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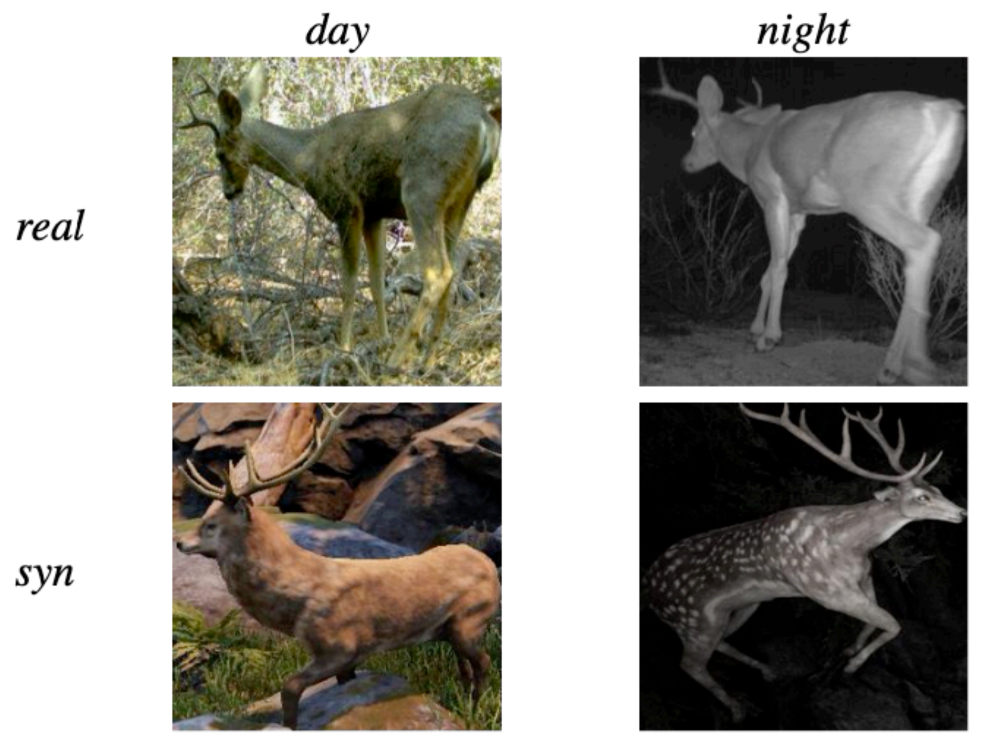
CVPR VIRTUAL JUNE 19-25 — CV4Animals Workshop

Image-to-Image Translation of Synthetic Samples for Rare Classes

I. Using synthetic data

- Camera-trap domain exhibits long-tailed distribution
- Rare classes are hard to classify
- Augment data with synthetic samples [1]
- Classification improves but there is still a visual gap
- Use *syn2real* image-to-image translation for a rare class to bridge this gap and measure the impact on classification.



