12-months Research Engineering Position for the Development and Maintenance of IOHprofiler, a Software for Benchmarking and Analysis of Iterative Optimization Algorithms

We are looking for a research engineer, to support the development and maintenance of IOHprofiler, [https://iohprofiler.github.io/](https://iohprofiler.github.io/), our state-of-the-art platform for benchmarking and empirical assessment of optimization algorithms.

**Working conditions:**
- 12-months contract (fixed-term; salary depends on experience, for PhDs with less than 3 years post-PhD experience it is around 2,500 euros net)
- Starting date: as soon as possible and before September 2023
- Employer: CNRS, the French National Centre for Scientific Research, [https://www.cnrs.fr/en](https://www.cnrs.fr/en)
- Host institution: LIP6 Computer Science lab at Sorbonne Université. We are located on the Jussieu campus, in Paris city center (5th arrondissement)
- Main supervisor: Carola Doerr, CNRS research director, [https://webia.lip6.fr/~doerr/](https://webia.lip6.fr/~doerr/)
- Collaborators:
  - Thomas Bäck, Diedriechk Vermetten, Jacob de Nobel, Furong Ye, Hao Wang at Leiden University (The Netherlands)
  - Tome Eftimov, Ana Kostovska, Sašo Džeroski at the Jožef Stefan Institute (Ljubljana, Slovenia)
- Working language is English
- Possibility to perform research is given

**IOHprofiler:**
IOHprofiler is a software environment built to empirically evaluate and compare iterative optimization heuristics such as local search algorithms, evolutionary and genetic algorithms, Bayesian Optimization, and other black-box algorithms. IOHprofiler facilitates systematic and reproducible empirical studies. Its user-friendly design with its fully interactive visualization module IOHanalyzer have helped establish IOHprofiler as a core component in our research, our industrial collaborations, and in our teaching activities.

IOHprofiler has two major components:
1. IOHexperimenter (the benchmarking tool with predefined problem sets; C++)
2. IOHanalyzer (performance analysis and visualization provided via web service; C++/R)

**Key Objectives:**
Based on the expertise and proficiency of the candidate, we expect him/her to join one or more of the following sub-projects:
- Extending the IOHprofiler components to
  - IOHdata (online data repository; cloud-based databases/Kubernetes),
  - IOHalgorithm (code repository for optimization algorithms; C++/Python)
- Devising and implementing new benchmark problem sets, among them extensions to mixed-integer optimization problems, to multi-objective optimization, to dynamic problems, to noisy problems, and to constrained optimization;
- The design of a data base that stores the benchmarking results in an organized way, with the key objectives being to accommodate highest reproducibility standards and to allow for automated annotation via the OPTION ontology that our team co-develops with colleagues from the Jožef Stefan Institute in Slovenia.
- Extensions of IOHanalyzer, e.g., adding new statistics and visualizations and improving the user experience (UX)
- Implementation of high-quality code bases for IOHalgorithm;
- Software testing, including unit testing and integration testing of each major component;

**Profile of the Research Engineer:**
1) **Interest in the topic:** The research engineer should bring a general interest in optimization and machine learning. Experience with black-box optimization would be beneficial but is not required.
2) **Programming skills:** Good knowledge of C++ and Python is required. A good command of R would be a plus, but is not strictly required.
3) **Language skills:** Our working language is English; we therefore require fluency in written and spoken English. French language skills are not required.

**Application procedure:**
Interested candidates are strongly encouraged to get in touch with Carola Doerr, https://webia.lip6.fr/~doerr/, prior to applying.
- Applications received on or before **April 27, 2023, anywhere on earth**, will receive full consideration. Later applications may be considered if the position remains vacant.
- Applications must be submitted via https://emploi.cnrs.fr/Offres/CDD/UMR7606-AUILEV-002/Default.aspx?lang=EN (we’ll be happy to help you with that. As mentioned above, please do get in touch with us prior to applying for this position)

**Want to know more?**
Should you have any questions about this position, please do not hesitate to contact Carola Doerr.

**Resources:**
An up-to-date wiki page of IOHprofiler is available at https://iohprofiler.github.io/, our main GitHub repository with the latest versions is https://github.com/IOHprofiler
IOHprofiler is fully open source, available at GitHub under BSD-3 license. The core modules IOHanalyzer and IOHexperimenter are available at CRAN and as PyPi packages.
The overall project is documented in arXiv report 1810.05281, the IOHanalyzer module is documented in this ACM Transactions on Evolutionary Learning and Optimization paper, and a short overview of the IOHexperimenter module is available in arXiv report 2111.04077

![Diagram](image.png)

**Figure 1:** Core modules of the IOHprofiler benchmarking environment.