

Offre n°2020-02885

PhD Position F/M PhD Position in Optimization

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

Type de contrat : CDD

Niveau de diplôme exigé : Bac + 5 ou équivalent

Fonction : Doctorant

A propos du centre ou de la direction fonctionnelle

Located at the heart of the main national research and higher education cluster, member of the Université Paris Saclay, a major actor in the French Investments for the Future Programme (Idex, LabEx, IRT, Equipex) and partner of the main establishments present on the plateau, the centre is particularly active in three major areas: data and knowledge; safety, security and reliability; modelling, simulation and optimisation (with priority given to energy).

The 450 researchers and engineers from Inria and its partners who work in the research centre's 28 teams, the 60 research support staff members, the high-level equipment at their disposal (image walls, high-performance computing clusters, sensor networks), and the privileged relationships with prestigious industrial partners, all make Inria Saclay Île-de-France a key research centre in the local landscape and one that is oriented towards Europe and the world.

Contexte et atouts du poste

In the context of the ERC STG MAJORIS European project, our aim in this PhD thesis, is to propose a new generation of non-convex stochastic optimization algorithms that can reach global minimizer while preserving reasonable complexity.

Subject : Nonconvex optimization problems are encountered in biomedical image processing to account for the nonlinearity of the observation model and/or for the sparsity of the data after some suitable transform (e.g. wavelet decomposition). However, most current methods for dealing with nonconvex large-scale problems only provide convergence guarantees to a critical point of the objective function. Now, it appears timely to go further and propose approaches securing the convergence to a global minimum. In this PhD thesis, we will investigate stochastic global optimization techniques. Existing approaches are however usually restricted to small dimensional problems and they may be slow. By better exploiting the structure of the cost functions minimized in inverse problems, more efficient methods should be devised. One may think, in particular, of combining stochastic sampling techniques with majorization-minimization methods. The main challenge is to reach satisfactory theoretical and practical convergence rates and low complexity with the proposed approaches.

Mission confiée

Missions : The recruited student will investigate new stochastic optimization schemes for global optimization. The main challenges are : convergence analysis, convergence rate study, practical implementation on non-convex problems arising in biomedical image processing and machine learning.

Environment : The PhD will be a co-direction between Emilie Chouzenoux (Inria Saclay, PI of the ERC project MAJORIS), and Victor Elvira (School of Mathematics, University of Edinburgh). The PhD student will join the Inria Saclay team OPIS (<https://opis-inria.eu/>). He/she will be located in the Centre de la Vision Numérique, in CentraleSupélec campus, Saclay, France. He/she will enjoy an international and creative environment where research seminars and reading groups take place very often.

Travel and informatic material expenses will be covered within the limits of the scale in force.

Principales activités

Main activities :

- Bibliographic study
- Convergence analysis
- Implementation of the methods in Python/Matlab softwares
- Validation on numerical examples
- Writing of scientific reports

Compétences

Languages : The candidate must be fluent in english and/or french languages.

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

Monthly gross salary (1st and 2nd year) : 1.982 euros

Monthly gross salary (3rd year) : 2.085 euros

Informations générales

- Thème/Domaine : Optimisation, apprentissage et méthodes statistiques Statistiques (Big data) (BAP E)
- Ville : Gif sur Yvette
- Centre Inria : [Centre Inria de Saclay](#)
- Date de prise de fonction souhaitée : 2021-10-01
- Durée de contrat : 3 ans, 3 mois
- Date limite pour postuler : 2020-09-30

Contacts

- Équipe Inria : [OPIS](#)
- Directeur de thèse :
Chouzenoux Emilie / emilie.chouzenoux@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.

L'essentiel pour réussir

We are looking for a motivated and talented PhD student with

- solid background in signal processing, statistics or applied mathematics
- strong mathematical skills, including convergence analysis
- if possible, experience in research environment (for e.g., during Master training period)
- experience in programming, preferably in Matlab and/or Python
- experience in writing of scientific reports

The candidates are requested to send a CV, a motivation letter, and two recommendation letters, to apply for this position.

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.