II. Learn the color statistics of different locations

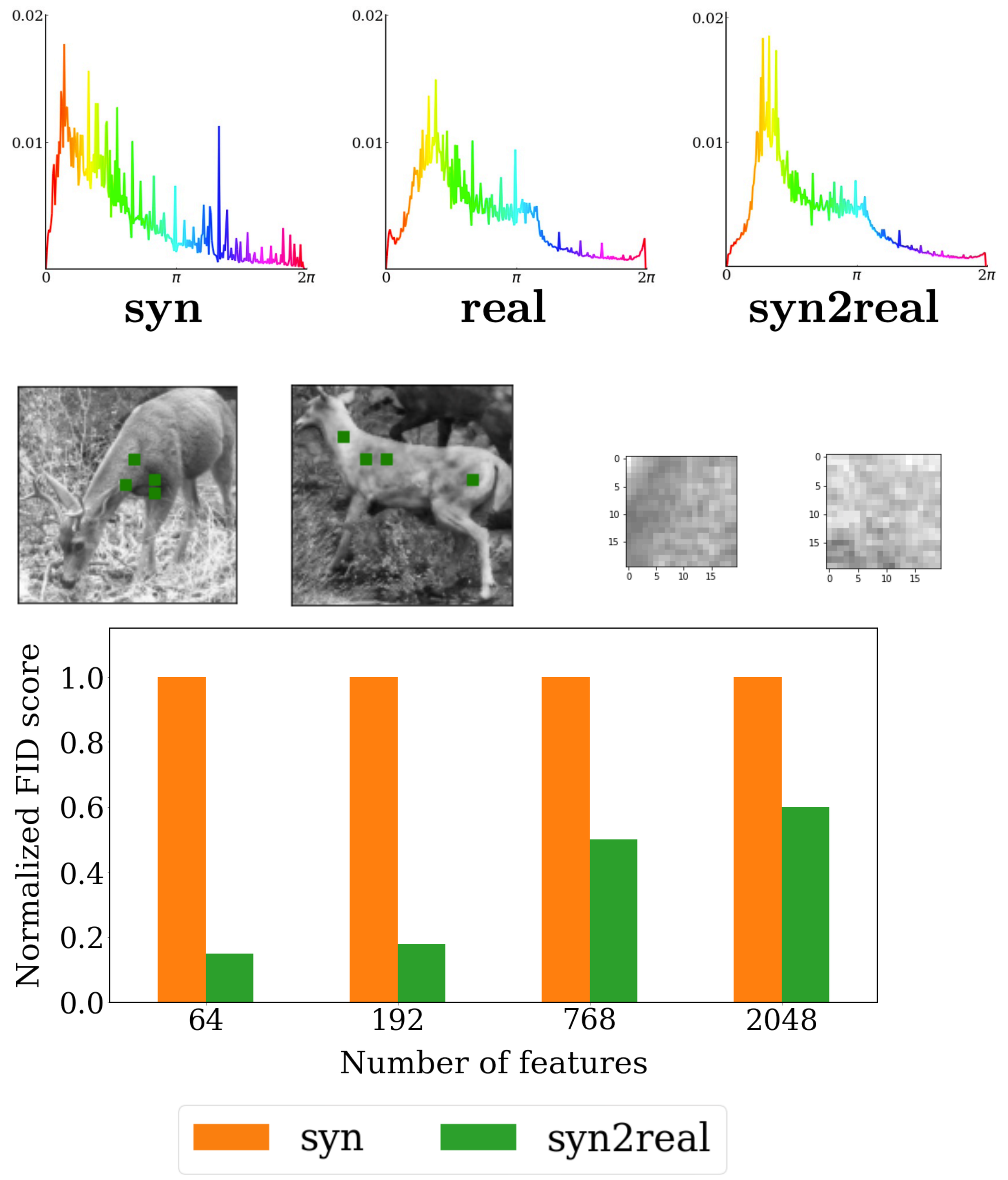
We train UNIT [3] separately for day and night using the entire deer population (~5k samples) as target.

