Offer #2026-10557

Post-Doctoral Research Visit F/M Universality for Deriving Low-Complexity INR for Visual Compression Models

Contract type : Fixed-term contract

Level of qualifications required : PhD or equivalent

Fonction : Post-Doctoral Research Visit

Level of experience : Recently graduated

About the research centre or Inria department

The Inria Centre at Rennes University is one of Inria's eight centres and has more than thirty research teams. The Inria Centre is a major and recognized player in the field of digital sciences. It is at the heart of a rich R&D and innovation ecosystem: highly innovative PMEs, large industrial groups, competitiveness clusters, research and higher education players, laboratories of excellence, technological research institute, etc.

Context

This postdoctoral position is part of the joint research activities between Inria and InterDigital conducted within **Nisk.AI**, a joint research project focusing on efficient and frugal compression of new media through artificial intelligence and neural network-based coding. Nisk.AI brings together Inria research teams and InterDigital to investigate new representations and coding technologies that can improve the efficiency of visual data compression while addressing the computational challenges associated with AI-based approaches. The project provides a strong academic–industrial research environment, combining Inria's expertise in information theory, signal and image processing, and machine learning with InterDigital's expertise in media technologies and standardization.

Assignment

One of the factors responsible for the growing popularity of **Implicit Neural Representation (INR)** models for image compression is their relatively low decoding time and their compression efficiency [1]. INR-based image compression introduces a new paradigm in which each image is represented by a function that can be transmitted and subsequently used to reconstruct the image [2]. Once this function has been learned at the encoder and transmitted, the image can be reconstructed from the learned representation.

However, one of the main challenges of this paradigm is the long image encoding time. This is because learning the personalized function requires "overfitting" a separate model to each individual image or video, which can be computationally expensive and time-consuming [3]. This remains one of the main limitations to the practical deployment of INR-based compression methods [4].

Main activities

In this project, we aim to investigate whether common knowledge can be extracted from the functions learned for individual images, thereby reducing the need to learn each function from scratch. More specifically, we seek to answer the following question: **Can common knowledge be extracted from image-specific functions in order to reduce the training required for each new image?**

To address this question, we will analyze learned INR functions and investigate whether some form of **universality across images** can be identified. Based on these insights, we will explore strategies for reducing the training complexity of INR-based architectures and, consequently, their image encoding time. The expected outcome is to develop INR-based compression models that retain the advantages of implicit representations while significantly reducing their computational cost at the encoder

Objectives

The main objectives of this project are:

- To investigate how INR-based models relate to conventional autoencoder architectures for image compression, and whether they exhibit common characteristics;
- To determine whether a subset of internal features or representations can be identified across different images;
- To exploit the universality of these features to develop lower-complexity INR-based image compression models with faster encoding times.

References

[1] T. Ladune, P. Philippe, F. Henry, G. Clare, and T. Leguay, "Cool-chic: Coordinate-based low complexity hierarchical image codec," in *International Conference on Computer Vision (ICCV)*, 2023, pp. 13 515–13 522.

[2] E. Dupont, A. Goli?ski, M. Alizadeh, Y. W. Teh, and A. Doucet, “COIN: Compression with implicit neural representations,” 2021. [Online]. Available: https://arxiv.org/abs/2103.03123

[3] E. Dupont, H. Loya, M. Alizadeh, A. Golinski, Y. W. Teh, and A. Doucet, “COIN++: Neural compression across modalities,” *Transactions on Machine Learning Research*, 2022. [Online]. Available: https://openreview.net/forum?id=NXB0rEM2Tq

[4] M. Gwilliam, R. Zhang, N. Padmanabhan, H. Du, and A. Shrivastava, “How to design and train your implicit neural representation for video compression,” in *Winter Conference on Applications of Computer Vision (WACV)*, 2026.

Benefits package

- 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

Remuneration

Monthly gross salary from 2 788 euros.

General Information

- **Theme/Domain :** Vision, perception and multimedia interpretation
  Information system (BAP E)
- **Town/city :** Rennes
- **Inria Center :** Centre Inria de l'Université de Rennes
- **Starting date :** 2027-02-01
- **Duration of contract :** 1 year, 6 months
- **Deadline to apply :** 2026-11-29

Contacts

- **Inria Team :** COMPACT
- **Recruiter :**
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About Inria

Inria, the French national institute for research in digital science and technology, supports the French government in national research and innovation strategies in the digital field, acting as Digital Programs Agency. Inria leads over 300 research and innovation projects with its 3,500 scientists, engineers, and support staff, in partnership with universities and the digital ecosystem (businesses, entrepreneurs, and public stakeholders). Together, we explore strategic fields such as artificial intelligence, cybersecurity, quantum computing, cloud technologies, digital transformation in healthcare, digital twins, and digital technologies for defence. We develop practical solutions such as software, tech startups, partnerships with national companies, and cutting-edge training programmes. Our goal is to drive scientific, technological, and industrial excellence to ensure France’s digital sovereignty.

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Instruction to apply

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

Defence Security :
This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST).Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy :
As part of its diversity policy, all Inria positions are accessible to people with disabilities.