Offer #2023-06832

Post-Doctoral Research Visit F/M Deep Information Geometry

**Contract type:** Fixed-term contract

**Level of qualifications required:** PhD or equivalent

**Fonction:** Post-Doctoral Research Visit

**About the research centre or Inria department**

The Centre Inria de l'Université de Grenoble groups together almost 600 people in 22 research teams and 7 research support departments.

Staff is present on three campuses in Grenoble, in close collaboration with other research and higher education institutions (Université Grenoble Alpes, CNRS, CEA, INRAE, ...), but also with key economic players in the area.

The Centre Inria de l'Université Grenoble Alpes is active in the fields of high-performance computing, verification and embedded systems, modeling of the environment at multiple levels, and data science and artificial intelligence. The center is a top-level scientific institute with an extensive network of international collaborations in Europe and the rest of the world.

**Context**

**Within the framework of a partnership (you can choose between)**

- Collaboration between 2 Inria teams: Statify and RobotLearn

**Assignment**

The aim of this post-doc is to investigate theoretical and practical relationships between various approaches from the deep generative modelling literature, such as the (D)VAE family [1], diffusion models [2], and normalising flows [3].

We expect that the development of such an unified framework may provide insights on the way these different models are trained, potentially reducing the amount of samples required for training. We are particularly interested in evaluating how this framework might be helpful for unsupervised domain adaptation of probabilistic models, i.e. situations where there are differences between the statistical properties of the training set and the testing set.

To that aim, one possibility is to investigate the formalism of information geometry [4], which represents probability distribution functions (pdf) as elements in a Riemannian manifold and provides a theoretical and practical framework to consider geodesic paths and distances between them, barycenters of a set of pdfs, etc. The compatibility of this framework with deep probabilistic models is yet to be investigated, and algorithms allowing to effectively compute such distances are yet to be developed. An initial investigation in recent literature is Arvanitidis et al. [5]

Despite being a rather methodological topic, we intend to validate our findings to real world applications in which the supervisors are well versed. These include speech enhancement, multi-person tracking, and multivariate time series.


**Main activities**

Main activities (5 maximum): Conduct research and help with the supervising of Ph.D. students and M2 interns, develop open source code, write reports and technical paper.

**Skills**
Technical skills and level required: pyTorch
Languages: English (obligatory) and French (bonus)

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) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking and flexible organization of 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

2788 euros gross salary/month

General Information

- Theme/Domain: Optimization, machine learning and statistical methods
  Statistics (Big data) (BAP E)
- Town/city: Montbonnot
- Inria Center: Centre Inria de l'Université Grenoble Alpes
- Starting date: 2024-03-01
- Duration of contract: 1 year, 7 months
- Deadline to apply: 2024-02-29

Contacts

- Inria Team: STATIFY
- Recruiter: Coelho Rodrigues Pedro Luiz / pedro-luiz.coelho-rodrigues@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

- Essential qualities in order to fulfil this assignment are feeling at ease in an environment of scientific dynamics and wanting to learn and listen.
- Curiosity, rigor, excellent writing skills.

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

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.