EBERHARD KARLS UNIVERSITÄT TÜBINGEN

Mathematisch-Naturwissenschaftliche Fakultät
Fachbereich Informatik
Kognitive Systeme (Prof. A. Zell)

Bachelorarbeit

Domain Adaptation for Object Detection on UAVs

Collecting labelled images and videos from UAVs is time-consuming and expensive. Instead, synthetic footage can be acquired much more easily, either from 3D video games (e.g. GTAV, RDR 2) or from professional simulations (e.g. DJI Flight simulator, Unreal Engine 4). However, training on synthetic images often fails to yield generalization to real images. In particular, images taken from UAVs cover wide areas with great variety and many features that may not be present in simulation software. Domain adaption (DA) is a field in Machine Learning that tries to narrow the performance gap when training and testing occur in different, but related domains (here synthetic vs. real data).

In this thesis, the student should study certain DA techniques in the context of UAV imagery. The Bachelor Thesis includes setting up a data generation pipeline from the software GTAV as well as collecting a synthetic dataset including, e.g., vehicles and pedestrians in a variety of environments. For this thesis, it suffices to study the method introduced in [1], which tested its method only in autonomous driving scenarios. The student should implement the DA model introduced there and modify it for the purpose of Object Detection from a UAV. The corresponding real datasets can be taken from freely available UAV datsets. Mainly, it should be investigated to what extend an object detection model improves when using this simulated data over the baseline model trained only on real data. The resulting model performance is to be studied in a variety of experiments, such as testing it on different datasets with different environments and statistics, comparing the performance of detecting different objects and comparing the method to naive approaches (such as train on simulated data, test on real data).

[1] Chen, Yuhua, et al. "Domain adaptive faster r-cnn for object detection in the wild." *Proceedings of the IEEE conference on computer vision and pattern recognition*. 2018.

Kontakt

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