Offre n°2024-08442

Internship Research Activity (Master/Engineering Level) - Agricultural field boundary extraction from satellite image time series data via geometric aware deep learning approaches

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

Type de contrat : Convention de stage

Niveau de diplôme exigé : Bac + 4 ou équivalent

Fonction : Stagiaire de la recherche

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

The internship position is opened in the context of the EVERGREEN team project - https://team.inria.fr/evergreen/ .

Our team is actively working on the design and implementation of cutting-edge machine learning techniques to effectively exploit heterogeneous and multi-temporal Earth observation data for agricultrual and enviromental applications.

The team, located in a multidisciplinary laboratory, has an active and stimulating environment with master, PhD and Post-doc students coming from different countries.

Mission confiée

Assignments :
With the help of the members of the EVERGREEN team (Raffaele Gaetano and Dino Ienco), the recruited person will explore, design and implement deep learning approaches, based on recent transformer neural network architecture, to automatically detect agricultural field boundary from satellite image time series data acquired via the Sentinel-2 mission.

For a better knowledge of the proposed research subject :

The research activity carried out by the intern will be based on the recent TSViT model [1] and the aim will be to adapt and extend such a model to extract agricultural field boundaries [2] by injecting a priori geometrici nformation related to curvilinear structures [3] into the model learning process.

[1] Tarasiou, Michail, Erik Chavez, and Stefanos Zafeiriou. "Vits for sits: Vision transformers for satellite image time series." *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. 2023.

[2] Kerner, Hannah, et al. "Fields of The World: A Machine Learning Benchmark Dataset For Global Agricultural Field Boundary Segmentation." *arXiv preprint arXiv:2409.16252* (2024).

[3] Cheng, Mingfei, et al. "Joint topology-preserving and feature-refinement network for curvilinear structure segmentation." *Proceedings of the IEEE/CVF International Conference on Computer Vision* 2021.

Collaboration :

The recruited person will be in tight connection with an industrial PhD student (Quentin Yeche - ATOS/INRAE) working on the same topic.

Principales activités

Main activities (5 maximum) :

The people recruited will be responsible for:

- Explore the scientific literature related to the research topic
- Design a solution to integrate geometric a priori information into the transformer model.
- Implement the proposed solution using the Pytorch library
- Carry out experiments and evaluation using state of the art approaches for agricultural field boundary detection on real world data.
- Report and summarise the results obtained.

Additional activities (3 maximum) :

- If the results allow, prepare a scientific paper for submission to an international journal or conference.

Compétences

Technical skills and level required :

- Advanced Python programming skills
- Proficiency in data manipulation libraries
- Expertise in deep learning frameworks - Pytorch or Tensorflow
- Experience with image segmentation, object detection, and classification techniques
- Experience with satellite data analysis is a plus

Languages :

- English - good proficiency
- French - is a plus but not necessary

Relational skills :

- Communication skills (Ability to explain complex technical concepts, Presentation skills for research findings and project outcomes,Collaborative communication in interdisciplinary teams)
- Problem solving (Analytical thinking and creative problem-solving, Ability to break down complex problems into manageable components, Critical evaluation of research methodologies)
- Project Management (Self-motivated and goal-oriented, Ability to work independently and as part of a team, Adaptability to changing project requirements)
- Research & Learning (Ability to read and comprehend scientific research papers, Continuous learning mindset)
- Interpersonal Skills (Teamwork and collaboration, Active listening, Cultural sensitivity in international research environments)

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
- Contribution to mutual insurance (subject to conditions)

Rémunération

Traineeship grant depending on attendance hours.

Informations générales

- **Thème/Domaine :** Sciences de la planète, de l'environnement et de l'énergie

Calcul Scientifique (BAP E)
- **Ville :** Montpellier
- **Centre Inria :** Centre Inria d'Université Côte d'Azur
- **Date de prise de fonction souhaitée :** 2025-04-01
- **Durée de contrat :** 6 mois
- **Date limite pour postuler :** 2025-03-30

Contacts

- **Équipe Inria :** EVERGREEN
- **Recruteur :**
Ienco Dino / dino.ienco@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

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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.