2021-04322 - PhD Position F/M Creative Applications for Algebraic Machine Learning Approaches

Niveau de diplôme exigé : Bac + 5 ou équivalent
Fonction : Doctorant

A propos du centre ou de la direction fonctionnelle

Located at the heart of the main national research and higher education cluster, member of the Université Paris Saclay, a major actor in the French Investments for the Future Programme (Idex, LabEx, IRT, EquipeX) and one of the main establishments present on the plateau, the centre is particularly active in three major areas: data and knowledge, safety, security and reliability; modelling, simulation and optimisation (with priority given to energy).

The 450 researchers and engineers from Inria and its partners who work in the research centre’s 28 teams, the 60 research support staff members, the high-level equipment at their disposal (image walls, high-performance computing clusters, sensor networks), and the privileged relationships with prestigious industrial partners, all make Inria Saclay Île-de-France a key research centre in the local landscape and one that is oriented towards Europe and the world.

Contexte et atouts du poste

The doctoral position is funded for three years by a European Union’s Horizon 2020 grant for ALMA: Human-centric algebraic machine learning (Grant agreement ID: 952091), which is part of the European HumanAI program.

The chosen candidate will join the ExSitu research team and will be supervised by Prof. Wendy Mackay and Dr. Janin Koch. The position will be in close collaboration with the OPKI (German Institute of Artificial Intelligence) and other partners.

Mission confiée

Context

Algebraic Machine Learning (AML) [6] is a new machine learning technique that is based on algebraic data representations. Unlike statistical learning, AML algorithms are parameter-free and therefore have the potential to be more robust and flexible than the main properties of the data. The larger project in which this doctoral position will be integrated aims to use AML properties to create a new generation of interactive, human-centric machine learning systems. These systems are expected to reduce bias and discrimination, remember what they know when taught something new, and promote trust and reliability in human-artificial intelligence systems.

The primary focus of the work will be on co-creative practice. Creative professionals are a particularly demanding audience, but professional design tools have traditionally focused on implementation rather than collaborative activity with systems. We are currently investigating how to develop human-computer partnerships that support highly fluid design processes in which users constantly iterate and extend ideas based on their knowledge, experience, and personal preferences, as well as adapt to ever-changing contexts.

The candidate will be part of the ExSitu team working on developing AML-based interactive systems. The ExSitu research group is investigating alternate approaches to traditional human-computer roles, with the goal of establishing true human-computer partnerships that leverage machine learning while keeping the user in control. We build on the principles of instrumental interaction [1,2] and co-adaptation [5] to create interactive systems that are discoverable, appropropriable, and expressive, growing with the user to enhance rather than replace the user’s skills.

Objective

The goal of this doctoral position is to explore new directions of Human-AI interactions facilitated by algebraic machine learning for creative practice. This includes the development of new design and evaluation methods to ensure effective human-computer interaction with intelligent systems, specifically:

- Identify key human characteristics of AML that lead to more informative visualisations of intelligent algorithms, better communicating state and possibilities to human users
- Revise standard interaction paradigms so as to empower, rather than de-skil human users over time
- Develop new design methods that enable AI researchers, not just HCI researchers, to easily create more effective human-computer partnerships, beyond any specific AI technique
- Develop a working prototype that demonstrates the design methodology and interaction paradigm for an effective human-computer partnership
- Develop and apply evaluation methods to determine the efficacy of the interaction from a human perspective

Two examples of effective human-computer partnerships in the context of creative practice: MoxyAI [3] is an artificial agent for visual ideation that expresses intention through contextual textual clues, with context-related observation of the user’s actions and inquiries to stay relevant. ImageSense [4] is a collaborative moodboard that allows designers to collaborate with remote designers and intelligent agents via semantic interpretation of visual material.

Informations générales

- Thème/Domaine : Interaction et visualisation
- Systèmes d’Information (BAP E)
- Ville : Palaiseau
- Centre Inria : CRI Saclay - Île-de-France
- Date de prise de fonction souhaitée : 2022-10-01
- Durée de contrat : 3 ans
- Date limite pour postuler : 2022-03-31

Contacts

- Equipe Inria : Ex-SITU
- Directeur de thèse : Koch Janin, janin.koch@inria.fr

A propos d’Inria

Inria est l’institut national de recherche dédié aux sciences et technologies du numérique. Il emploie 2600 personnes. Ses 200 équipes projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3500 scientifiques pour relever les défis du numérique, souvent à l’interface d’autres disciplines. L’institut fait appel à de nombreux talents dans plus d’une quarantaine de métiers différents. 900 personnes d’appui à la recherche et à l’innovation contribuent à faire émerger et grandir des projets scientifiques ou entrepreneuriaux qui impactent le monde. Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 180 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.

Consignes pour postuler

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 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.


Principales activités

Specific Activities

The doctoral candidate will be expected to:

- Design novel interactive systems using AML in conjunction with creative professionals
- Run laboratory experiment to determine the effectiveness of interaction techniques
- Implement alternative approaches for comparing different ML approaches
- Design, run and analyze the results of controlled and/or field experiments

Expected Results

- Develop a working prototype that demonstrates how human users can successfully interact with and control AML
- Advance the framing and developing of AML for creative applications
- Write scientific papers

Compétences

Required Skills:

We are looking for motivated students who are enthusiastic about creativity-support tools and are interested in combining research of Human-Computer Interaction and Machine Learning.

Solid programming skills are required. Experience in Python and web technologies is a plus.

A background or interest in design and/or creative practices is especially appreciated.

The doctoral position will be in English.

Avantages

- 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

Rémunération

monthly gross salary: 1st and 2nd year 1982€ and 3rd year 2085€