KI DATA TOOLING
The Data Kit for Automotive AI

Active Learning On Dynamic Scenes Using Multi View Consistency

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Moredata is not always better

Deep learning models need very large datasets to reach high accuracy. While true, high amounts of data do not always lead to better results, if the data is not well sampled. Thus, sampling data in a clever way can keep the data size low while increasing performance. Active learning investigates
how the model being trained can decide
which data sample would lead to an increase in results.

Be consistent in your prediction

We investigate the usage of Multi View Consistency applied to dynamic outdoor scenes [1], which showed promising results on static indoor scenes [2]. It uses inconsistent predictions of same points, at different time steps and/or viewpoints, to quantify the model uncertainty for the given class.

Evaluation:

We evaluate our method on the nuScenes [1] Mini dataset using [3] as 3D segmentation backbone. We always train for 4 iterations, increasing the dataset by 5% in each iteration.

	5%	10%	15%	20%
Random Sample	24.70	26.03	26.52	28.80
Random Points	24.55	**27.99**	**28.43**	**29.90**
Monte Carlo Dropout@0.2 Dropout	**25.99**	27.24	25.91	27.89
Ours	22.53	26.55	27.75	28.68
Ours@0.2 Dropout	23.78	26.28	27.85	28.97

Table 1: mIoU of our method compared to the baselines: (1) Random Sample – randomly select a sample (2) Random Points – randomly select points in each sample (3) Monte Carlo Dropout [4] using 20% dropout rate. All experiments ran on the nuScenes [1] mini dataset without the usage of dynamic objects

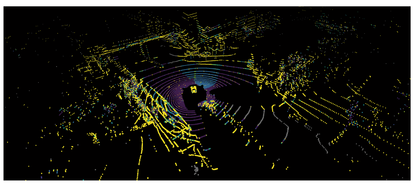

Figure 1: Visualization of our entropy calculation considering predictions between timestep t and t+1. To match the points in the different time steps, we use nearest neighbour search with a search radius of 20 cm

References:

[1] Caesar, H., et al. „nuscenes: A multimodal dataset for autonomous driving.“ Proceedings of the IEEE/CVF conference on computer vision and pattern recognition. 2020.
[2] Siddiqui, Y., Valentin J., Nießner M. „Viewal: Active learning with viewpoint entropy for semantic segmentation.“ Proceedings of the IEEE/CVF conference on computer vision and pattern recognition. 2020.
[3] Xinge, Z. et al. „Cylindrical and asymmetrical 3d convolution networks for lidar segmentation.“ Proceedings of the IEEE/CVF conference on computer vision and pattern recognition. 2021.
[4] Gal, Y., Islam, R., and Ghahramani Z. „Deep bayesian active learning with image data.“ International Conference on Machine Learning. PMLR, 2017.

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