



Offre n°2020-02794

Post-Doctoral Research Visit F/M Detection of abnormal behavior in satellite videos/ Détection de comportements anormaux dans des vidéos satellitaires

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 Sophia Antipolis - Méditerranée center counts 34 research teams as well as 8 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

Weakly-Supervised Anomaly Detection.

Video representation for discriminating anomalies from normal visual patterns is a challenging task in video monitoring domain. The current anomaly detection models lack in providing discriminative video representation for a wide variety of anomalous events. This is due to under-specified problem and unavailability of large-scale videos pertaining to anomalous events, which is a crucial factor for training the modern deep architectures. Thus, we will study the task of anomaly detection which can be leveraged for anomalous video dataset collected from satellites, where videos are split into 2 sets, normal (large set) and anomalous (small set) with only video level labels. The evaluation of proposed framework and model will be performed on an inhouse benchmark dataset which contain human activities of repetitive daily routines in the context of satellite monitoring.

This position is part of the **LiChIE** project in collaboration with Airbus

Mission confiée

The topic proposed for this position is that of **"Weakly-Supervised Anomaly Detection"**.

In this task, we will study a weakly supervised model performing anomaly detection based on Multiple Instance Learning (MIL) [Mar-97] with ranking loss. By incorporating ranking loss, a model learns to maximize the margin of separation between anomalous and normal instances. In our model, we will incorporate an attention mechanism to focus on the video segments containing the anomalies for learning discriminative representation for the anomalies. The challenge is that these segments are rare and could correspond to only subtle motion/gesture.

[Mar-97] O. Maron and T. Lozano-Perez, "A framework for multiple-instance learning," in Proceedings of the 1997 Conference on Advances in Neural Information Processing Systems 10, ser. NIPS '97. Cambridge, MA, USA: MIT Press, 1998, p. 570–576.

Principales activités

The main activity is to develop a novel algorithm for **Weakly-Supervised Anomaly**

Detection

The targeted learning methods are grouped together under the umbrella title of weakly supervised learning, a term indicating learning from incomplete or inexact annotations. Manual annotation in the field of video monitoring is a time-consuming and costly process, which is prone to many challenges such as inter-annotator variance. Compared to bounding box annotations, collecting information about event, is much easier and faster. Research in weakly supervised learning, systems have the capacity to make better and faster utilization of the wealth of image and video data available today. By eliminating the need for exact manually annotated bounding boxes, it removes a basic bottleneck in the machine learning pipeline. Considering the expected widespread applicability of surveillance applications, a weakly supervised learning system makes adjustments to previously trained systems to new environments (a process called fine-tuning in deep learning literature) easier and faster.

Compétences

1. Strong programming skills in Python and in using one of the deep learning libraries like PyTorch or TensorFlow.
2. Experience in C/C++ and CUDA programming is highly preferred.
3. Experience with Linux scripting and large scale computations will be an added plus.

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
- Social security coverage

Rémunération

Gross Salary: 2653 € per month

Informations générales

- **Thème/Domaine** : Vision, perception et interprétation multimedia Calcul Scientifique (BAP E)
- **Ville** : Sophia Antipolis
- **Centre Inria** : [Centre Inria d'Université Côte d'Azur](#)
- **Date de prise de fonction souhaitée** : 2020-09-01
- **Durée de contrat** : 2 ans
- **Date limite pour postuler** : 2020-07-30

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

Successful inculcation in this project would require the following conditions:

1. Strong theoretical and implementation-level understanding of video monitoring

techniques.

2. Good understanding of various deep learning techniques such as CNNs and RNNs.
3. Good understanding of the recent work done in machine learning techniques.
4. Strong focus on reading and interpreting research papers.
5. Past experience in publishing in peer-reviewed international conferences and journals as a first author.

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

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.