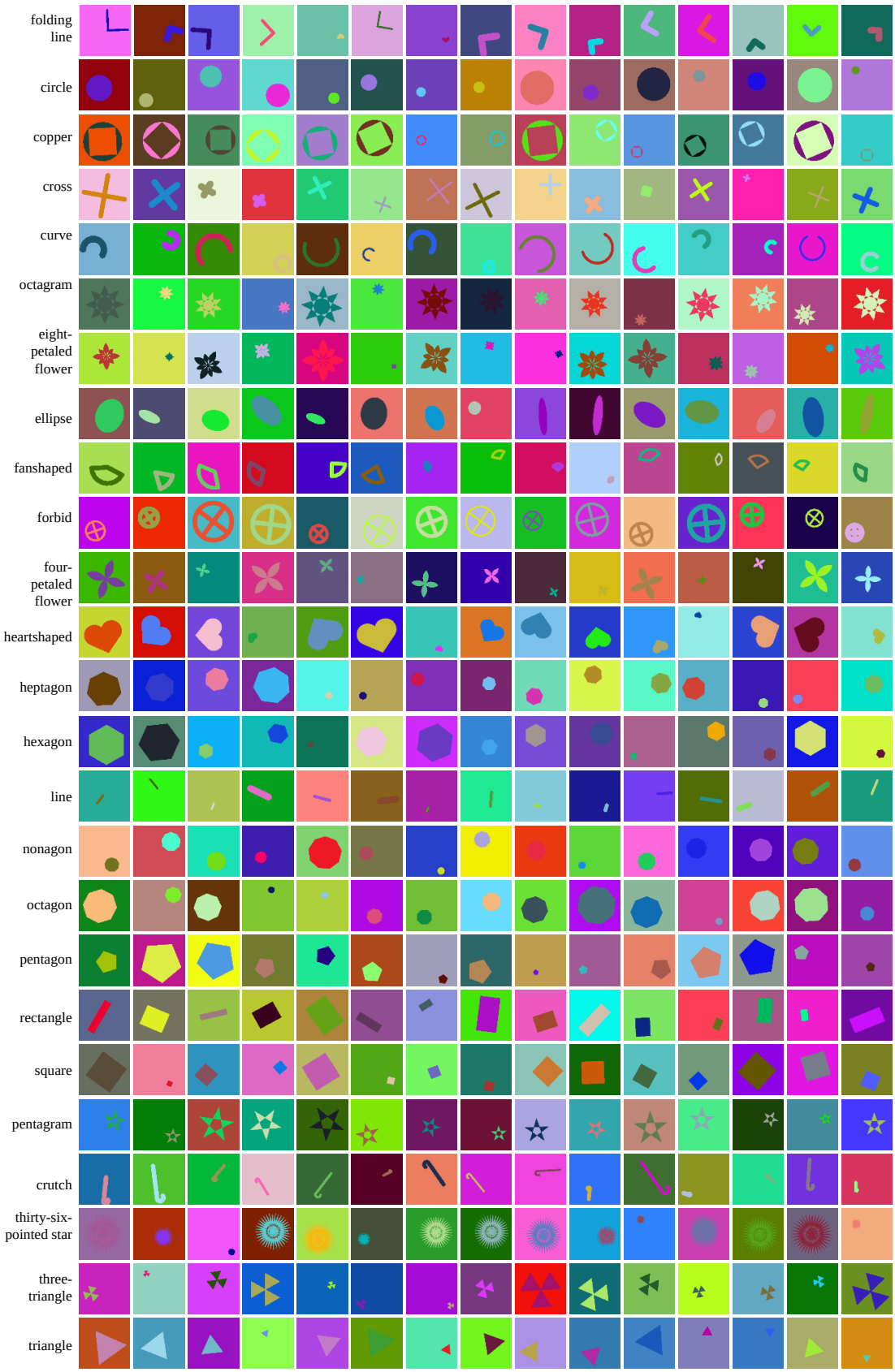

Figure 1. Total 25 classes in the simple-shape dataset. Each row shows examples from one class.