III. Measuring distance between synthetic and real

colors

textures

features

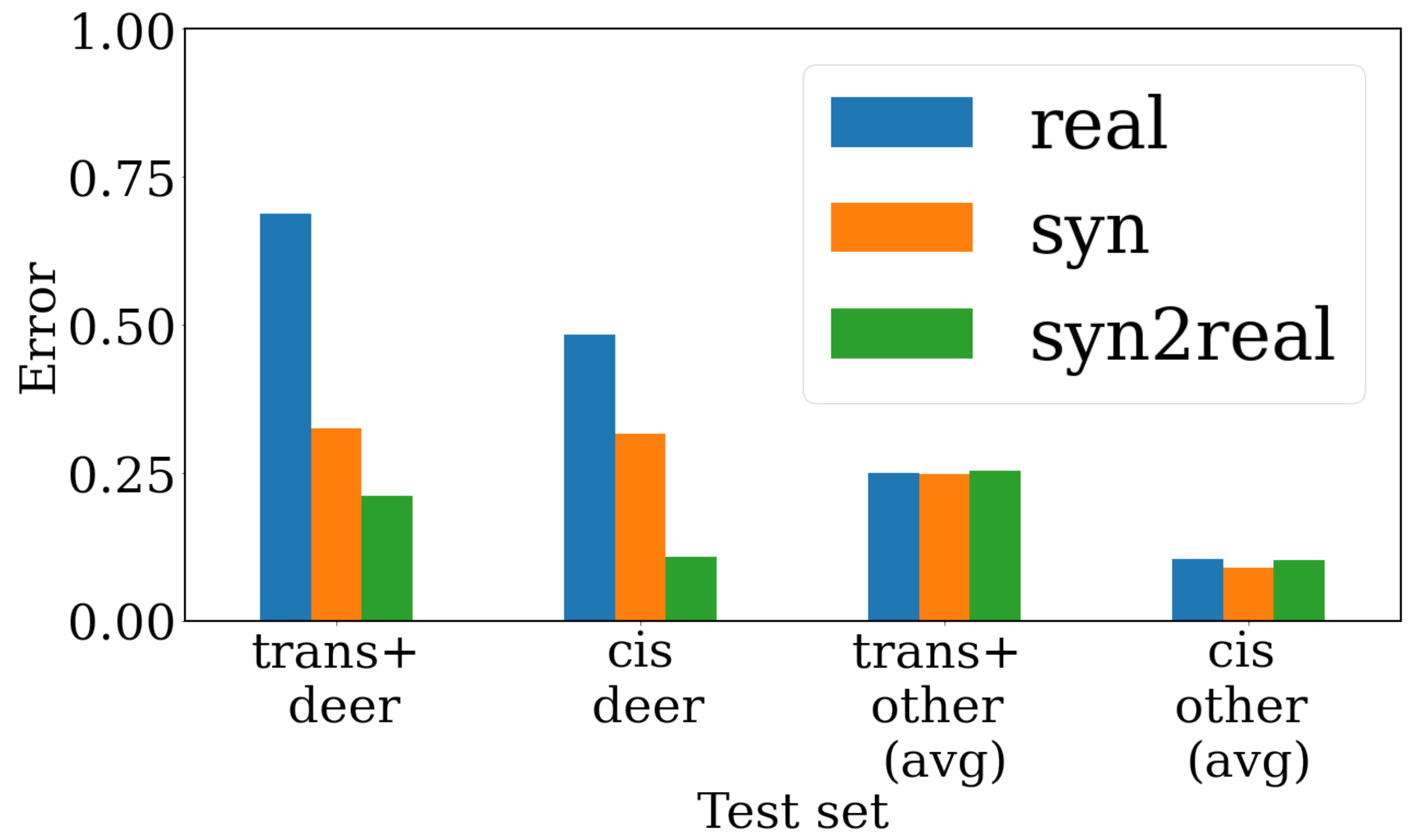


- The color distribution significantly changes while textures are slightly altered.
- The low-level features are more aligned after the translation.
- We can use the real training data from **other** categories to transfer *realness.*

IV. Transfer *realness* from other categories

With only 44 deer samples, we transfer *realness* using the entire training set, including all categories as our target domain.

V. Classification improvements



trans(+) : unseen locations (+ all deer)
cis : seen locations

- We augment with 10k *syn* samples, refine them in *syn2real*
- ***syn2real*** compared to ***syn*** **error rates:**
  - ***- 21%** on cis test set on deer class*
  - ***- 12%** on trans+ test set on deer class.*
  - ± <1% in the average error rate of the other classes.

VI. Conclusion

- "Realness" can be learned using data from other categories
- Combining synthetic data augmentation with a *syn2real* step can considerably help the classification of the rare class

VII. References

[1] Beery, Sara, et al. "Synthetic examples improve generalization for rare classes." *WACV*. 2020.
[2] Beery, Sara, Grant Van Horn, and Pietro Perona. "Recognition in terra incognita." *ECCV*. 2018.
[3] Liu, Ming-Yu, Thomas Breuel, and Jan Kautz. "Unsupervised image-to-image translation networks." *NeurIPS*. 2017.