

IBBM Project Proposal: Bachelor Thesis

Improving Generalizability through Generative Adversarial Domain Adaptation for MR Spectroscopy

Keywords

Generative Adversarial Network; GAN; Magnetic Resonance Spectroscopy; Domain Adaptation, Signal Processing

Abstract

Spectroscopy is a technique that, when used in medicine, uses magnetic properties to evaluate the chemical composition of tissue of interest in a noninvasive manner. Analyzing quantified metabolite ratios can help physicians to differentiate between physiological and pathological tissues. This is an advanced topic that can be simplified to signal processing.

In collaboration with a MRS research group at University of California, San Francisco, we are looking to develop a tool to aid in the training of DL models for spectra analysis. High quality, processed, and annotated medical data is expensive in general. This is even more problematic with MRS data. Current physics models can generate synthetic spectra, but due to the nonlinearities inherent in spectroscopy data and its acquisition protocols, models trained on these spectra do not perform well when tested on real spectra.

Required Skills

- Background in deep learning, especially GANs
- Proficient in Python, and preferably PyTorch
- Signal processing is beneficial

What we expect from you

I am looking for a **highly-motivated student** with a firm understanding of deep learning techniques and a good academic track record. You should have a technical background, data analysis and programming skills, be proficient with python, **and be able to work independently**.

What we offer you

You will receive **strong support** to make your thesis a success. You will gain experience working with a unique, specialized data type from an international collaboration. Successful completion of this project will give you a good chance at **co-authorship** on a high-profile **journal publication**.

If you are interested, please reach out to jlamaste@gmail.com.



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