



Offer #2022-05400

Post-Doctoral Research Visit F/M Subgroup discovery for profiling drug response to chemotherapy combinations

Contract type : Fixed-term contract

Renewable contract : Yes

Level of qualifications required : PhD or equivalent

Fonction : Post-Doctoral Research Visit

Context

We are seeking for a candidate for a 2-year postdoc funded by the CombO research project, in collaboration with the Health Data Hub and Centre Léon Bérard (CLB) in Lyon.

The postdoc will join the HeKA team (Inria, Inserm, Univ. Paris Cité <https://team.inria.fr/heka/>), located in Paris (PariSanté Campus, <https://goo.gl/maps/eW55zuHd2ggt2Q4Z9>).

The postdoc will be hired by Inria Paris and will be paid following Inria salary policy.

Keywords :

- *representation learning with knowledge graphs
- *unsupervised learning for subgroup discovery
- *applications to biomedicine

Assignment

The associated research project concerns knowledge discovery from healthcare data, in particular discovery of subgroups of patients answering homogeneously to chemotherapy combinations. It includes :

- a-the representation of clinical and omics data in a knowledge graph [1,2];
- b-the linkage of these data to ontologies and other knowledge graphs relevant to oncology;
- c-propose unsupervised methods for the discovery of subgroups whose treatment effect is distinct [3].
- d-implement these methods on real-world data.

Regarding the methods, we would like to deepen the learning of representation from knowledge graphs and ontologies, for example with GCNs, which allow to learn graph embeddings. These representations can be used to define a clustering task in the representation space of embeddings [4]. From these representations we aim to identify groups in which the level of response to treatment is homogeneous within a group, but possibly heterogeneous between groups [5].

References :

- [1] Xiao, G., Pfaff, E., Prud'hommeaux, E., Booth, D., Sharma, D.K., Huo, N., Yu, Y., Zong, N., Ruddy, K.J., Chute, C.G. and Jiang, G., 2022. FHIR-Ontop-OMOP: Building clinical knowledge graphs in FHIR RDF with the OMOP Common Data Model. *Journal of Biomedical Informatics*, 134, p.104201.
<https://www.sciencedirect.com/science/article/pii/S1532046422002064>
- [2] Jacobsen, J.O., Baudis, M., Baynam, G.S., Beckmann, J.S., Beltran, S., Buske, O.J., Callahan, T.J., Chute, C.G., Courtot, M., Danis, D. and Elemento, O., 2022. The GA4GH Phenopacket schema defines a computable representation of clinical data. *Nature biotechnology*, 40(6), pp.817-820.
<https://www.nature.com/articles/s41587-022-01357-4>
- [3] Vernerey, C., Loudni, S., Aribi, N. and Lebbah, Y., 2022, July. Threshold-free Pattern Mining Meets Multi-Objective Optimization: Application to Association Rules. In *IJCAI-ECAI 2022*.
<https://www.ijcai.org/proceedings/2022/0261>
- [4] Monnin, P., Raïssi, C., Napoli, A. and Coulet, A., 2022. Discovering alignment relations with Graph Convolutional Networks: A biomedical case study. *Semantic Web*, 13(3): 379-398.
<https://content.iospress.com/articles/semantic-web/sw210452>
- [5] Gong, X., Hu, M., Basu, M. and Zhao, L., 2021. Heterogeneous treatment effect analysis based on machine learning methodology. *CPT: pharmacometrics & systems pharmacology*, 10(11), pp.1433-1443.
<https://ascpt.onlinelibrary.wiley.com/doi/full/10.1002/psp4.12715>

Main activities

The postdoc will be in charge first of data preparation, including clinic and genetic data linking with knowledge graphs and domain ontologies;

and of proposing and exploring subgroup discovery approaches to highlight sets of patients responding differently to various combinations of chemotherapeutic molecules.

Skills

Appreciated skills:

Knowledge discovery, knowledge graph, representation learning, unsupervised learning, subgroup discovery, healthcare data, causality.

Python, RDF, Spraq

Communication, scientific writing

Required:

Enthusiastic about Computer Science research

Deep interest in medical applications of Computer Science

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

General Information

- **Theme/Domain** : Data and Knowledge Representation and Processing
- **Town/city** : Paris
- **Inria Center** : [Centre Inria de Paris](#)
- **Starting date** : 2023-01-01
- **Duration of contract** : 2 years
- **Deadline to apply** : 2023-03-31

Contacts

- **Inria Team** : [HEKA](#)
- **Recruiter** :
Coulet Adrien / adrien.coulet@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

Communication, scientific writing in English

Enthusiastic about Computer Science research and its application to healthcare

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.

