2018-00633 - Development of a video light field compression tool

Type de contrat : CDD de la fonction publique
Contrat renouvelable : Oui
Niveau de diplôme exigé : Bac + 5 ou équivalent
Autre diplôme apprécié : Ou Thèse
Fonction : Ingénieur scientifique contractuel
Niveau d’expérience souhaité : Jusqu’à 3 ans

A propos du centre ou de la direction fonctionnelle

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

Team presentation

Efficient processing, i.e. analysis, storage, access and transmission of visual content, with continuously increasing raw data rates, in environments which are more and more mobile and distributed, remains a key challenge of the years to come. The emergence of new image modalities leads to a sustained need for algorithmic tools allowing efficient compression and communication of large volumes of visual data, of visual features and descriptors extracted for different video processing tasks.

The goal of the project-team is the design of algorithms and practical solutions in the areas of visual data analysis, modeling, representation, compression and communication. Our activities are thus structured around the following inter-dependent axes:

- Analysis and modeling for compact representation and navigation in large volumes of visual data
- Representation and compression of visual data
- Distributed processing and robust communication of visual data

The proposed research is at the frontier of computer vision, signal processing, coding and information theory. In terms of application domains, the project will primarily target networked visual applications such as 3DTV, FTV, camera sensor networks, satellite and medical imaging applications.

More informations : https://www.inria.fr/en/teams/sirocco

Contexte et atouts du poste

The position is funded by the ERC advanced grant project CLIM: Computational Light Fields Imaging.

Mission confiée

Light fields are densely sampled high-dimensional signals containing information about the light rays interacting with the physical objects in the scene. They yield a very rich description of a 3D scene which enables advanced creation of novel images from a single capture [1][2]. However, if we want the light field technology to be as widely used as classical imaging and video systems, it is necessary to offer the users the possibility to edit and manipulate light fields as it is quite common with 2D images and videos.

The goal of the engineer position will be to develop a video light field compression tool.
architecture that will integrate the following steps: scene depth estimation, view
synthesis, scene flow estimation, over-segmentation to find the support of local
models, local transforms and coding tools. Algorithms for the different steps [3-5]
have been proposed in the team and a first validation has been carried out via a
matlab implementation. After having designed in the coder and decoder architecture,
the work will consist in re-writing these algorithms in c/c++ while proposing possible
algorithmic optimizations. The solution is intended, via possible options and
optimizations, to be usable both for dense and sparse light fields. The codec
(coder/decoder) may be eventually integrated as a plug-in within a light field editing
tool.

References

- [1] M. Levoy and P. Hanrahan, Light Field Rendering, ACM Siggraph, pp. 31-
  42,1996.
  university, 2006.
- [3] Hog, N. Sabater, C. Guillemot, Super-rays for efficient light field processing,
  IEEE J. on Selected Topics on Signal Processing, special issue on light fields
  from a sparse set of light field views, IEEE International Conf. on Image
  Processing, 2018 (submitted).
  Predictive Light Field Compression based on Super-Pixels, IEEE International
  Conf. on Acoustics, Speech and Signal Processing, 2018.

Principales activités
Research and software development.

Compétences

- Engineer or PhD degree in computer science or signal and image processing
- Solid programming skills (Matlab, C/C++), practical knowledge of
  mathematical libraries
- Practical knowledge of software development process (scm, agile method,
  continuous integration)
- Fluent in English, both written and spoken

Avantages sociaux

- Subsidised catering service
- Partially-reimbursed public transport
- Social security
- Paid leave
- Sports facilities

Rémunération
The gross monthly salary depends on the candidate's level of education and
professional experience (from 2562 euros gross monthly).