

Neuroimaging / Data Science Research Engineer

Multimodal neuroimaging study of brain development in human fetuses

The project SulcalGRIDS (Dynamics of cortical morphology during childhood development) is funded by the French National Research Agency (ANR) for four years, starting on January 2020. SulcalGRIDS aims at elaborating a new model of cortical morphogenesis that could explain how the human cerebral cortex shape complexity emerges during development. Such a model would be instrumental to develop novel biomarkers of early atypical development and to better understand the pathophysiology of neurodevelopmental disorders.

We will apply and evaluate our model on a large dataset of cortical surfaces extracted from fetal MRI data with appropriate clinical description, thanks to our collaboration with the neuroradiology unit of CHU Timone. We aim at including all fetal MRI data acquired between 2009 and 2018 in the hospital of La Timone (more than 800 cases) with a variety of pathological fetal brains which represents a unique chance to study cortical malformations in fetuses. We did initiate the data aggregation and the first steps of the image processing pipeline, such that to date this database includes 257 cases. The recruited engineer will pursue this effort to organize and manage the data, and contribute to implementation of a dedicated image processing pipeline.

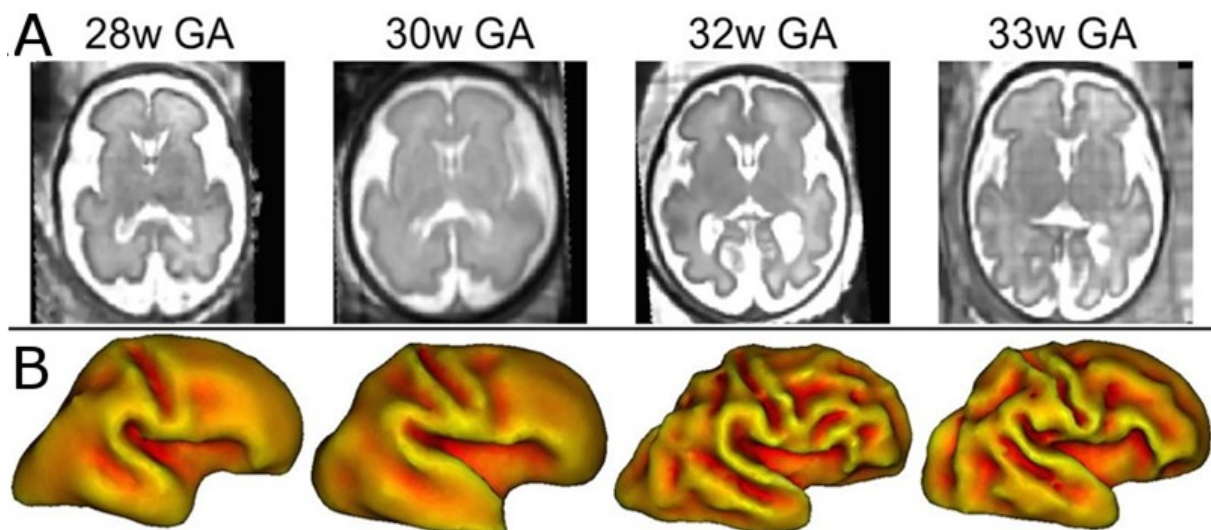


Fig.1. A) Anatomical MRI of fetuses at different gestational ages. B) Corresponding 3D cortical surfaces reconstruction.

Missions.

1-The recruited engineer will be in charge of data management and standardization in order to make it accessible to all consortium members.

2-The recruited engineer will contribute to the implementation and validation of image processing pipelines dedicated to the different neuroimaging scan types (anatomical and diffusion MRI). These processing pipelines will combine several advanced image processing tools. The engineer will implement quality control procedures and empirical optimization of most influencing parameters for each of the corresponding image processing algorithms.

3-In close collaboration with consortium members, new processing solutions will be investigated and evaluated, such as deep-learning approaches for image segmentation.

Profile. This position is for a candidate who is comfortable (or proficient) with **computer programming (python** will be our language of choice) and has good knowledge and/or experience in **signal and image processing**. Good knowledge and/or experience in **machine learning / data science / multivariate statistics** would be a plus. Good reading/writing/communication skills in English are also essential. Prior experience in neuroscience is not a requirement, but interest in the field and high motivation are of course necessary.

It can be of interest to different types of profiles. You are a young graduate (Bsc, Msc, engineering school) either in data science, in electrical engineering or neuroimaging and you want to develop your expertise by applying your formal skills to an innovative medical imaging project. Or you already have a PhD in a relevant field and you want to take this opportunity to fulfill the aforementioned missions while getting further involved in the research aspects of the project, which should offer excellent opportunities for publications in neuroscience or methodological journals.

Working environment. The *Institut de Neurosciences de la Timone* (INT) is one of the top French neuroscience research institutes with 150 staff members gathered in 10 inter-disciplinary teams examining different aspects of the cerebral organization. It is located on the medical campus of Aix-Marseille University. The successful candidate will join the SulcalGRIDS project's team within INT and will interact with neuroscientists, pediatricians as well as specialists in neuroimaging data acquisition and processing. Marseille, the second largest city in France, is a vibrant inter-cultural hub located on the Mediterranean shore, and only 2h away from the Alps mountains.

The position is initially open for one year, with a possible renewal for one or two more years depending on the advances of the project. Starting date can be as early as November 2020 and can be postponed until the position is fulfilled. If you are interested, please send your CV and a cover letter to:

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