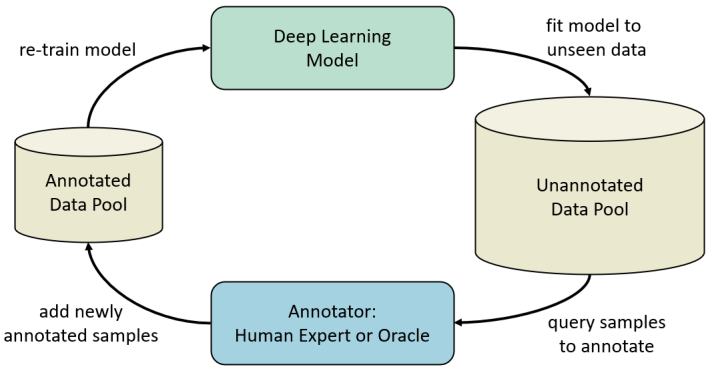
Medical Imaging and Biometrics Group
Institute of Computer Graphics and Vision
Graz University of Technology

Deep Active Learning for Semantic Segmentation

Master's Thesis/Project



Description:

The exponential growth of data contributed significantly to the success of Deep Learning in the last decade. While more data often leads to a better performance, there are practical limitations to consider. First, it can be infeasible to acquire additional data in a significant quantity. Second, annotating data is a laborious process that can quickly become very cost-intensive, especially when human experts are required. Last, some data samples can be detrimental to the overall performance of the model and are preferably excluded from training.
Active Learning (AL) mitigates these shortcomings by focusing the annotation effort solely on the most informative samples in an iterative learning procedure. To accomplish this, an AL system proposes a subset of data samples in an unsupervised manner and requests annotations from a human expert. This subset is then added to the annotated data pool and used to train a model to solve the given task. When training finishes, the trained model is used to propose another subset of samples to be annotated and the procedure starts over until the predefined total annotation effort of the human expert is reached. The goal of this project is to apply Deep AL to solve semantic segmentation problems on cell images using measures like dropout as a query function to propose data samples for annotation.

Objective:

- Perform literature review on Deep Active Learning and related topics.
- Train and test CNN based approaches to solve this problem.
- Evaluate the performance of the trained CNN models.

Qualification:

- Interested in machine learning and computer vision
- Preferably knowledgeable with Python and TensorFlow

Literature:

Yang et al., Suggestive Annotation: A Deep Active Learning Framework for Biomedical Image Segmentation, International Conference on Medical Image Computing and Computer-Assisted Intervention, 2017

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