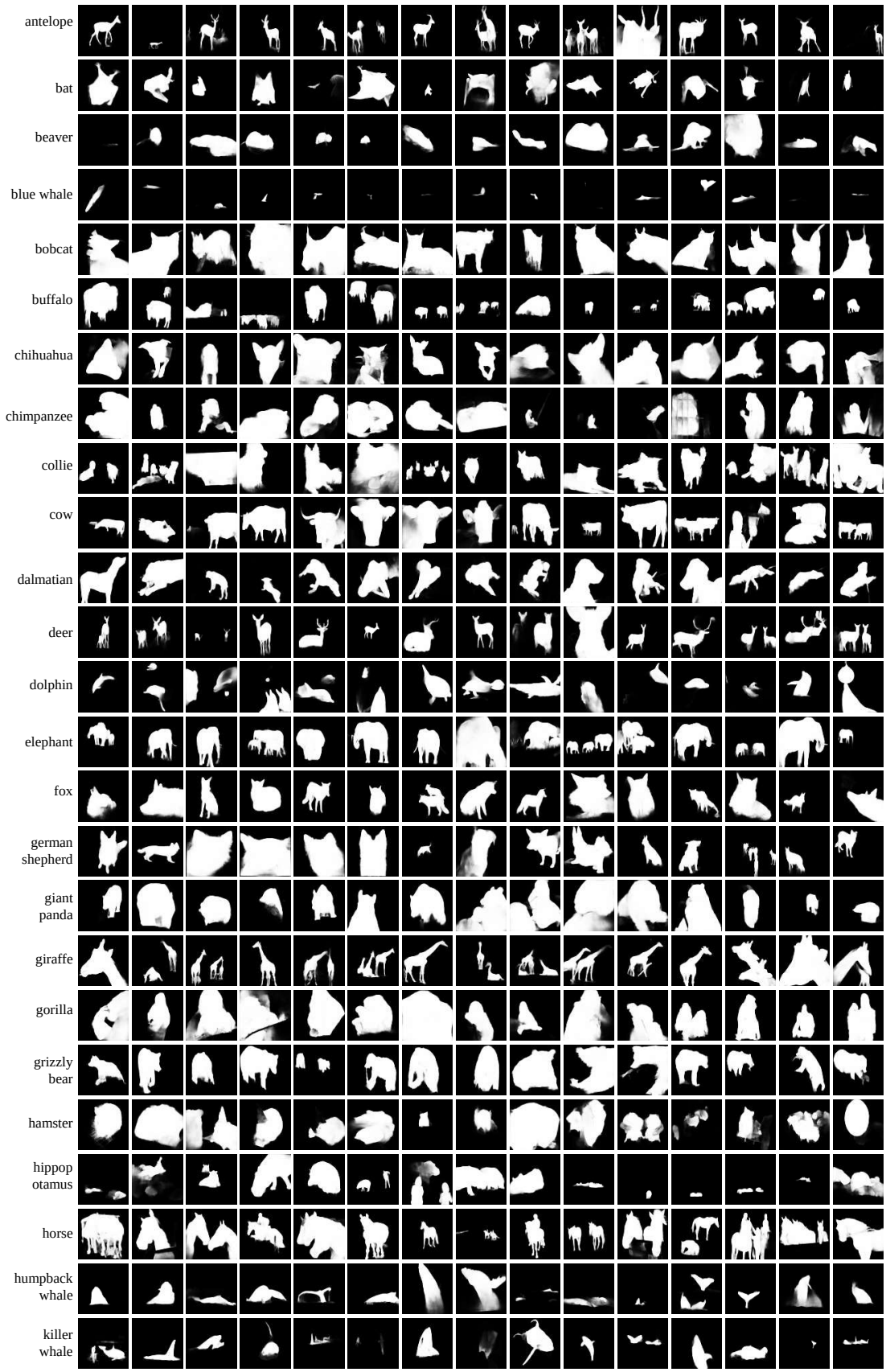

Figure 2. First 25 classes in the Shape-AwA2 dataset. Each row shows examples from one class.

