



Master Thesis Position: Unsupervised Semantic Image Synthesis for Medical Imaging

Area

Semantic image synthesis (SIS) is the task of generating high-resolution images from user-specified semantic layouts. SIS opens the door to an extensive range of applications such as content creation and semantic manipulation by editing, adding, removing or changing the appearance of an object. SIS can play a pivotal role in generating realistically looking synthetic data to train and validate deep learning models. SIS is a subtype of the image-to-image translation task, which is often accomplished by generative adversarial neural networks (GANs).

Topic

Obtaining large labeled datasets in the medical field is often hard due to privacy concerns. A promising solution is to generate synthetic labeled data with Generative Adversarial Networks. Given a labeled dataset A containing images from one modality (e.g. CT scans) and their semantic labels, and an unlabeled dataset B with unlabeled images from another modality (MRI scans), the task is to translate the semantic maps from dataset A to images from dataset B. Several challenges exist in this task due to the scarcity of the labels, and the heterogeneity of the data (from different patients and modalities).

Requirements

- Strong programming experience (ideally with Python)
- Ability and interest to learn and try new things
- Theoretical knowledge in deep learning, computer vision and image processing (Deep learning and Detection and Pattern Recognition lectures)
- Ideally some experience with pytorch and/or tensorflow

For applications, send an email to george.eskandar@iss.uni-stuttgart.de