

2019-01593 - Post-Doctoral Research Visit F/M Learning of graph-based models for compact representation of 360° images

Type de contrat : CDD de la fonction publique
Niveau de diplôme exigé : Thèse ou équivalent
Fonction : Post-Doctorant

A propos du centre ou de la direction fonctionnelle

Inria, the French national research institute for the digital sciences, promotes scientific excellence and technology transfer to maximise its impact. It employs 2,400 people. Its 200 agile project teams, generally with academic partners, involve more than 3,000 scientists in meeting the challenges of computer science and mathematics, often at the interface of other disciplines. Inria works with many companies and has assisted in the creation of over 160 startups. It strives to meet the challenges of the digital transformation of science, society and the economy.

Contexte et atouts du poste

This position is part of an Associate team with the LTS4 at EPFL,

Yes, some travels to Lausanne are foreseen for this project and the travel expenses are covered by the associate team.

Mission confiée

Supervisors:

At Inria: Thomas MAUGEY (thomas.maugey@inria.fr), Aline ROUMY (aline.roumy@inria.fr)

At EPFL: Pascal FROSSARD (pascal.frossard@epfl.ch)

Goal: The goal of the project is to develop the mathematical and algorithmic tools for an efficient representation and compression of 360° images in the spherical domain.

International collaboration The project will be developed in collaboration with Pascal Frossard¹, EPFL, in the context of the Associate Team "GOP".

Candidate Profile The candidate should have

- strong background in signal processing, information theory,
- notions of learning and graph theory would be appreciated,
- interest in programming.

How to apply Each application should consist of

- a CV,
- a letter of introduction
- a copy of the student's university transcripts.

Principales activités

Context: Omnidirectional (or 360°) images has become popular in the recent years, with many applications such as robotic, virtual reality, 3D reconstruction, etc. The 360° image describes the information coming from any direction towards the camera center. It is naturally represented as pixels distributed on a unit sphere, whose positions are parametrized by two angles. However, in order to be compressed, an intermediary representation is usually adopted, namely a mapping of the sphere into a 2D planar image. This is motivated by the fact that 2D image processing tools are numerous and benefit from decades of research. This strategy might nevertheless be inefficient since the mapping also introduce radial distortion. The aim of the project is to compress the spherical image directly, avoiding the 2D projection.

Envisaged Approach: Processing data directly on the sphere implies to develop specific tools that are compatible with non cartesian domain. For that purpose, we will rely on graph-based representation and construct new tools taking into account the spherical topology as long as the statistical dependencies of the 360° content. For that purpose, we will design learning strategies to find transforms, predictions, or other graph-based processing tools to efficiently compress the omnidirectional data.

Bibliography

- F. De Simone, N. Birkbeck, B. Adsumilli, and P. Frossard, "Deformable block based motion estimation in omnidirectional image sequences," in IEEE 19th International Workshop on Multimedia Signal Processing, 2017.

- B. Vishwanath, T. Nanjundaswamy, and K. Rose, "Rotational

Informations générales

- **Thème/Domaine:** Vision, perception et interprétation multimedia
- **Ville:** Rennes
- **Centre Inria:** CRI Rennes - Bretagne Atlantique
- **Date de prise de fonction souhaitée:** 2019-11-01
- **Durée de contrat:** 2 ans
- **Date limite pour postuler:** 2019-05-31

Contacts

- **Equipe Inria:** SIROCCO
- **Recruteur:** Maugey Thomas / thomas.maugey@inria.fr

A propos d'Inria

Inria, l'institut national de recherche dédié aux sciences du numérique, promeut l'excellence scientifique et le transfert pour avoir le plus grand impact. Il emploie 2400 personnes. Ses 200 équipes-projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3000 scientifiques pour relever les défis des sciences informatiques et mathématiques, souvent à l'interface d'autres disciplines. Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 160 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."

Consignes pour postuler

Please submit online: your resume, cover letter and letters of recommendation eventually

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

motion model for temporal prediction in 360 video coding,” in IEEE International Workshop on Multimedia Signal Processing (MMSP), 2017.

- C. W. Fu, L. Wan, T. T. Wong, and C. S. Leung. 2009. The Rhombic Dodecahedron Map: An Efficient Scheme for Encoding Panoramic Video. IEEE Transactions on Multimedia 11, 4 (June 2009), 634–644.

- W. Boomsma and J. Frellsen. Spherical convolutions and their application in molecular modelling. In Advances in Neural Information Processing Systems 30, pages 3436–3446. 2017.

- N. Perraudin, M. Defferrard, T. Kacprzak, R. Sgier. Deepsphere: Efficient spherical convolutional neural network with healpix sampling for cosmological applications. arXiv preprint arXiv:1810.12186

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
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Social security coverage

Rémunération

Monthly gross salary amounting to 2653 euros.

situation de handicap.

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.