

R&D Computer Vision INTERNSHIP

Internship topic: Active learning: strategies to select most valuable new samples of data.

Keywords: Computer Vision, AI, Deep-learning, Internship

Context

HD-Maps aims to provide a centimeter-accuracy map of the static environment to self-driving cars. Road analysis for HD-Maps generation is a large and challenging task. It includes assessing road conditions, segmenting road markings, detecting road signs... To provide such HP-Maps, we can rely on multiple data sources, from point clouds to images, as well as several models.

Supervised deep-learning based models (Resnet (He, 2016) , Unet (Ronneberger, 2015), DeepLabV3+ (Adam)) were developed to address part of these issues. These approaches are re-trained based on the use-case, which requires a largely annotated dataset. At GEOSAT we master the whole data pipeline from acquisition to delivery of the final product. Thus, we have a large amount of data, but not all data is equal. We need the most informative samples to be annotated so they will bring better robustness and performance to our models.

This is where active learning (AL) comes into action and where you can come and help us to get the most out of our models using as few samples as possible!

Subject

The scientific community has a growing interest for data-centric AI and active learning judging by the increasing number of publications (Ren, 2021) (Javad Zolfaghari Bengar, 2022) (Parvaneh, 2022).

Thus, the goal of this internship is to benchmark and develop active learning strategies. The scope of applications is wide from image classification to point clouds segmentation but will be refined during the internship. Your first mission will be to get familiar with the R&D team, tools, data, and challenges. Then we can identify the following:

- Conduct a literature review to identify state-of-the-art AL strategies, metrics, and datasets.
- Focus on a given model, identify the challenges to overcome with AL.
- Choose AL strategies to benchmark on our own dataset as well as on a public one.
- Propose a new strategy.
- Measure the impact of active learning on our models.
- Evaluate the possibility to transfer the AL strategy to another type of data.
- ...

Tech stack

- Python
- Tensorflow / PyTorch
- Git, DVC

Internship information

- 6-month internship starting from January to March 2023
- Location: GEOSAT at Pessac.

Applications should be sent by mail to gsoubies@geo-sat.com with a detailed CV, cover letter, latest grade transcripts and optionally recommendation letters.

Bibliography

Adam, L.-C. C. (n.d.). Encoder-Decoder with Atrous Separable Convolution for Semantic Image Segmentation. *ECCV*. 2018.

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