Offer #2025-08749

Post-Doctoral Research Visit F/M Risk Measures in Task-Oriented Communications

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 Inria research centre in Lyon is the 9th Inria research centre, formally created in January 2022. It brings together approximately 300 people in 16 research teams and research support services.

Its staff are distributed at this stage on 2 campuses: in Villeurbanne La Doua (Centre / INSA Lyon / UCBL) on the one hand, and Lyon Gerland (ENS de Lyon) on the other.

The Lyon centre is active in the fields of software, distributed and high-performance computing, embedded systems, quantum computing and privacy in the digital world, but also in digital health and computational biology.

Context

This postdoctoral research position will be carried out in Inria Lyon, funded by the PEPR Networks of the Future programme. The candidate will be hosted within the MARACAS team in the CITI Laboratory, working primarily with Dr. Malcolm Egan. As the PEPR Networks of the Future programme is a national French collaboration, opportunities will be available for interactions with other researchers working in foundations and applications via seminars, workshops, and short-term visits.

Assignment

The focus of the PEPR Networks of the Future programme is to develop fundamental and applied research towards future communication networks. One aspect of this programme is goal-oriented and semantic communications, where communications is tailored for a specific task (e.g., training machine learning models or process control). In addition to considering task-dependent constraints (e.g., latency or reliability), a key aspect of goal-oriented communications is selecting relevant data to communicate.

In the work to be carried out in this postdoctoral position, the focus is on coding schemes (both compression and channel) with guarantees on the performance of a specific task. In particular, unlike for traditional coding schemes, we will focus on risk constraints, which account for the impact of a large distortion in the received signal on the performance of a task. Our focus will be on tasks modeled via data-dependent optimization, which arises in machine learning, statistical inference, and resource allocation.

The goal of this postdoctoral position will be to design and analyze coding schemes using tools from information theory subject to risk constraints where the distortion measure is defined in terms of optimality loss in data-dependent optimization. The performance of algorithms to construct (joint) source and channel codes will be then evaluated in comparison with the theoretical analysis.

Main activities

The candidate will carry out research on federated learning algorithms in collaboration with members of the MARACAS Inria project-team. This includes participation in local seminars as well as in summer schools and international conferences.

Main activities:

- Information-theoretic analysis of risk-constrained source and channel coding.
- Development of algorithms to construct source and channel codes with risk-constraints.
- Simulation-based comparisons of information-theoretic bounds and proposed algorithms.

Benefits package

- Subsidized meal
- 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 (90 days / year) 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
- Complementary health insurance under conditions

Remuneration

2788€ gross salary / month

General Information

- **Theme/Domain :** Networks and Telecommunications
- **Town/city :** Villeurbanne
- **Inria Center :** Centre Inria de Lyon
- **Starting date :** 2025-09-01
- **Duration of contract :** 1 year, 6 months
- **Deadline to apply :** 2025-04-20

Contacts

- **Inria Team :** MARACAS
- **Recruiter :**
  Egan Malcolm / malcom.egan@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.

Instruction to apply

Applications must be submitted online on the Inria website.

Processing of applications sent by other channels is not guaranteed.

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.