MR Spectroscopy Signal Quantification using Deep Learning

Post Doc Fellowship 2017-2018

Keywords  Deep learning, MR spectroscopy, parameter estimation, uncertainties estimation, signal processing

Scientific objective  Magnetic resonance spectroscopy (MRS) is an important technique in biomedical research as it has the unique capability to give access non invasively to the biochemical content (metabolites) of scanned organs. In the literature, the quantification (the extraction of these potential biomarkers from the MRS signal), involves the resolution of an inverse problem based on a parametric model of the metabolite signal. However, quantification results in large uncertainties for most of the metabolites which is one of the main reason that prevents the use of MRS in clinical routine.

In this project, an original approach using deep learning will be used. The recruited post doc would extend and improve our preliminary results. More specifically, he/she will work on subjects in this list: improving our network architecture, investigating training strategies, providing an uncertainties estimator, investigating the features discovered by the network and also refining our NMR signal model.

Applications on real clinical data/problem and consequences on acquisition strategies will also be investigated in collaboration with our partners.

Lab  The project will be realized in partnership between the team "Images and Models" (machine learning for medical imaging) and the team "NMR and Optics: From Measure to Biomarkers" (MRS acquisition and quantification) of the CREATIS lab in Lyon (France).

Application  Strong knowledge in the following fields is required:

- Deep learning
- Signal processing
- Applied mathematics

The successful candidate is expected to be autonomous and show strong motivation and interest in multidisciplinary research. He/She will need to understand the question and issues related to MRS quantification of in vivo data. The available code is written in Matlab and Python and use the deep learning framework Caffe. Knowledge of these tools is a plus but is not mandatory.

Interested applicants are required to send a cover letter, CV, reference letters, ... to: michael.sdika[at]creatis.insa-lyon.fr and helene.ratiney[at]creatis.insa-lyon.fr

Location, Duration, Salary

- CREATIS lab, Lyon, France
- 12 months, available immediately
- Depending on experience, according to the "Université de Lyon" salary scale (Labex PRIMES’s funding).

www.creatis.insa-lyon.fr
http://caffe.berkeleyvision.org
http://primes.universite-lyon.fr