KI DATA TOOLING
The Data Kit for Automotive AI

Augmentation with Generative Adversarial Networks at Object Level

Philipp Rigoll, Patrick Petersen,
Jacob Langner, Eric Sax,
FZI Forschungszentrum Informatik

Need for diverse data in automated driving

Automated driving functions rely on the diversity of training data. An example of underrepresented data are images of rarely occurring traffic signs. However, it is costly to record various data in real-world test drives. As an alternative to the real-world data recording, we propose augmentation based on Generative Adversarial Networks. Our focus is on the additional information which is necessary for meaningful augmentation.

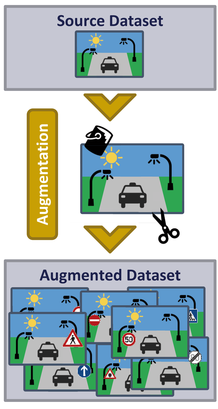

Figure 1: Augmentation as a method for dataset enlargement

Generative Adversarial Networks (GANs)

During the training process GANs, the network learns the underlying data distribution. After training, the generator part of a GAN is able to generate new data that looks like it originates from the same underlying distribution as the training data. In augmentation, this property is used to generate new examples for the training of automated driving functions.

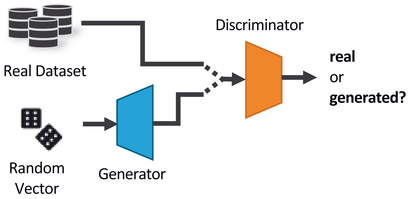

Figure 2: Generative Adversarial Network training architecture

Augmentation parameters

While GANs are a tool to generate realistic augmentations of objects in a scene, further steps are required to provide meaningful images. In case of traffic signs, e.g. the positioning of the sign itself in the image plays a crucial role.

Traffic sign positions

With our method, it is now possible to determine reasonable traffic sign positions. For this purpose, the semantic segmentation of the camera image is combined with the three-dimensional lidar data. Based on legal regulations for positioning traffic signs, possible positions are calculated.

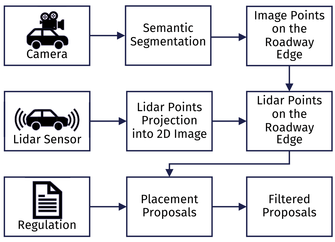

Figure 3: Procedure to determine reasonable traffic sign positions [1]

Figure 4: Example of possible traffic sign positions (red) [1]

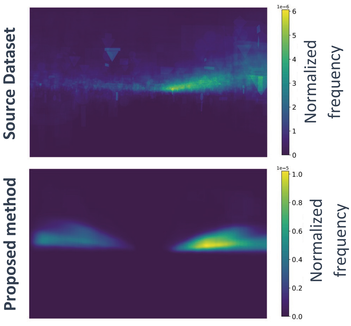

Figure 5: Plausibility check of the position proposals [1]

References:

[1] P. Rigoll, P. Petersen, J. Langner, and E. Sax, “Parameterizable Lidar-Assisted Traffic Sign Placement for the Augmentation of Driving Situations with CycleGAN,” in Advances in Systems Engineering, vol. 364.

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For more information contact:
philipp.rigoll@fzi.de

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