Offre n°2024-08531

Post-Doctoral Research Visit F/M Postdoc in Neural Networks and Computational Neuroscience

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

Type de contrat : CDD

Niveau de diplôme exigé : Thèse ou équivalent

Fonction : Post-Doctorant

A propos du centre ou de la direction fonctionnelle

The Inria center at Université Côte d'Azur includes 42 research teams and 9 support services. The center's staff (about 500 people) is made up of scientists of different nationalities, engineers, technicians and administrative staff. The teams are mainly located on the university campuses of Sophia Antipolis and Nice as well as Montpellier, in close collaboration with research and higher education laboratories and establishments (Université Côte d'Azur, CNRS, INRAE, INSERM ...), but also with the regional economic players.

With a presence in the fields of computational neuroscience and biology, data science and modeling, software engineering and certification, as well as collaborative robotics, the Inria Centre at Université Côte d'Azur is a major player in terms of scientific excellence through its results and collaborations at both European and international levels.

Contexte et atouts du poste

We are looking for a postdoc to join theInterdisciplinary Institutes for Artificial Intelligence 3IA Côte d'Azur, in the beautiful French Riviera, to work with 3IA ChairEmanuele Natale on problems at the interface of machine learning and computational neuroscience. The candidate will be part of the COATI joint team between INRIA d'Université Côte d'Azur and the I3S Laboratory.

Mission confiée

Depending on the candidate's interests, the research topic will be tailored to one of the following directions:

- **Sparsity and Structure in Neural Networks**. We are interested in understanding the role of topology in artificial neural networks at a fundamental level. To this end, we have investigated the Strong Lottery Ticket Hypothesis [NFG+24], [dCDN23], [dCDG+23], [dNV22], which states that random neural networks can be pruned to approximate a large class of functions without changing the initial weights. We are also interested in Neural Combinatorial Optimization, where we investigate the use of graph neural networks to solve graph and combinatorial problems, such as approximating centrality measures or performing network alignment.
- **Computational Neuroscience**. We are interested in developing new tools to understand the nervous system and to explore theories behind neural phenomena. As for developing new tools, we have been working on network alignment algorithms [FCC+21] and network statistical models [RDN24], and we are currently working on GNN-based alignment algorithms to compare connectomes across different species. As for the theoretical side, we are interested in various fundamental questions, including —but not limited to— models of evolution of the brain connectivity structure.

For inquiries on possible research topics, please send an email toemanuèle.natale@univ-cotedazur.fr.

References

- [dCDG+23] Arthur Carvalho Walraven da Cunha, Francesco D'Amore, Frédéric Giroire, Hicham Lesfari, Emanuele Natale, and Laurent Viennot. Revisiting the random subset sum problem. In Inge Li Gørtz, Martin Farach-Colton, Simon J. Puglisi, and Grzegorz Herman, editors, 31st Annual European Symposium on Algorithms, ESA 2023, September 4-6, 2023, Amsterdam, The Netherlands, volume 274 of LIPIcs, pages 37:1–37:11. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2023.
- [dCDN23] Arthur da Cunha, Francesco D'Amore, and Natale, Emanuele. Polynomially Over-Parameterized Convolutional Neural Networks Contain Structured Strong Winning Lottery Tickets. In Thirty-Seventh Conference on Neural Information Processing Systems, November 2023.
- [dNV22] Arthur da Cunha, Natale, Emanuele, and Laurent Viennot. Proving the Strong Lottery

Ticket Hypothesis for Convolutional Neural Networks. In ICLR 2022 - 10th International Conference on Learning Representations, Virtual, France, April 2022.
- [FCC+21] Matteo Frigo, Emilio Cruciani, David Coudert, Rachid Deriche, Natale, Emanuele, and Samuel Deslauriers-Gauthier. Network Alignment and Similarity Reveal Atlas-Based Topological Differences in Structural Connectomes. Network Neuroscience, 5(3):711–733, September 2021.
- [NFG+24] Natale, Emanuele, Davide Ferre', Giordano Giambartolomei, Frédéric Giroire, and Frederik Mallmann-Trenn. On the Sparsity of the Strong Lottery Ticket Hypothesis. In The Thirty-eighth Annual Conference on Neural Information Processing Systems, September 2024.
- [RDN24] Aurora Rossi, Samuel Deslauriers-Gauthier, and Natale, Emanuele. On Null Models for Temporal Small-Worldness in Brain Dynamics. Network Neuroscience (Cambridge, Mass.), 8(2):377–394, 2024.

Principales activités

To be discussed with the supervisor at the time of the candidate's skills assessment and agreement on the main project that will be pursued.

Compétences

Technical skills and level required :

Languages :

Relational skills :

Other valued appreciated :

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 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
- Contribution to mutual insurance (subject to conditions)

Rémunération

Gross Salary : 2788 € per month.

Informations générales

- **Thème/Domaine :** Optimisation, apprentissage et méthodes statistiques
  Calcul Scientifique (BAP E)
- **Ville :** Sophia Antipolis
- **Centre Inria :** Centre Inria d'Université Côte d'Azur
- **Date de prise de fonction souhaitée :** 2025-09-01
- **Durée de contrat :** 2 ans
- **Date limite pour postuler :** 2025-03-31

Contacts

- **Équipe Inria :** COATI
- **Recruteur :**
  Natale Emanuele / emanuele.natale@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

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."

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

Applications must be submitted online on the Inria website. Collecting applications by other channels is not guaranteed.

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.