

PhD Project Description

School/Department:	Biomedical Imaging Group Rotterdam, Erasmus MC
Supervisor information:	<ul style="list-style-type: none"> • Assistant Professor Dr. Esther Bron • Email: e.bron@erasmusmc.nl • Prof. dr. WJ Niessen w.niessen@erasmusmc.nl • Website: www.bigr.nl, https://estherbron.com/, https://scholar.google.nl/citations?user=Mg7Q67sAAAAJ&hl=nl • Selected publications: <ul style="list-style-type: none"> - Venkatraghavan et al. Disease Progression Timeline Estimation for Alzheimer's Disease using Discriminative Event Based Modeling, <i>NeuroImage</i>, 2019. https://arxiv.org/abs/1808.03604 - Li et al. A hybrid deep learning framework for integrated segmentation and registration: evaluation on longitudinal white matter tract changes, <i>International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)</i>, 2019. https://arxiv.org/abs/1908.10221 - Bron et al., Multiparametric computer-aided differential diagnosis of Alzheimer's disease and frontotemporal dementia using structural and advanced MRI, <i>European Radiology</i>, 2017 - Bron et al. Standardized evaluation of algorithms for computer-aided diagnosis of dementia based on structural MRI: the CADDementia challenge. <i>NeuroImage</i>, 2015. https://caddementia.grand-challenge.org/
Project Title:	Neuroimage Analysis and Machine Learning
Abstract:	<p>Brain diseases – including dementia and stroke – impose an enormous burden to the individual and to society. As a consequence, there is an urgent need to develop effective preventive and therapeutic strategies. It is therefore essential to improve the understanding of the progression of diseases, patient selection in clinical trials, and patient monitoring in clinical practice and clinical trials. Neuroimage analysis and machine learning play a herein a crucial role, i.e. for developing robust quantitative brain imaging biomarkers and for developing data-driven models for diagnosis and prediction. PhD projects on the following topics are offered:</p> <p><u><i>Predictive modeling of Alzheimer's disease</i></u> – In our research, we develop innovative diagnostic and prediction models using spatiotemporal modeling, machine learning and deep learning approaches. For this we analyze of thousands of brain MRI scans and clinical data from several large clinical, population and multi-center studies. Such method are however not yet used in clinical practices as this is hampered by the integration of multimodal biomarkers, heterogeneity of the disease and differences between datasets. In this project, we aim develop methods that can be translated towards clinical practice making use of novel machine learning strategies.</p> <p><u><i>The baby brain pipeline: MRI analysis in craniosynostosis</i></u> – Syndromic craniosynostosis is a congenital disorder in which several skull sutures close prematurely, causing skull and facial anomalies. The Dutch Craniofacial Center at the Erasmus MC aims to get a better understanding of the disease process and its consequences, particularly relating to visual, behavioural and neurocognitive functioning. It is yet unclear whether surgery of these children is beneficial. We hypothesize that in some patients refraining from surgery might result in similar outcome, but this cannot yet be proven. We aim to use advanced MRI techniques to study the impact of craniosynostosis on the structure and function of the brain. For the analysis of these brain scans, in small children with brain deformations, no automated approaches exist. The proposed project aims at development of dedicated image analysis tools for children with craniosynostosis.</p>
Requirements of candidate:	<ul style="list-style-type: none"> • This project requires a highly motivated, hardworking candidate with good communication skills, who likes to become part of our international team. • Master degree in a technical discipline preferably with an affinity for medical applications (medical physics, biomedical engineering, physics, computer science, engineering, ...) • Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) • English language requirement: <ul style="list-style-type: none"> • <i>English speaking countries & Netherlands:</i> no requirement • <i>Other countries:</i> IELTS 7.0 (<i>min 6.0 for all subs</i>), TOEFL 100 (<i>min 20 for all subs</i>)

Erasmus MC, ranked world no. 32 for [Clinical Medicine US News 2020](#) no. 30 [Nature Index for Biomedical Sciences 2019](#)

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Application requirements & Deadlines:

<https://www.eur.nl/en/about-eur/erasmus-university-china-centre/csc-scholarship>

Erasmus MC, ranked world

** No.32 for Clinical Medicine US News 2020:*

<https://www.usnews.com/education/best-global-universities/clinical-medicine?page=3>

** No. 30 Nature Index for Biomedical Sciences 2019:*

<https://www.natureindex.com/supplements/nature-index-2019-biomedical-sciences/tables/healthcare>