Offre n°2025-08781

R&D Engineer - Improving Long-Term Multi-Object Tracking for Sports Analysis

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

Type de contrat : CDD

Niveau de diplôme exigé : Bac + 5 ou équivalent

Fonction : Ingénieur scientifique contractuel

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 di?erent 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

Inria, the French National Institute for Computer Science and Applied Mathematics, promotes "scientific excellence for technology transfer and society". Graduates from the world's top universities, Inria's 2,700 employees rise to the challenges of digital

sciences. With its open, agile model, Inria can explore original approaches with its partners in industry and academia and provide an efficient response to the multidisciplinary and application challenges of digital transformation. Inria is the source of many innovations that add value and create jobs.

Team

The STARS research team combines advanced theory with cutting-edge practice focusing on cognitive vision systems.

Team web site : https://team.inria.fr/stars/

Scientific context

This project aims to develop advanced methods for long-term multi-object tracking (MOT), an essential task for sports analysis and video surveillance. Multi-object tracking involves locating targets while maintaining unique identities, enabling precise analysis of the movements and interactions of players or other subjects of interest in high-density environments.

The approach developed focuses on improving target association accuracy, by integrating a cost matrix into Hungarian-style association procedures. This matrix will take into account various attributes inherent to the targets, such as jersey color or player numbers, in order to optimize target matching on each image. In addition, the project focuses on reducing processing time, while adapting to the complexity introduced by a high density of people in the video sequences.

Detection-based tracking, currently divided into two independent stages (detection and association), will be enhanced by the following proposals:

Local association: In this first stage, we will establish local associations between the current image and the objects in memory, to enhance tracking continuity.
Long-term association: In the second stage, we'll apply a Hungarian approach to linking tracklets over an extended period. This method will reduce the calculation of re-identification functionalities and decrease the total number of tracklets created, thus ensuring better identification management.

Validation data: This project will be based on a large-scale multi-object tracking dataset, named SportsMOT, consisting of 240 video clips classified into three categories (basketball, soccer, volleyball). The characteristics of this dataset are ideally suited to the needs of the project:

Large scale
Detailed annotations
Consistent player identification
No shot changes
High, fixed resolution (1080P)
Varied and complex movement patterns

Re-identification challenges

Mission confiée

Expected result: At the end of the project, the aim is to reduce the number of “unaffected tracklets” during the 90-minute match. A key performance indicator (KPI) will be established to measure the number of tracklets generated at the end of the match, taking into account substitutes entering the field. This result will guarantee reliable and continuous player identification, which is essential for accurate sports analysis.

Principales activités

The Inria STARS team is seeking an engineer with a strong background in computer vision, deep learning, and machine learning.

Compétences

Candidates must hold a Master's or Engineering degree or equivalent in Computer Science or a closely related discipline by the start date.

The candidate must be grounded in computer vision basics and have solid mathematical and programming skills.

With theoretical knowledge in Computer Vision, OpenCV, Mathematics, Deep Learning (PyTorch, TensorFlow), and technical background in C++ and Python programming, and Linux.

The candidate must be committed to scientific research and substantial publications.

In order to protect its scientific and technological assets, Inria is a restricted-access establishment. Consequently, it follows special regulations for welcoming any person who wishes to work with the institute. The final acceptance of each candidate thus depends on applying this security and defense procedure.

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

From 2692 € gross monthly (according to degree and experience)

Informations générales

- **Thème/Domaine :** Vision, perception et interprétation multimedia
- **Ville :** Sophia Antipolis
- **Centre Inria :** Centre Inria d'Université Côte d'Azur
- **Date de prise de fonction souhaitée :** 2025-07-01
- **Durée de contrat :** 12 mois
- **Date limite pour postuler :** 2025-05-01

Contacts

- **Équipe Inria :** STARS
- **Recruteur :**
  Brémond François / Francois.Bremond@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'e?orce ainsi de répondre aux enjeux de la transformation numérique de la science, de la société et de l'économie.

L'essentiel pour réussir

- 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, Computer Vision, and Machine Learning.

Languages: English

- Relational skills: teamwork
- Other values appreciated: leadership

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.