



Offre n°2024-07202

Grid Coloring for Object Sensing and Localization (Master's Internship)

Le descriptif de l'offre ci-dessous est en Anglais

Niveau de diplôme exigé : Bac + 4 ou équivalent

Fonction : Stagiaire de la recherche

A propos du centre ou de la direction fonctionnelle

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 [39 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.

Contexte et atouts du poste

Within the framework of a partnership with Nokia Bell Labs.

Starting time: Position available immediately (duration 6 months).

Mission confiée

Internship Supervisors:

- Cedric Adjih, Research Scientist
Department/Lab: INRIA, TRiBE team, Saclay, France
<https://www.inria.fr/en/tribe>, Contact: cedric.adjih@inria.fr
- Chung Shue (Calvin) Chen, Research Scientist
Department/Lab: Nokia Bell Labs, ML & System team, Paris-Saclay, France
<https://www.bell-labs.com>, Contact: chung_shue.chen@nokia-bell-labs.com
- Elie de Panafieu, Research Scientist
Department/Lab: Nokia Bell Labs, Math & Algorithm team, Paris-Saclay, France
<https://www.bell-labs.com>, Contact: elie.de_panafieu@nokia-bell-labs.com

Principales activités

▫ Project Description / Internship Subject

A robot moves on a grid or topology. At each position, it perceives the multiset of sensing of the tiles or surroundings that it covers. The goal of the project is to design and code an algorithm that labels the grid so that the robot can uniquely determine its location due to the combination of the sensed labels.

The fewer the number of bits used to represent all the required labels for the system or network, the better.

For example, in the following grid, no two 3-by-3 square contains the same multiset of the labels (we use color to illustrate, which however can mean an identification number or a few bits).

We would propose interesting new mathematical models which may spur future scientific research. Interesting engineering application includes 6G wireless IoT systems.

Research methodology to be used:

Several approaches of increasing sophistication can be applied. Greedy algorithm, algorithms improving

a coloring of graph by solving local conflicts randomly, graph neural networks (as the problem is reminiscent of, but distinct from, graph coloring), machine learning and deep learning techniques.

References

1. C. Adjih, C. S. Chen, C. S. Gobin, and I. Hmedoush, "Designing Medium Access Control Protocol Sequences Through Deep Reinforcement Learning," European Conference on Networks and Communications & 6G Summit, 2023.
2. Y. Shao, S. C. Liew and T. Wang, "AlphaSeq: Sequence Discovery with Deep Reinforcement Learning," IEEE Trans. on Neural Netw. & Learning Systems, 2020.
3. S.-W. Ho and C. S. Chen, "Visible Light Communication Based Positioning Using Color Sensor," IEEE 8th Optoelectronics Global Conference (OGC), 2023.
4. C. S. Chen, Y.-H. Lo, W. S. Wong, and Y. Zhang, "Object Tracking Using Multiset Color Coding," Preprint, 2024.

The team:

Inria is the French national research institute for digital science and technology. World-class research, technological innovation and entrepreneurial risk are its DNA. In 220 project teams, most of which are shared with major research universities, often in an interdisciplinary manner and in collaboration with industrial partners to meet ambitious challenges. Saclay research centre is located at the heart of the Paris-Saclay scientific and technological excellence cluster. Serving the development of the Université Paris-Saclay and the Institut Polytechnique de Paris, the Inria Saclay centre has 60 people working in research support services and 600 scientists working in 37 project teams. It offers a unique environment to talented candidates in the field of technological and software development.

Nokia creates the technologies to connect the world. With the research and innovation capabilities of Nokia Bell Labs, we provide network service providers, governments, large business companies and end users with the most comprehensive portfolio of products, services and licenses on the market. Nokia Bell Labs is the world-renowned research arm of Nokia, having invented many of the foundational technologies that underpin information and communications networks and all digital devices and systems. Within Bell Labs, AI Research Lab conducts fundamental and applied research in machine learning, mathematics, modeling, and optimization. The Lab has a long tradition of excellence in research and currently consists of over 80 staff members with expertise in algorithmic and computing sciences, network measurement and optimization, information theory and machine learning.

Compétences

Skills that are useful/that you will acquire:

- Combinatorics, number and coding method/theory, graph representation and discrete mathematics,
- algorithm design,
- programming and software implementation,
- machine learning and deep learning method,
- engineering practice and industrial experience

Avantages

- 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

Rémunération

Gratification

Informations générales

- **Thème/Domaine** : Réseaux et télécommunications

- Système & réseaux (BAP E)
- **Ville** : Palaiseau
- **Centre Inria** : [Centre Inria de Saclay](#)
- **Date de prise de fonction souhaitée** : 2024-03-01
- **Durée de contrat** : 7 mois
- **Date limite pour postuler** : 2024-09-30

Contacts

- **Équipe Inria** : [TRIBE](#)
- **Recruteur** :
Adjih Cédric / Cedric.Adjih@inria.fr

A propos d'Inria

Inria est l'institut national de recherche dédié aux sciences et technologies du numérique. Il emploie 2600 personnes. Ses 215 équipes-projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3900 scientifiques pour relever les défis du numérique, souvent à l'interface d'autres disciplines. L'institut fait appel à de nombreux talents dans plus d'une quarantaine de métiers différents. 900 personnels d'appui à la recherche et à l'innovation contribuent à faire émerger et grandir des projets scientifiques ou entrepreneuriaux qui impactent le monde. Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 200 start-up. L'institut s'efforce ainsi de répondre aux enjeux de la transformation numérique de la science, de la société et de l'économie.

Attention: Les candidatures doivent être déposées en ligne sur le site Inria. Le traitement des candidatures adressées par d'autres canaux n'est pas garanti.

Consignes pour postuler

Sécurité défense :

Ce poste est susceptible d'être affecté dans une zone à régime restrictif (ZRR), telle que définie dans le décret n°2011-1425 relatif à la protection du potentiel scientifique et technique de la nation (PPST). L'autorisation d'accès à une zone est délivrée par le chef d'établissement, après avis ministériel favorable, tel que défini dans l'arrêté du 03 juillet 2012, relatif à la PPST. Un avis ministériel défavorable pour un poste affecté dans une ZRR aurait pour conséquence l'annulation du recrutement.

Politique de recrutement :

Dans le cadre de sa politique diversité, tous les postes Inria sont accessibles aux personnes en situation de handicap.