Offer #2024-08484

Developer/Data Analyst for Neuroimaging Databases

Contract type : Fixed-term contract

Renewable contract : Yes

Level of qualifications required : Graduate degree or equivalent

Fonction : Temporary scientific engineer

Level of experience : Up to 3 years

About the research centre or Inria department

The Inria Centre at Rennes University is one of Inria's eight centres and has more than thirty research teams. The Inria Centre is a major and recognized player in the field of digital sciences. It is at the heart of a rich R&D and innovation ecosystem: highly innovative PMEs, large industrial groups, competitiveness clusters, research and higher education players, laboratories of excellence, technological research institute, etc.

Context

Multiple Sclerosis (MS) is a common and potentially debilitating disease affecting around 3 millions persons in the world. Currently, Magnetic Resonance Imaging (MRI) plays a central role in this context and in particular allows the identification of MS lesions in the central nervous system.

The identification of these lesions on a given MRI image, and of new lesions between pairs of longitudinal MRI images, is a complex and mentally demanding task that often leads to an underestimation of disease activity, even for most experienced radiologists. There is thus a need for dedicated systems that can provide clinicians an aid for accurate and robust identification of MS lesions in the brain as in the spinal cord.

The development and the evaluation of such system is one of the research topic of the Empenn research team. In practice such systems generally stand on deep-learning methods. Such methods rely on an extensive use of annotated and non-annotated data. To allow the design and the evaluation of methods efficiently and robustly dealing with real-life data, the characteristics of data and annotations must be well documented and accessible. Moreover, data annotations must be iteratively revised to improve the quality of the database. Therefore, initiating and accumulating a high-quality annotated database for such a medical purpose needs dedicated tools to ease the different associated operations. The development and maintenance of these tools as well as the participation to the different projects exploiting the databases will consist of the two main missions of the selected candidate.

The selected candidate will join the research lab Empenn in Inria-Irisa, located in Rennes, France. Empenn (https://team.inria.fr/empenn) is jointly affiliated with Inria, Inserm (National Institute of Health and Scientific Research), CNRS (INS2I institute), and the University of Rennes I. The Empenn group operates the Neurinfo imaging facility in the context of a partnership with the University Hospital of Rennes, Inria, the CNRS, and the Cancer Research Center. The team has access to several computing facilities (e.g. IGRIDA cluster) and established collaborations with other Inria/Irisa research teams in the field of machine learning.

Our research lab consists of more than 20 researchers, faculty members, PhD students, engineers and interns, working in the field of image processing and neuroimaging. The team targets the detection and development of imaging biomarkers for brain diseases and focuses its efforts on translating this research to clinics and clinical neurosciences at large. The Empenn team is one of the leaders of the Primus project (https://www.chu-rennes.fr/recherche-innovation/rhu-primus.html). Its contribution will be the development of methods that allow for detection and segmentation of MS lesions from MRI images acquired with current clinical protocols.

Assignment

The selected candidate will focus on i) mastering and developing tools to monitor, populate and exploit the databases and ii) managing the data and ease the data usage for the different projects exploiting the database. More specifically, he/she will:

- ensure the development of the MS imaging database. This includes the maintaining and development of tools to:
  - identify and organize MR images, experts annotations and associated metadata,
  - populate the database,

    - control data integrity,
    - ease data segmentations/annotations,
    - automate numerical and graphical summaries of data,
    - extract relevant subsets of data from a variety of conditions,

- be involved in the different projects exploiting the databases. We continuously work on several research projects involving the MS databases. Each of these projects comes with its own specificity regarding data characteristics, annotation and data access. The selected candidate will help the responsible of the different projects to summarize and access the available data related to their particular purposes. Depending on the candidate's skills and motivations, he/she will participate in the elaboration of the experiments or the development of specific tools for some of these projects.

- be involved in the valorization of the database. In particular, the team organized the past two international MS segmentation challenges (MSSEG-1 and MSSEG-2) and will organise in 2025 an international challenge devoted to the segmentation of spinal cord MS lesions (MS-Multi-Spine). Moreover, several other data sources could be included in this aspect of the work.

More generally, the selected candidates will collaborate with the other engineers, researchers and clinicians of the team involved in MS research and image processing as well as with the OFSEP, the French National Cohort of MS patients.

Main activities

From a technical perspective, the activities will include :

- the maintaining of existing R/python code as well a the developpement, documentation and maintaining of new R/python scripts to:
    - identify and organize MR images, experts annotations and associated metadata,
    - populate the database,
    - control data integrity,
    - ease data segmentations/annotations,
    - automate numerical and graphical summaries of data,
    - extract relevant subsets of data from a variety of conditions.
- (depending on candidate skills) the developpement and maintaining of image processing tools associated to the ongoing projects related to the database.

- the collaboration with different members of the associated projects to design and extract dataset relevant to their needs.

Skills

We are seeking highly motivated candidates with interest in working in health and clinical applications. We require good experience in programming (R and/or python) for data analysis and graphical exploration. Knowledge in image processing, machine learning or medical imaging can be an added-value.

Benefits package

- Subsidized meals
- Partial reimbursement of public transport costs
- Possibility of teleworking (90 days per year) and flexible organization of working hours
- Partial payment of insurance costs

Remuneration

Monthly gross salary from 2 695 euros according to diploma and experience

General Information

- **Theme/Domain :** Computational Neuroscience and Medicine
  Information system (BAP E)
- **Town/city :** Rennes
- **Inria Center :** Centre Inria de l'Université de Rennes
- **Starting date :** 2025-03-01
- **Duration of contract :** 12 months
- **Deadline to apply :** 2025-01-18

Contacts

- **Inria Team :** EMPENN
- **Recruiter :**
  Combes Benoit / benoit.combes@inria.fr

About Inria

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

The keys to success

Organization and autonomy as well as an ambition to contribute to the improvement of clinical follow-up of patients are fundamental.

Warning : you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.

Instruction to apply

Please submit online : your resume, cover letter and letters of recommendation eventually

Defence Security :
This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST).Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy :
As part of its diversity policy, all Inria positions are accessible to people with disabilities.