



Offre n°2024-07457

Post-Doctoral Research Visit F/M Mobility-aware Edge Computing for 5G

Type de contrat : Fixed-term contract

Niveau de diplôme exigé : PhD or equivalent

Fonction : Post-Doctoral Research Visit

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 since 2021.

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 scientists and research and innovation support staff, including 54 different nationalities.

Contexte et atouts du poste

A post-doctoral fellowship is available in the Inria TRiBE team at the Saclay Center. This position is funded in the context of the National French PEPR projects on "Networks of the Future" and "Mobility Digitalization". The post-doctoral fellow will collaborate with Dr. Aline C. Viana (<https://pages.saclay.inria.fr/aline.viana/>) and Nadjib Achir (<https://nadach.github.io>) from the TRiBE team and Razvan Stanica (<http://perso.citi.insa-lyon.fr/rstanica/>) from the Inria Agora team.

Mission confiée

A direct consequence of hosting resources in a distributed way at the Edge is their exposure and sensitivity to the heterogeneity, massiveness, and uncertainty in mobility and demands of smart devices, leading to non-optimal edge usage in the long run. We aim to deal with such impacting factors in device behaviors by bringing (i) perceptive and aware mobility/demand quasi-in-time anticipation, (ii) uncertainty handling, and (iii) self-adaptation to device-edge resource management.

In particular, the focus will be on smart devices, where perceptiveness and awareness of needs and behaviors (where, when, and for what resources are required) of users and applications dictate decision, reaction/action, and allocation/management at the edge. Previous knowledge of TRiBE and AGORA on modeling, uncertainty profiling, interpretative predictability, and personalized anticipation of mobility behaviors [1],[2],[3],[4] as well as of resource demands [5],[6][7] of networking users, will be leveraged. The **first goal** will be to design a **framework for quasi-in-time anticipation of spatial-temporal resource demands**.

The **second goal** will be the design of perceptive mobility-aware offloading policies and adaptive allocation strategy according to the quasi-in-time anticipation of spatial-temporal resource demands. The quasi-in-time anticipation will limit service interruptions due to networking uncertainties or overload. The **third goal** concerns the evaluation of the designed framework, policies, and strategies. Besides, the benefits and tradeoffs of decisions that are taken based on quasi-in-time spatiotemporal anticipation of demands will also be analyzed (e.g., energy or resource loss/gain).

References

[1] D. Do Couto Teixeira, A. Carneiro Viana, J. Marques Almeida, and M.S. Alvim, "The Impact of Stationarity, Regularity, and Context on the Predictability of Individual Human Mobility", ACM Transactions on Spatial Algorithms and Systems, vol. 7, no. 4, June 2021.

[2] D. Do Couto Teixeira, A. Carneiro Viana, J. Marques Almeida. On estimating the predictability of human mobility: the role of routine. EPJ Data Science, 2021, 10 (1).

[3] L. Amichi, A. C. Viana, M. Crovella, A. A. F Loureiro. Revealing an inherently limiting factor in human mobility prediction. IEEE Transactions on Emerging Topics in Computing, 2023. In press.

[4] L. Amichi, A. C. Viana, M. Crovella, A. A. F Loureiro. Understanding individuals' proclivity for

novelty14seeking. ACM SIGSPATIAL 2020.

[5] Pedro Cruz, Nadjib Achir, Aline Carneiro Viana. On the Edge of the Deployment: A Survey on Multi-Access Edge Computing. ACM Computing Surveys, 55 (5). 2022.

[6] H. Mazouzi, N. Achir, and K. Boussetta. DM2-ECOP: an efficient computation offloading policy for multi-user multi-cloudlet mobile edge computing environment. ACM Transaction on Internet Technology, 2021, 19(2).

[7] H. Mazouzi, K. Boussetta, and N. Achir. Maximizing mobile energy saving through tasks offloading placement in two-tier cloud: A theoretical and an experimental study. Elsevier Computer Communication, 144:132–148, 201

Principales activités

- Literature and code review of the team's previous works and design of the framework for quasi-in-time anticipation of spatial-temporal resource demands
- Design perceptive mobility-aware offloading policies and an adaptive allocation strategy. This design will leverage mobility, resource anticipation, and ML strategies to capture the dynamics of the whole system (user behaviors, application demands, and network conditions).
- Evaluate designed solutions, mainly through emulation tools or experimental platforms, following the recommendations of ETSI MEC architecture to mimic realistic MEC infrastructures.
- Quantify benefits and tradeoffs of quasi-in-time spatiotemporal anticipation on energy, resource usability, network management, etc.
- Analyse performance gains obtained when perceptive-to-needs policies and adaptive allocation strategies are implemented.

Compétences

- A Ph.D. degree in wireless networks, mobile networks, or data-related topics.
- a solid understanding of networking principles, protocols, and architectures is essential.
- ability to write and debug (student) code in Python is an important requirement.
- proficiency in programming languages commonly used in AI and networking research.
- Experience with relevant libraries and frameworks is also valuable.
- Ability to design and implement algorithms for solving complex problems.
- Familiarity with optimization techniques.
- Excellent written and verbal communication skills for presenting research findings, writing academic papers, and collaborating with peers.
- The ability to work effectively as part of a research team, collaborate with colleagues from diverse backgrounds, and contribute positively to group dynamics
- A good personal and project management skills are required to function in this multi-disciplinary multi-team project.

Avantages

- Subsidized meals
- 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 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

Rémunération

According to profile

Informations générales

- **Thème/Domaine** : Networks and Telecommunications System & Networks (BAP E)
- **Ville** : Palaiseau
- **Centre Inria** : [Centre Inria de Saclay](#)
- **Date de prise de fonction souhaitée** : 2024-07-01
- **Durée de contrat** : 12 months
- **Date limite pour postuler** : 2024-06-30

Contacts

- **Équipe Inria** : [TRIBE](#)
- **Recruteur** :
Achir Nadjib / Nadjib.Achir@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

The post-doctoral fellow will design new perceptive mobility-aware offloading policies and adaptive allocation strategies and test them on an experimental platform with large mobile network datasets.

The recruited person is expected to write reports and give presentations to academic and industrial partners (e.g., network operators). A special attention will be given to the visualization of results and their presentation to stakeholders and the general public.

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

CV

Cover letter

Letter(s) of recommendation, where applicable

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.