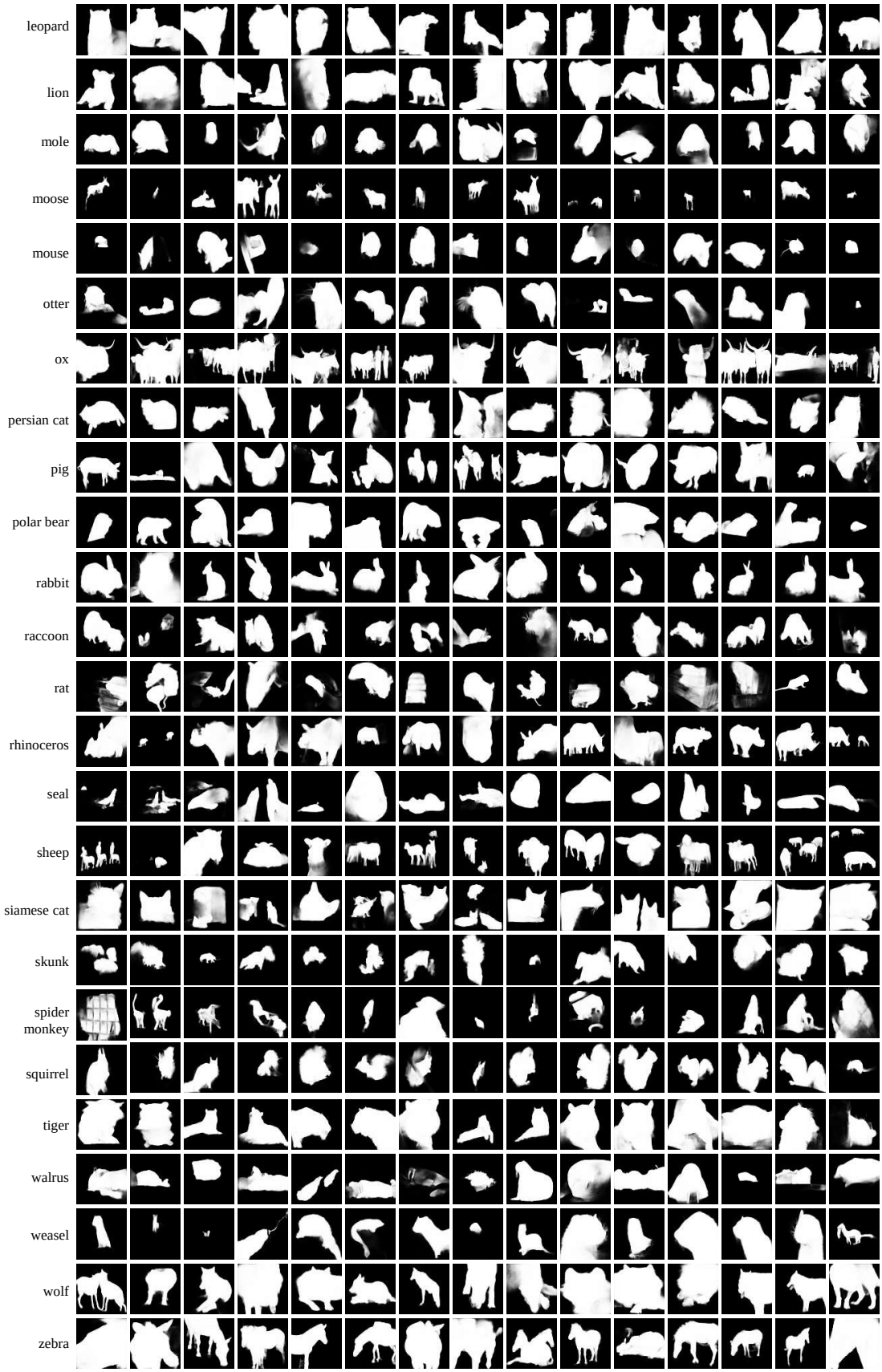

Figure 3. Second 25 classes in the Shape-AwA2 dataset. Each row shows examples from one class.