Offer #2026-10501

PhD Position F/M Visualization of the Plausibility and Bias for Data Resources used in a Geographic Digital Twin

Contract type : Fixed-term contract

Level of qualifications required : Graduate degree or equivalent

Fonction : PhD Position

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 **39 project teams** , 27 of which operate jointly with Paris-Saclay University and the Institut Polytechnique de Paris; Its activities occupy over 600 people, scientists and research and innovation support staff, including 44 different nationalities.

Context

The project will be hosted by Inria's AVIZ team and supervised by : Maria Lobo-Gunther

This advertised topic targets students focused on visualization and data analysis, with a background in artificial intelligence. It is not focused purely on AI. Also, please note that we only consider applications sent in English.

In the field of visualization, questions on the visualization of data uncertainty have been a core part of the research to date [e.g., 1]. Yet past work largely often silently considered data uncertainty to arise (primarily) from measurement uncertainty or as connected to some statistical analysis of captured data values. Only relatively recently have questions of implicit notions of error [4] or data hunches [3] entered the discussions of this general problem—these cover aspects of data imprecision that can arise from various sources: e.g., different forms of measurement or data recording, biases in how people access data, and even intentionally introduced errors. For example, spatial geographic data may not only come from systematically controlled sources but also from, for instance, from multiple sets of data that come from different institutions with different data collection policies, from contributions from the general public, or even by sourcing data from social media. Naturally, this introduces a variety of different levels of

data quality and plausibility for spatial data. Sometimes experts are aware of these data caveats (that exist even for professionally collected datasets) and we can try to visualize them [3–5], yet in other cases the data collection happens in a way that this knowledge is not available—e.g., when data is retro-actively collected from sources that were not (primarily) created for recording this data in the first place—and we have to find ways of recovering such information retroactively and without access to the ground truth [2]. For instance, image collection sites such as Flickr partially show geo-located images, from which locations of certain points of interest can be extracted. In this specific example we ourselves recovered species distribution data from images posted on photo sharing platforms, and found that such geographic data is subject to many biases and errors. Yet this data analysis so far [2] has been a manual process and also only recovers anecdotal information about the existence of data errors and biases. In this PhD research project we will investigate if those results generalize to other kinds of spatial data (e.g., automatically detected features in remote sensing imagery, other volunteered geographic information, other forms of 2D and 3D spatial data). Then we will investigate ways to automate the error and bias identification process as well as to quantify the existence of such biases and errors in some form of plausibility measure, to be visualized in the digital twin [6].

The funding for this thesis comes from the EDT project (https://edtlab.fr/en/).

Further informations : https://www.edtlab.fr/en/join-us/phd-pc5-phd2-estimatingbiases

Assignment

- analysis and visualization of the plausibility of crowd-sourced and/or heterogenous geographic data
  * use of artificial intelligence to automate the analysis of the data errors and biases
  Digital twins [6] are virtual representations of real-world products, systems, or processes, enabling simulation, integration, testing, monitoring, and maintenance. They play a pivotal role in optimizing complex systems across a wide range of domains, from industrial manufacturing and energy to environmental monitoring and healthcare.

- The intellectual property is shared among all collaborators and the scientific results will be published in international journals and/or at international conferences.

  For the remaining context please see the abstract.

More detailed description : https://www.edtlab.fr/en/join-us/phd-pc5-phd2-estimatingbiases

Main activities

Method :
Typical requirements analysis-design-implementation-evaluation approach that is used in most of HCI and visualization.

Expected result :
Prototypical implementations in the context and within the framework of the EDT project (https://edtlab.fr/en/), study results, scientific publications.

Collaborations will be established within the context of the EDT project (https://edtlab.fr/en/), depending on the specific development of the project. Generally, members of AVIZ are well embedded into the international research community and have active collaborations with many researchers worldwide.

Skills

* well-motivated student with interest in interactive data visualization and analysis
* good written and spoken communication in English to be able to interact within the research team, to be able collaborate with domain scientists, and to be able to disseminate the results in scientific publications
* excellent skills in actual manual (non-AI-based) programming
* experience in the use of machine learning and artificial intelligence
* experience (but not necessarily academic) in data visualization
* experience in HCI and empirical evaluation preferred but not required
* past publications preferred but not required

English level : Advanced

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

Monthly gross salary : 2.300 euros

General Information

- **Theme/Domain :** Interaction and visualization
  Information system (BAP E)
- **Town/city :** GIF SUY YVETTE
- **Inria Center :** Centre Inria de Saclay
- **Starting date :** 2027-10-01
- **Duration of contract :** 3 years

- **Deadline to apply :** 2027-03-28

Contacts

- **Inria Team :** AVIZ
- **PhD Supervisor :**
  Isenberg Tobias / Tobias.Isenberg@inria.fr

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.

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.