



Offer #2020-02715

Temporary scientific engineer in machine learning and Python development

Contract type : Fixed-term contract

Level of qualifications required : PhD or equivalent

Fonction : Temporary scientific engineer

About the research centre or Inria department

The Inria Rennes - Bretagne Atlantique Centre is one of Inria's eight centres and has more than thirty research teams. The Inria Center 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

Have you heard of Tensorly (www.tensorly.org)? Tensorly is a collaborative open-source project which aims at providing a complete python library for tensor manipulations and decompositions. Tensorly is already a great toolbox featuring many tensor manipulations (such as permuting entries in multiway arrays), operations (such as the Khatri-Rao product or the MTTKRP) and tensor decomposition models (such as CP/PARAFAC, Tucker, Matrix Product State, soon PARAFAC2). However, several criticisms can be made about Tensorly:

- the algorithms implemented for training these models are not state-of-the-art.
- there is at most two different algorithms for training a tensor decomposition in Tensorly, while the literature has dozens for each model.
- there is no plug-and-play system for more advanced users.

The Tensoptly project aims at solving the above issues, in order to drastically improve the Tensorly toolbox and expand its userbase. Although entirely funded by Inria, the Tensoptly project is a collaborative project. Collaborators for this project are

- the core development team of Tensorly (tensorly.org), NVidia (in particular Anima Anandkumar's team), and the development community.
- members of the project-team Panama hosting the project (Jeremy Cohen, Nancy Bertin, Axel Marmoret, possibly interns).
- the users, composed among others of several Inria teams (SIROCCO, EMPENN, DANTE)

This job is thus an incredible opportunity to have a leadership role among many actors from the machine learning and informatics communities, with various cultures and expectations.

Assignment

Assignments:

The candidate will be the main developer of the Tensoptly project. Tensoptly will implement several features in Tensorly, in particular state-of-the-art optimization algorithms, class-based programming and easy customization.

These features are key to allow the Tensorly project to become usable in various fields of machine learning, which have various specificities, and drastically expand its user base.

For a better knowledge of the proposed project, see the official project webpage (<https://cohenjer.gitlab.io/tensoptly-website/project/>).

Responsibilities:

The person recruited is responsible for the implementation of state-of-the-art algorithms and will take initiatives for his formation on tensor algebra and optimization and his collaboration with the various actors of the project.

Moreover, the person recruited will be in charge of managing the existing workforce and reviewing potential external contributions.

Main activities

Main activities:

- Case study of several uses of tensor decomposition techniques
- API design for the Tensoptly project
- Efficient implementation of algorithms and routines
- Ensuring the transmission of the code at the end of the project
- Benchmarking existing algorithms using the Tensoptly implementation

Additional activities:

- Building from existing free data set a benchmark data set for tensor decomposition.
- Punctual help on other projects within the team involving Python or collaborative development
- Participation to the scientific life of the team (such as team and group meetings) and potential Tensorly developers meetings.

Skills

- A PhD related to numerical optimization, machine learning or signal processing.
- Publications or open-source software related to machine learning or numerical optimization.
- Knowledge about numerical optimization (e.g. gradient descent, second-order methods, stochastic/extrapolated/proximal variants).
- Experience in programming with Python.
- Experience in collaborative projects hosted on platforms such as Github. Experience in medium/large-scale collaborative projects is a plus. The candidate should be completely autonomous on these aspects.
- Any knowledge about tensor decomposition or related models such as Nonnegative Matrix Factorization is a plus.

Benefits package

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours)
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Social security coverage

Remuneration

Monthly gross salary from 2735 euros according to diploma and experience

General Information

- **Theme/Domain** : Language, Speech and Audio Statistics (Big data) (BAP E)
- **Town/city** : Rennes
- **Inria Center** : [Centre Inria de l'Université de Rennes](#)
- **Starting date** : 2020-11-02
- **Duration of contract** : 2 years
- **Deadline to apply** : 2020-07-31

Contacts

- **Inria Team** : [PANAMA](#)
- **Recruiter** :
Cohen Jérémy / jeremy.cohen@irisa.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

Ideally, a perfect candidate would have a very solid background in collaborative machine learning projects in Python, and/or a very solid background on the mathematics of machine learning.

The project will involve learning and understanding a large number of tensor decomposition models and complex algorithms. Therefore, it is expected that the candidate has appetite for learning new concepts in an autonomous fashion, and is able to keep up with the high-level cross-disciplinary

excellence required for the project.

Moreover, the Tensoptly project is not isolated: it is part of a larger community collaborating on Tensorly. Social skills and a taste for teamwork in the context of a development project are therefore important assets as well. Members of the project-team Panama will also participate in the development, and a smooth local insertion is also expected.

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

For more information, please contact jeremy.cohen@irisa.fr

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.