Detailed instance segmentation of objects in sequences

Motivation and background

The development of self-driving vehicles is an important and challenging task. The vehicles' perception systems are often based on deep learning and training these models require huge sets of annotated data. Annotating data is time consuming and our teams at annotell have developed an annotation platform to make the annotation workflow efficient, including all aspects from UI/UX to integration of interactive deep learning algorithms.

Problem description

The objective of this thesis project is to investigate methods for performing detailed instance segmentation of objects by utilizing the information we can get by looking at sequences of images. The method could, if necessary, utilize manual annotator input and feedback. The overall goal is to speed up the process of annotating instance segmentation sequence tasks. Keeping the level of detail in the annotations without introducing biases is critical. We have been investigating the level of detail problem internally using a PointRend network https://arxiv.org/pdf/1912.08193.pdf. Inspiration for tracking objects in sequences can be found in Mapillary's MOTS article: https://arxiv.org/pdf/1912.02096.pdf.

We expect the students to:

- Perform a thorough literature study
- Develop a method for improving detail in segmentation tasks
    - Possibly using a PointRend architecture
- Develop a method to utilize temporal information in sequences
- Iterate design choices to try to boost performance

Applicant profile

We seek two students with an interest for deep learning. We also expect the students to have experience with python and preferably pytorch.

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