Doctoral Candidate 14 - MRI image quality enhancement for quantitative applications

Host Institution	Icometrix, Belgium
PhD enrolment	University of Antwerp, Belgium
Primary Supervisor	Dr. Thibo Billiet, Icometrix
Subject area	Image quality transfer, AI, segmentation, diffusion MRI

About this doctoral project and your tasks

The goal of this project will be to **expand the usability of brain qMRI data that has limitations** (e.g. limited resolution, SNR or CNR). By using AI (machine learning and/or deep learning), existing MRI data will be enhanced to allow accurate segmentation (e.g. lesions or tissue structures) and/or to allow qMRI modeling (e.g. diffusion tractography).

The focus will be on **tractography** based on DTI datasets with few gradient directions and/or accurate **volume segmentations** based on low spatial resolution T1-weighted images. The clinical added value of MRI biomarkers extracted from such enhanced datasets will be evaluated in MS patients in comparison with conventional brain imaging.

Your tasks will include :

- Perform top class research in the field of medical image processing
- Find creative solutions for challenging image processing questions
- Develop novel quantitative image processing pipelines with a special focus on deep learning (programming in Python)
- Develop and execute validation of novel algorithms
- Data management and data quality control
- Stay informed on the developments and trends in the field of medical image processing
- Discuss the progress and intermediate results of research projects both internally and externally
- Present your work to an international multi-disciplinary community
- You will work actively on the preparation and defense of a PhD thesis in magnetic resonance imaging.
- You will write several high-quality scientific articles related to the research project and publish them in peer-reviewed journals.

Foreseen secondments

For this project, we foresee secondments to:

- Prof. Dr. Pieter Van Dyck (2 months) at **University Hospital Antwerp** (UZA, Belgium)
- Prof. Dr. Jorge Cardoso (3 months) at **King's College London** (United Kingdom)
- Dr. Ana-Maria Oros-Peusquens (2 months) at **Forschungszentrum Jülich** (Germany)

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