

IBBM Project Proposal: Master thesis

Transformer-Based Pipeline for Pre-Processing MR Spectroscopic Imaging Data

Keywords

Transformer; Magnetic Resonance Spectroscopy; MRSI; Pre-processing

Abstract

MRS data is composed of 1D spectra that can quantitatively characterize the metabolic composition of *in-vivo* tissue. This is especially useful for characterizing brain tumors. The primary drawback to this data type is the extensive and costly pre-processing and analysis necessary to prepare and annotate the data. Attempts to accelerate this work using deep learning is a budding, active research field.

Transformers were initially developed for NLP tasks. However, recent research has shown them to be highly effective for image classification in computer vision as well. Due to the spatial nature of MRS data, CV CNN models and MLPs have been effective in this pre-processing task. Therefore, we would like to explore the use of transformers to assess their potential for automating the MRSI pre-processing pipeline. Steps to be evaluated would include things like phase and frequency correction, baseline estimation, and eddy current corrections.

Required Skills

- Proficient with PyTorch
- Experience with Transformers and Computer Vision

What we expect from you

We are looking for a **highly-motivated student** with an above-average academic track record. You should have a technical background including data analysis and machine learning, good problem solving skills, and **be able to work independently**. This project will be challenging due to it's **highly interdisciplinary nature**.

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 send a CV, transcript, and letter of motivation to jlamaste@gmail.com.



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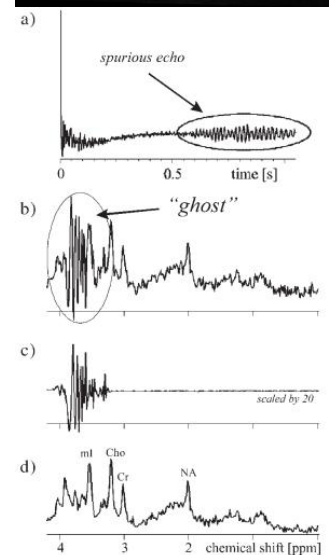
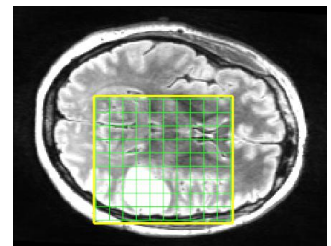
Image-Based Biomedical Modeling Group (IBBM)
Prof. Dr. Bjoern Menze

<http://campar.in.tum.de/Chair/ResearchIBBM>

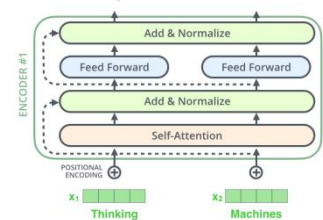
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Kreis 2004, DOI:10.1002/nbm.891



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