KI DATA TOOLING
The Data Kit for Automotive AI

Reducing the amount of real world data for object detection training with synthetic data

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Questions

Would using synthetic data as training data improve object detection networks?
Could synthetic data replace real world data?
How „much“ synthetic data makes sense to apply?

Goal

Compare object detection performances of networks trained on different ratios of real/ synthetic data in the training set

Input

Cityscapes: annotated urban street dataset (car is the dominant class)

Synscapes: A photorealistic synthetic dataset for street scene parsing (person is the dominant

Some training details

- Synscapes resembles cityscape images
- Real data: 2.727 Cityscapes images
- Synthetic data: 25.000 Synscapes images
- Different ratios r of real images in training data (r = 0% ... 100%)
- YoloV3 object detector

Performance results

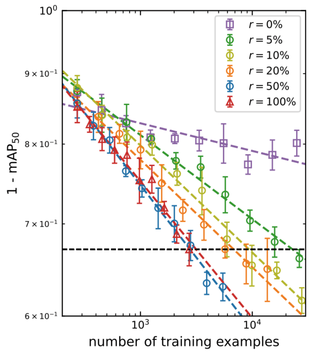

Figure 1: Log-log plot of YOLO performance in terms of 1-mAP50 (lower is better) for various ratios r of real world data in training set

Sample images

Figure 2: Trained only on synthetic data

Figure 3: Trained only on real data

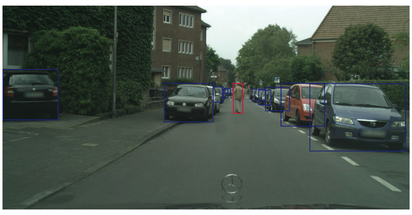

Figure 4: Trained on real and synthetic data (10% real data)

Conclusion

Training on mixed datasets of real world and synthetic data

- reduces the need for labeled real world data
- can improve the performance of object detection networks especially on underrepresented classes in the real world data set

For more information:

References:

Cityscapes: M. Cordts et al., ”The Cityscapes Dataset for Semantic Urban Scene Understanding”, in Proc. of the IEEE Conference for Computer Vision and Pattern Recognition (CVPR), Las Vegas, 2016, pp. 3213.
Synscapes: M. Wrenninge and J. Unger, ”Synscapes: A Photorealistic Synthetic Dataset for Street Scene Parsing”, CoRR, abs/1810.08705, 2018.

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*Work was done while being an intern at dSPACE

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