



Offer #2025-09158

Engineer -- market places simulation and incentives

Level of qualifications required : Graduate degree or equivalent

Fonction : Temporary scientific engineer

About the research centre or Inria department

The Inria Saclay-Île-de-France Research Centre was established in 2008. It has developed as part of the Saclay site in partnership with **Paris-Saclay University** and with the **Institut Polytechnique de Paris** .

The centre has 40 [project teams](#) , 27 of which operate jointly with Paris-Saclay University and the Institut Polytechnique de Paris; Its activities occupy over 600 people, scientists and research and innovation support staff, including 44 different nationalities.

Context

The recruited engineer will work in the FairPlay team. FairPlay is a joint team between Inria, ENSAE and Criteo with around 8 permanent researchers and 15 PhD students/postdocs from all three partners institution. The team is bi-localized, hosting at CREST (on the Polytechnique campus) but working from Criteo HQ in Paris once a week.

Several of the researchers (incl. the team's heads Vianney Perchet and Patrick Loiseau as well as PhD students) are working on topics related to the engineer's position and the engineer will interact with them both to understand their need and provide them with tools that can create new results. The recruited engineer will also benefit from interactions (and support as needed) with engineering teams from both Inria (SED) and Criteo.

Assignment

The recruited engineer will support the team by developing prototypes of research products. (S)he will work on two projects. Both projects are key to the FairPlay team, but the first project will be prioritized at least in the beginning.

Development of an AI-based simulator of markets

Markets such as the online advertising market organize many important parts of society and industry. Online platforms often seek to devise global rules to optimize several metrics of those markets such as efficiency, revenue, and fairness. However, markets are difficult to model, design, and analyze due to having many agents interacting with their own objectives; and market designers usually fall short of explicit solutions because of the complexity of these systems.

To address this issue, the team proposes a completely different approach based on simulating the market instead of trying to model it precisely, using deep reinforcement learning to let agents learn optimal strategies through interactions. The goal of this project is therefore to build an agent-based simulator of a market that takes into account relevant features such as supply-demand dynamics, heterogeneous agent behavior or regulatory constraints. Then, based on this simulator, we should be able to optimize the market parameters, such as the ad auction mechanism (using automated differentiation).

This project follows a recent trend initiated by the "AI economist" (<https://github.com/salesforce/ai-economist>) for different purposes (tax). A simple initial code in the case of a simplistic labor market was done at ENSAE (<https://github.com/coni26/MARL-Labor-Market>). The goal of the engineer will be to develop a complete simulator for the online advertising market. This includes in particular coding modules for the different market aspects (agents, policies, etc.). The code will be done in Python and open sources libraries can be used for RL tasks. The simulator should then be packaged as a reproducible environment.

Datacoop: a platform for incentivized data sharing

Machine learning models use datasets for training. In many cases, several datasets exist, owned by different entities, and the machine learner would like to incentivize the dataset owners to join a coalition that pools all the datasets together to learn a common model. This requires to be able to quantify the value that a dataset adds to the machine learning model (e.g., to its accuracy). In a recent paper (NeurIPS 2024), we proposed a new method to evaluate this contribution through an efficient approximation of the Shapley value.

The objective of the engineer will be to develop a proof-of-concept of the datacoop based on our valuation method. This will be done in cooperation with the product team of Criteo, in particular for design choices.

Main activities

The main activity will be the development of code to support research as well as to make it accessible to the public. The recruited engineer will be in charge of the whole development pipeline (coding, testing, documenting, distributing, etc.).

Skills

Technical skills and level required:

The main competence required is Python programming. Understanding of machine learning basic concepts and experience in using some of the libraries (e.g., for reinforcement learning) is a plus but is not strictly necessary as it can be learned somewhat easily.

The following will be a plus (we do not expect necessarily all):

- knowledge of C++ to optimize the code.
- competence in code organization and reproducible development tools.
- competence in developing a user-friendly interface.

Languages:

English is required, French is not.

Relational skills:

Capability to interact with the team of researchers.

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

Remuneration : in regards to your professional experience

General Information

- **Theme/Domain** : Optimization, machine learning and statistical methods Statistics (Big data) (BAP E)
- **Town/city** : Palaiseau
- **Inria Center** : [Centre Inria de Saclay](#)
- **Starting date** : 2025-10-01
- **Duration of contract** : 2 years
- **Deadline to apply** : 2025-09-30

Contacts

- **Inria Team** : [FAIRPLAY](#)

- **Recruiter :**

Loiseau Patrick / patrick.loiseau@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

The successful candidate should have a taste for working with researcher and for developing solutions for economically-motivated problems and for data-related problems.

(S)he can either be a graduate from CS/engineering studies (M2 level) or have a PhD with a coding component. Post-diploma coding experience is appreciated but not necessary.

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.