Offer #2024-07660

Post-Doctoral Research Visit F/M - INRIA/CWI on computing saddle points

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 Grenoble research center groups together almost 600 people in 23 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 (University Grenoble Alpes, CNRS, CEA, INRAE, ...), but also with key economic players in the area.

Inria Grenoble 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

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Every year Inria International Relations Department has a few postdoctoral positions in order to support Inria international collaborations.

The postdoctoral fellow will join the4TUNE associate team at the CWI-Inria International Lab. The research conducted by the team is centered around online learning, bandits, and optimization. We aim to advance statistical learning by developing sophisticated algorithms that exploit problem structure beyond traditional worst-case analysis. We in particular investigate adaptivity to non-standard patterns encountered in embedded learning tasks, such as in iterative equilibrium computations, which is the focus of this postdoc project.

Work environment

The project will be formally co-supervised by Pierre Gaillard from Inria Grenoble and Wouter Koolen from CWI Amsterdam. The postdoc will start and be hosted administratively in Grenoble, and will include extended visits to Amsterdam, as well as to the 4TUNE project collaborators Rémy Degenne in Lille and Adrien Taylor in Paris.

The specific time split will be decided based on the needs of the postdoc. It could be for example 1 year in Grenoble followed by 1 year in Amsterdam with several missions to Lille and Paris.

Starting date & duration

The postdoctoral contract will have a duration of 12 to 24 months. The default start date is November 1st, 2024 and not later than January, 1st 2025. The postdoctoral fellow will be recruited by one of the Inria Centres in France but it is recommended that the time is shared between France and the partner's country (please note that the postdoctoral fellow has to start his/her contract being in France and that the visits have to respect Inria rules for missions)

Assignment

Assignments

Candidates for postdoctoral positions are recruited after the end of their Ph.D. or after a first post-doctoral period: for the candidates who obtained their PhD in the Northern hemisphere, the date of the Ph.D. defense shall be later than September 1, 2022; in the Southern hemisphere, later than April 1, 2022.

In order to encourage mobility, the postdoctoral position must take place in a scientific environment that is truly different from the one of the Ph.D. (and, if applicable, from the position held since the Ph.D.); particular attention is thus paid to French or international candidates who obtained their doctorate abroad.

Research project and main activities

This is a project at the intersection of**game theory, online learning and convex optimisation**

Two-player zero-sum matrix games, and their generalisation to convex-concave saddle points arise in a multitude of application domains. As such, the complexity of (approximate) saddle point computation is of central scientific interest. For classic instances, including matrix games, we have efficient algorithms, for example the iterative methods of [3, 4] and their accelerated version by [9]. Yet in almost all instances the exact limits remain open, both for computational complexity as well as for query complexity [7].

In this project we are interested in studying a family of saddle point problems arising in the analysis of sequential learning problems [2,5,6]. The value of these saddle point problems is known to characterise the statistical complexity of the corresponding online learning problems, and their approximate equilibrium is a powerful tool in the design of efficient learning algorithms. The main thrust of this project is to develop new theory and efficient algorithms for computing these equilibria.

The proposed first avenue of attack is to combine the advantages of (online) Frank-Wolfe methods [8] with the acceleration toolbox of [1].

Collaboration

The recruited person will be in connection with Rémy Degenne (Lille) and Adrien Taylor (Paris).

Skills

A Phd degree in mathematics or theoretical computer science, with specialisation optimization, machine learning, statistical learning or game theory, as witnessed by publications in relevant venues including NeurIPS, COLT, ICML, ALT, AISTATS, FOCS, STOC, SODA, EC, JMLR, GEB.

1. [1] J. D. Abernethy, K. A. Lai, K. Y. Levy, and J. Wang. “Faster Rates for Convex-Concave Games”. In: COLT. Vol. 75. Proceedings of Machine Learning Research. PMLR, 2018, pp. 1595–1625.
2. [2] A. Al Marjani and A. Proutiere. “Adaptive sampling for best policy identification in markov decision processes”. In: International Conference on Machine Learning. PMLR. 2021, pp. 7459–7468.
3. [3] G. W. Brown. “Iterative solution of games by fictitious play”. In: Act. Anal. Prod Allocation 13.1 (1951), p. 374.
4. [4] Y. Freund and R. E. Schapire. “Adaptive game playing using multiplicative weights”. In: Games and Economic Behavior 29.1-2 (1999), pp. 79–103.
5. [5] A. Garivier and E. Kaufmann. “Optimal Best arm Identification with Fixed Confidence”. In: Proceedings of the 29th Conference On Learning Theory (COLT). 2016.
6. [6] T. L. Graves and T. L. Lai. “Asymptotically Efficient adaptive choice of control laws in controlled markov chains”. In: SIAM Journal on Control and Optimization 35(3) (1997), pp. 715–743.
7. [7] H. Hadiji, S. Sachs, T. van Erven, and W. M. Koolen. “Towards Characterizing the First-order Query Complexity of Learning (Approximate) Nash Equilibria in Zero-sum Matrix Games”. In: Advances in Neural Information Processing Systems (NeurIPS) 35. Dec. 2023.

Main activities

Main activities (5 maximum) :

Additional activities (3 maximum) :

Examples of activities:

- Analyse the requirements of {partners, clients, users}
- Propose **** solutions for ****
- Develop programs/applications/interfaces of ****,****
- Design experimental platforms ****
- Write documentation
- Write reports
- Write ****
- Test, change up until validation
- Distribute the *** * to **** via ****
- Provide user training for the service’s main clients
- Lead a user community
- Present the works’ progress to partners, ****to an audience of financiers ****
- Other ****

Skills

Technical skills and level required :

Languages :

Relational skills :

Other valued appreciated :

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 (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 :** Optimization, machine learning and statistical methods
- **Town/city :** Montbonnot
- **Inria Center :** Centre Inria de l'Université Grenoble Alpes
- **Starting date :** 2024-11-01
- **Duration of contract :** 2 years
- **Deadline to apply :** 2024-05-31

Contacts

- **Inria Team :** THOTH
- **Recruiter :**
  Gaillard Pierre / pierre.gaillard@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

There you can provide a "broad outline" of the collaborator you are looking for what you consider to be necessary and sufficient, and which may combine :

- tastes and appetencies,
- area of excellence,
- personality or character traits,
- cross-disciplinary knowledge and expertise...

This section enables the more formal list of skills to be completed and 'lightened' (reduced) :

- "Essential qualities in order to fulfil this assignment are feeling at ease in an environment of scientific dynamics and wanting to learn and listen."
- " Passionate about innovation, with expertise in Ruby on Rails development and strong influencing skills. A thesis in the field of **** is a real asset."

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.

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.