2020-02777 - Post-Doctoral Research Visit F/M Interpretable causal discovery

Contract type : Civil Servants Mobility (EU) or Fixed-term contract
Renewable contract : Oui
Level of qualifications required : PhD or equivalent
Fonction : Post-Doctoral Research Visit
Level of experience : Recently graduated

Context

This position is funded by INRIA's IPL-HyAIAI project, and is a collaboration between its teams TAU (Paris) and MAGNET (Lille). The recruited researcher will work in one team (TAU or MAGNET), visit regularly the other team and participate in project meetings (usually in Paris). The work may include other travel, e.g., as is normal in the context of scientific training or dissemination activities

The HyAIAI project is concerned with HYbrid Approaches to Interpretable AI. With this position, we aim to study interpretable methods for causal analysis. While it is relatively easy to find in big data correlations between variables, deciding what is the cause and what is the effect is more challenging. In some cases, one can make good conjectures about the causal direction from data (e.g., based on what is the most simple explanation), in others specific experiments (with interventions) are required. Our goal is to both improve the methods and their interpretability (understandability for the user).

Assignment

The recruited researcher will interact with both the TAU and MAGNET teams, and perform research on interpretable causal analysis algorithms.

More information in general about the HyAIAI research topics can be found on the HyAIAI project webpage https://project.inria.fr/hyaiai/ , and on relevant causality topics at https://project.inria.fr/hyaiai/files/2020/01/Causal_HAI_Jan_20.pdf .

The research will concern causal modelling in large dimensions, in particular explaining the deconfounders: Causal modeling (Pearl 18; Peters et al. 17; Goudet et al 18; Kalainathan et al. 19) aims to uncover models that reflect the intrinsic dependencies among variables. Their robustness is essentially obtained through restrictions on the complexity of the underlying causal mechanisms (the way causes control effects) and/or the number of variables involved (a few hundred). In the context of observational causal modeling, where big data allows, one hopes, to cope with the lack of interventions and randomized control trials, how to deal with high-dimensional data is acknowledged a main challenge. The Deconfounder approach (Wang & Blei 19; d'Amour 19) aims to compress such high dimensional data in latent space, approximating the (few) hidden confounders explaining the data. The interpretation of such hidden confounders yields new challenges, at the cross-road of causal modeling and explainable AI. Our goal is to advance the construction and interpretation of causal models using latent spaces.

Main activities

The main activities will include

- researching new algorithms
- evaluating the performance of these algorithms (analytical, empirical) and their interpretability
- interacting with other Tau and Magnet researchers, reporting results, participating in Hyaiai meetings
- disseminating results in scientific venues

Skills

The following skills are desired for this position:

- a good understanding of statistics
- a background in causality, interpretability and/or algorithms
- good communication and reporting skills
- proficiency in English

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

The successful candidate will interact with teams with different expertises, and will contribute to the exchange of insights between the Hyaiai teams. Interests will include both the high-level interpretability, the technical problems of causality and statistics and the more computational questions related to building efficient algorithms to realize ideas.

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.