Offer #2025-08952

Post-Doctoral Research Visit F/M
Transfer Learning for Graph-linked Data

Level of qualifications required : PhD or equivalent

Fonction : Post-Doctoral Research Visit

About the research centre or Inria department

The Inria centre at Université Côte d'Azur includes 42 research teams and 9 support services. The centre's staff (about 500 people) is made up of scientists of di?erent nationalities, engineers, technicians and administrative staff. The teams are mainly located on the university campuses of Sophia Antipolis and Nice as well as Montpellier, in close collaboration with research and higher education laboratories and establishments (Université Côte d'Azur, CNRS, INRAE, INSERM ...), but also with the regiona economic players.

With a presence in the fields of computational neuroscience and biology, data science and modeling, software engineering and certification, as well as collaborative robotics, the Inria Centre at Université Côte d'Azur is a major player in terms of scientific excellence through its results and collaborations at both European and international levels.

Context

The work will be at Inria team **NEO** (https://team.inria.fr/neo/), located in Sophia Antipolis, under the supervision

of **Dr. Konstantin Avrachenkov** (https://www-sop.inria.fr/members/Konstantin.Avratchenkov/me.html).

Assignment

Topic:
The project is a cutting-edge research initiative funded by Université Côte d'Azur under
the DS4H "Idées 2025" program. It aims to push the boundaries of machine learning by
developing advanced techniques for transfer learning in graph-linked data. In many real-world scenarios—from electrical grids and transportation systems to blockchain networks—data is naturally represented as graphs. However, most existing Graph Neural
Networks (GNNs) struggle to generalize across different graph topologies, especially
when those graphs are large, dynamic, or only partially labeled. We seeks to overcome
these limitations by creating novel GNN architectures that are invariant (i.e., their outputs do not change under graph isomorphisms) or equivariant (i.e., their outputs change in a predictable way when the input graph is transformed). The goal is to build and to analyse models that maintain high performance even when applied to graphs
that differ from those they were trained on. We shall be testing new methods on two high-impact use cases: predicting cascading failures in electrical grids and detecting fraudulent patterns in cryptocurrency networks.

Background references:

Avrachenkov, K., Mishenin, A., Gonc?alves, P. & Sokol, M. Generalized optimization framework
for graph-based semi-supervised learning. In Proceedings of SIAM SDM 2012.

Azizian, W., & Lelarge, M. Expressive power of invariant and equivariant graph neural networks.
arXiv preprint arXiv:2006.15646, 2020, also in Proceedings of ICLR 2021.

Gritsenko, A., Shayestehfard, K., Guo, Y., Moharrer, A., Dy, J. & Ioannidis, S. Graph transfer learning. Knowledge and Information Systems, 65(4), 1627-1656, 2023.

To apply: Submit an application containing CV, Research Statement with a connection to the
proposed project and two recommendation letters.

Main activities

Main activities:

1. Conducting research;
2. Carrying out numerical experiments (in pyton or matlab);
3. Writing scientific articles

Skills

Required skills:

We seek a candidate with PhD in Mathematics or Theoretical Computer Science/Machine Learning.
A candidate should have a solid knowledge in probability, statistics and a good knowledge in
graph theory. A candidate should be able to program in pyton or matlab.

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
- Contribution to mutual insurance (subject to conditions)

Remuneration

Gross Salary: 2788 € per month.

General Information

- **Theme/Domain :** Optimization, machine learning and statistical methods
- **Town/city :** Sophia Antipolis
- **Inria Center :** Centre Inria d'Université Côte d'Azur

- **Starting date :** 2025-10-01
- **Duration of contract :** 12 months
- **Deadline to apply :** 2025-07-31

Contacts

- **Inria Team :** NEO
- **Recruiter :**
  Avrachenkov Konstantin / Konstantin.Avratchenkov@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.

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

Applications must be submitted online on the Inria website. Collecting applications 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.