Offer #2025-08763

Post-Doctoral Research Visit F/M Post-Doctoral Position in AI and Human-Machine Interaction for Knowledge Graph Exploration in Metabolomics

Contract type : Fixed-term contract

Renewable contract : Yes

Level of qualifications required : PhD or equivalent

Fonction : Post-Doctoral Research Visit

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

The postdoctoral position will be in the Wimmics research team (Inria, Université Côted'Azur, CNRS, I3S) specialized in knowledge graphs, artificial intelligence and Web technologies. It is part of the MetaboLinkAI ANR-SNF project, which aims to revolutionize the analysis and interpretation of metabolomics data through a multidisciplinary approach. The project combines a comprehensive knowledge graph hub (MetaKH) with advanced artificial intelligence (AI) and machine learning (ML) techniques.

The main objectives of the project are to enhance the accessibility and querying of metabolomics data, improve research efficiency, and foster innovation in the field. The project aspires to go beyond current standards by developing an evolving encyclopedic knowledge base, integrating advanced AI approaches to handle experimental data uncertainties, and facilitating the exploration and evaluation of a broader range of hypotheses.

Within this framework, we will focus on developing innovative methodologies and tools, such as graph exploration methods, to improve data interaction, analytical capabilities, and uncertainty representation. A key challenge of metabolomics data (and thus MetaKH) lies in its incompleteness, variable reliability, and inherent uncertainty. AI will be leveraged to enhance the completeness and reliability of the knowledge graph while effectively addressing these uncertainties.

This postdoctoral position is specifically part of WP3.4, which aims to develop an AI-powered research assistant for MetaKH. It builds on recent advances in generative AI, natural language understanding, and knowledge graph integration. An initial version of this assistant has been designed and developed as an intuitive chatbot, facilitating researchers' interaction with metabolomics data and the MetaKH knowledge graph. This chatbot enables users to query the graph in natural language and refine their searches incrementally.

The current approach needs to be extended to support multimodal queries and integrate visualization tools tailored to metabolomics research. Furthermore, it is crucial to define relevant evaluation methods to assess the usefulness and added value of this approach for users. In the long term, the assistant will evolve into a web application incorporating dynamic feedback mechanisms, enabling continuous improvement through user interactions.

Assignment

The recruited candidate will be responsible for designing and developing an LLM-based approach to query the MetaKH knowledge graph, providing personalized support as well as visual and textual solutions tailored to user needs. They will also be tasked with designing, implementing, and deploying evaluation methods with users to assess the usefulness and reliability of the assistant's results, thereby contributing to the improvement of decision-making processes in metabolomics.

The expected deliverables are:

- Publication: An approach leveraging LLMs to replicate the methods of research assistants.
- Publication: A method for evaluating conversational interfaces based on LLMs.
- Software: A stable version of the AI assistant’s source code and the web application.

The recruited candidate will collaborate with Aline MENIN and Marco WINCKLER on aspects related to human-computer interaction and data visualization, as well as with other researchers of Wimmics for topics related to the Semantic Web and LLMs.

Main activities

The planned activities are as follows:

- Develop interaction solutions based on LLM technologies to support the exploration of the MetaKH knowledge graph.
- Develop solutions to enhance data exploration (e.g., by combining information from multiple sources) to strengthen the decision-making processes of metabolomics experts.
- Investigate the use of analytical provenance data to optimize the graph querying process, integrating dynamic feedback that takes into account the history of exchanges and interactions.
- Propose and implement evaluation methods for the proposed solutions with end users.
- Explore strategies for transferring the scientific knowledge acquired in the field of metabolomics to other application domains that could benefit from it.
- Participate in the supervision of interns working on the MetaboLinkAI project.
- Contribute to the dissemination of results within the scientific community, notably through publications and the release of the developed software.

Skills

Technical skills and level required : LLM, conversational interfaces

Other valued appreciated : data visualization, semantic web, human-computer interaction

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

Gross Salary: 2788 € per month

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 :** 2025-09-01
- **Duration of contract :** 12 months
- **Deadline to apply :** 2025-04-26

Contacts

- **Inria Team :** WIMMICS
- **Recruiter :**
  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.

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.