Offer #2023-07039

Master Internship - Deep Unrolling for Source Separation

Contract type: Internship

Level of qualifications required: Graduate degree or equivalent

Fonction: Internship Research

Level of experience: Recently graduated

About the research centre or Inria department

The Inria Saclay-Île-de-France Research Centre was established in 2008. It has developed as part of the Saclay site in partnership with Paris-Saclay University and with the Institut Polytechnique de Paris.

The centre has 40 project teams, 27 of which operate jointly with Paris-Saclay University (15 teams) and the Institut Polytechnique de Paris (12 teams). Its activities occupy over 600 people, scientists and research and innovation support staff, including 44 different nationalities.

The centre also hosts the Institut DATAIA, dedicated to data sciences and their disciplinary and application interfaces.

Context

In the context of the ERC STG MAJORIS European project, our aim in this internship, is to investigate the deep unrolling approach, in the context of source separation from multivariate data.

Subject: Independent vector analysis (IVA) generalizes independent component analysis (ICA) to multiple datasets, and when used with a multivariate Gaussian model (IVA-G), provides a powerful tool for joint analysis of multiple datasets in an array of applications, such as source separation. In [1], a block-alternating non-smooth optimization algorithm has been proposed, offering a suitable solution to the IVA-G problem. The proposed method also provides convergence guarantees that are lacking in other state-of-the-art approaches to the problem. This internship proposes to investigate the deep unrolling of the method, following the paradigm from [2,3]. Deep unrolling should allow both the deployment of GPU-friendly tools for accelerated implementation, as well as the introduction of a supervised learning strategy for tuning automatically the regularization parameter. Training and test, on synthetic datasets from source separation will be conducted.


Assignment

Missions: The recruited student will re-implement the algorithm from [1] in a GPU friendly framework such as PyTorch or TensorFlow. The next step will be to deploy the deep unrolling strategy, and to train/test on synthetic datasets.

Environment: The intern will be supervised by Clément Cosserat (PhD student, OPIS, Inria Saclay), and Emilie Chouzenoux (Head of OPIS team, Inria Saclay, PI of the ERC project MAJORIS). The intern student will join the Inria Saclay team OPIS (https://opis-inria.eu/). He/she will be located in the Centre de la Vision Numérique, in CentraleSupélec campus, Saclay, France. He/she will enjoy an international and creative environment where research seminars and reading groups take place very often. Informatic material expenses will be covered within the limits of the scale in force.
Organization: The proposed offer is dedicated to internship of Master 2 students. The starting/end dates are flexible, with a minimum duration of 5 months.

Main activities

Main activities:
- Programming
- Deep learning architecture design
- Scientific meetings
- Deep learning training/testing
- Writing of scientific reports

Skills

Languages: The candidate must be fluent in English and/or French languages.

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 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

Gratification.

General Information

- Theme/Domain: Optimization, machine learning and statistical methods
  Statistics (Big data) (BAP E)
- Town/city: Gif sur Yvette
- Inria Center: Centre Inria de Saclay
- Starting date: 2024-04-01
- Duration of contract: 5 months
- Deadline to apply: 2024-03-31

Contacts

- Inria Team: OPIS
- Recruiter: Chouzenoux Emilie / emilie.chouzenoux@inria.fr

About Inria

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

The keys to success

We seek for a talented candidate in Master 2 studies, with a solid background in optimization, and an interest in statistics. Experience in Python programming is necessary. An experience in PyTorch or TensorFlow is highly recommended.

The candidates are requested to send a CV and a motivation letter to apply for this position.

Warning: you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.
**Instruction to apply**

**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.