Offre n°2024-07177

Engineer Position Computer Vision / Deep Learning for Human Behavior Monitoring - Toyota

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

Type de contrat : CDD
Contrat renouvelable : Oui
Niveau de diplôme exigé : Bac + 5 ou équivalent
Fonction : Chercheur contractuel

A propos du centre ou de la direction fonctionnelle

The Inria Sophia Antipolis - Méditerranée center counts 34 research teams as well as 7 support departments. The center’s staff (about 500 people including 320 Inria employees) is made up of scientists of different nationalities (250 foreigners of 50 nationalities), engineers, technicians and administrative staff. 1/3 of the staff are civil servants, the others are contractual agents. The majority of the center’s research teams are located in Sophia Antipolis and Nice in the Alpes-Maritimes. Four teams are based in Montpellier and two teams are hosted in Bologna in Italy and Athens. The Center is a founding member of Université Côte d’Azur and partner of the I-site MUSE supported by the University of Montpellier.

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

STARS group works on automatic video monitoring and human behavior understanding for health applications. The Deep Learning platform developed in STARS, detects mobile objects, tracks their trajectory, and recognizes related behaviors predefined by experts. This platform contains several techniques for detecting people and for recognizing human postures/gestures using conventional cameras. However, there are scientific challenges in people tracking when dealing with real-world scenes: cluttered scenes, handling wrong and incomplete person segmentation, handling static and dynamic occlusions, low contrasted objects, moving contextual objects (e.g. chairs), similar appearance of clothes among different people ...

This Project aims to detect critical situations in the daily life of elderly people living at home alone. We believe that a system that can detect potentially dangerous situations will give peace of mind to frail older people as well as to their caregivers. This will require not only recognition of ADLs but also an evaluation of the way and timing in which they are being carried out.
The users we are targeting should be in relatively good health condition. We do not want to address serious dementia problems but intend to give support to people who suffer from age-related forgetfulness (in many cases the start of an Alzheimer’s condition). The users should live in their own house by themselves and generally be able to carry out their day-to-day activities. The system we want to develop is intended to help them and their relatives feel more comfortable because they know potentially dangerous situations will be detected and reported to caregivers if necessary.

Mission confiée

To address the limitations of existing vision foundation models, we develop a novel approach that utilizes lightweight and efficient skeleton-based foundation models that will be trained on a massive
Dataset of skeleton sequences compiled from diverse action recognition datasets such as EGO-EXO4d, HVU, CAP, Kinetics, YOGA... This comprehensive dataset, encompassing a wide range of human actions, will be generated using state-of-the-art pose estimation methods such as HRNet, LCRNet, and OpenPose. To further enhance the dataset's diversity, we will employ data augmentation techniques, including viewpoint rotation and action composition using the Linear Action Composition (LAC) algorithm [4]. These models will be trained using self-supervised learning techniques, which enable them to extract generic representations from the vast skeleton sequence data. Then, using different benchmark datasets such as TSU [1], Charades, PKU, and NTU, the model will be evaluated and validated for various downstream tasks like Action recognition, detection, and anticipation.

**Principales activités**

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

The candidate is expected to conduct research related to the development of computer vision algorithms for video understanding.

**Main activities:**
- Analyze the requirements of doctors and patients/end-users and Study the limitations of existing solutions.
- Propose a new algorithm for detecting the behaviors of patients/end-users
- Evaluate and optimize the proposed algorithm on the targeted video datasets
- Oral presentation and Write reports
- Submit a scientific paper to a conference

**Compétences**

Candidates must hold a Master's 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 (after 6 months of employment) and flexible organization of working hours
- 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**: Modèles et méthodes stochastiques
- **Calcul Scientifique (BAP E)**
- **Ville**: Sophia-Antipolis
- **Centre Inria**: Centre Inria d'Université Côte d'Azur
- **Date de prise de fonction souhaitée**: 2024-05-01
- **Durée de contrat**: 12 mois
- **Date limite pour postuler**: 2024-03-24

**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'efforce 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, willing to go for a PhD thesis in the field of Computer Vision and Machine Learning.

Languages: English
- Relational skills: team work
- Other valued 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

Before applying, it is strongly recommended that you contact the Scientific manager beforehand.

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.