Offer #2022-05117

Post-Doctoral Research Visit F/M Reinforcement Learning with Applications to Active Learning and Recommender Systems

Contract type : Fixed-term contract

Renewable contract : Yes

Level of qualifications required : PhD or equivalent

Fonction : Post-Doctoral Research Visit

About the research centre or Inria department

The Inria Sophia Antipolis - Méditerranée center counts 34 research teams as well as 7 support departments. The center's staff (about 500 people including 320 Inria employees) is made up of scientists of different nationalities (250 foreigners of 50 nationalities), engineers, technicians and administrative staff. 1/3 of the staff are civil servants, the others are contractual agents. The majority of the center's research teams are located in Sophia Antipolis and Nice in the Alpes-Maritimes. Four teams are based in Montpellier and two teams are hosted in Bologna in Italy and Athens. The Center is a founding member of Université Côte d'Azur and partner of the I-site MUSE supported by the University of Montpellier.

Context

Postdoc position will be with Inria NEO team:

https://team.inria.fr/neo/

Assignment

Topic description:

Recently we have witnessed tremendous success of Deep Reinforcement Learning algorithms, specifically Deep Q-Network (DQN) algorithm [1], in various application domains. Just to name a few examples, DRL has achieved superhuman performance in playing Go, Chess and many Atari video games. We would also like to mention the
impressive progress of DRL applications in robotics [2], telecommunications [3] and medicine [4].

However, as was recently pointed out in [5], the original DQN scheme lacks convergence guarantees. In [5] a new Deep Reinforcement Learning scheme, FG-DQN, was proposed, which not only has sound theoretical convergences guarantees but also have shown superior performance on some benchmark environments.

The goal of this postdoc project is to further study and apply the FG-DQN scheme. In particular, as application areas we aim at active learning and recommender systems.

References:

[1] Mnih, V., et. al. (2015). Human-level control through deep reinforcement learning. Nature, 518(7540), 529-533.

[2] Gu, S., et. al. (2017). Deep reinforcement learning for robotic manipulation with asynchronous off-policy updates. In 2017 IEEE international conference on robotics and automation (ICRA) (pp. 3389-3396).

[3] Luong, N. C., Hoang, D. T., Gong, S., Niyato, D., Wang, P., Liang, Y. C., & Kim, D. I. (2019). Applications of deep reinforcement learning in communications and networking: A survey. IEEE Communications Surveys & Tutorials, 21(4), 3133-3174.

[4] Jonsson, A. (2019). Deep reinforcement learning in medicine. Kidney diseases, 5(1), 18-22.

[5] Avrachenkov, K. E., et. al. (2021). Full gradient DQN reinforcement learning: A provably convergent

scheme. In Springer Modern Trends in Controlled Stochastic Processes: (pp. 192-220).

Skills

Technical skills required:

Good knowledge of Markov Decision Processes or/and Reinforcement Learning, Python

Languages:

Good level of English, Conversational French is an advantage but not strictly required

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 (after 6 months of employment) 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

Gross Salary: 2653 € per month

General Information

- **Theme/Domain** : Optimization, machine learning and statistical methods
  Statistics (Big data) (BAP E)
- **Town/city** : Sophia Antipolis
- **Inria Center** : [Centre Inria d'Université Côte d'Azur](#)
- **Starting date** : 2022-10-01
- **Duration of contract** : 2 years
- **Deadline to apply** : 2022-09-30

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

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.