Offer #2025-08715

PhD Position F/M Knowledge Graph-Based Provenance Modeling for the Evaluation of Interactive Visualization Tools

Contract type : Fixed-term contract

Level of qualifications required : Graduate degree or equivalent

Fonction : PhD Position

Level of experience : Recently graduated

About the research centre or Inria department

The Inria centre at Université Côte d'Azur includes 42 research teams and 9 support services. The centre's staff (about 500 people) is made up of scientists of di?erent nationalities, engineers, technicians and administrative staff. The teams are mainly located on the university campuses of Sophia Antipolis and Nice as well as Montpellier, in close collaboration with research and higher education laboratories and establishments (Université Côte d'Azur, CNRS, INRAE, INSERM ...), but also with the regiona economic players.

With a presence in the fields of computational neuroscience and biology, data science and modeling, software engineering and certification, as well as collaborative robotics, the Inria Centre at Université Côte d'Azur is a major player in terms of scientific excellence through its results and collaborations at both European and international levels.

Context

This PhD subject is part of a doctoral grant awarded by the Université Côte d'Azur following a selection process. The start date is October 1, but can be flexible up to one month. More details on the selection process can be found on https://webusers.i3s.unice.fr/edstic/3-2-candidater-en.php and for EUR-DS4H https://ds4h.univ-cotedazur.eu/education/phd

This thesis aims to advance analytical provenance in visualization tools by developing a structured model based on the Semantic Web to systematically capture and represent provenance data. It also proposes an evaluation framework to assess the usability and effectiveness of visualization techniques using this data. Finally, an extensible solution will be designed to seamlessly integrate provenance tracking into widely used web-based visualization libraries like D3.js, without requiring major modifications to existing systems.

Assignment

This PhD research aims to advance analytical provenance in visualization tools by addressing the following key objectives:

- **Designing a Provenance Model:** Developing a structured approach based on Semantic Web models to systematically capture and represent analytical provenance data across diverse visualization tools.
- **Establishing an Evaluation Framework:** Proposing a methodology that leverages provenance data to assess the usability and effectiveness of visualization techniques, providing insights into how different tools support user reasoning.
- **Seamless Integration with Web-Based Visualization Libraries:** Creating an extensible solution that can be easily incorporated into widely used libraries like D3.js, enabling provenance tracking without requiring significant modifications to existing visualization systems.

Main activities

The planned activities are as follows:

- **Literature Review and State-of-the-Art Analysis:** Conduct a comprehensive review of existing work on analytical provenance, visualization evaluation to establish a theoretical foundation for the research.
- **Development of a Provenance Model:** Design a structured model using Semantic Web languages to represent analytical provenance, ensuring interoperability and extensibility.
- **Implementation of Data Collection Methods:** Develop techniques to systematically collect provenance data from visualization tools, considering different types of user interactions and exploration strategies.

- **Integration with Web-Based Visualization Tools:** Develop an approach for seamlessly embedding provenance tracking mechanisms into widely used visualization libraries such as D3.js, ensuring ease of adoption by developers.
- **Design and Implementation of an Evaluation Framework:** Define a methodology that leverages analytical provenance data to assess the usability and effectiveness of visualization techniques, providing insights into user reasoning and decision-making processes.
- **Case Study Application and Validation:** Implement the proposed provenance model and evaluation framework within real-world visualization tools, including MGExplorer for multivariate graph exploration and eSTIMe for mobility data analysis, to assess their effectiveness and adaptability.
- **User-Centered Data Collection through Hackathons:** Organize hackathons with end-users to gather analytical provenance data from the case study tools, evaluating the framework's ability to capture and analyze user interactions in practical scenarios.
- **Dissemination of Results:** Publish findings in high-impact conferences and journals, participate in research collaborations, and present results at scientific events.
- **Collaboration and Supervision:** Work closely with the research team and participate in the supervision of master’s students involved in related topics.

Skills

Technical skills and level required : semantic web, data visualization, human-computer interaction

Languages : 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 (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

Remuneration

Duration: 36 months
Gross Salary per month: 2200€ (2025)

General Information

- **Theme/Domain :** Data and Knowledge Representation and Processing Information system (BAP E)
- **Town/city :** Sophia Antipolis
- **Inria Center :** Centre Inria d'Université Côte d'Azur
- **Starting date :** 2025-10-01
- **Duration of contract :** 3 years
- **Deadline to apply :** 2025-04-10

Contacts

- **Inria Team :** WIMMICS
- **PhD Supervisor :**
  Menin Aline / aline.menin@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

The ideal candidate for this PhD position should have a Master's degree in Computer Science, with expertise in Semantic Web technologies and experience with data visualization. The candidate should have the ability to conduct scientific literature reviews and apply research methodologies. The candidate must be autonomous, curious, and possess good teamwork skills to work on interdisciplinary projects, especially applied case studies.

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.