

Projet approfondissement “analyse des algorithmes évolutionnaires” [en Anglais]

Project description: Evolutionary algorithms are massively used randomized search heuristics. There is no doubt that they are immensely useful in practical applications. On the other hand, our theoretical understanding of these algorithms is very limited. Even for very, very simple evolutionary algorithms (e.g., having a population of size one only) and very simple classic optimization problems, it can be surprisingly difficult to prove interesting bounds on the run time of the algorithms.

In this strongly research-oriented project, we will regard a (relatively confined) problem from today’s research on theory of evolutionary computation. We will work through the existing previous work (mainly one research paper) and in close interaction between the student(s) and the two supervisors, we will try to obtain new results of sufficient quality to justify a (small) scientific publication. This is an ambitious project, but a similar successful project conducted in 2013/14 suggests that this is possible.

To ensure that we work on a problem of current interest, we will choose the particular topic of this project after this year’s *Genetic and Evolutionary Computation Conference (GECCO)* in July. To get an idea of how a topic could look like, please refer to the result of the 2013/14 project (Colin, Doerr, Férey. Monotonic Functions in EC: Anything but Monotone! In: Genetic and Evolutionary Computation Conference (GECCO 2014), 753–760, 2014. ACM).

Supervisors and contact: Benjamin Doerr, professor at Polytechnique, and Carola Doerr, CNRS researcher at Paris 6. Feel free to contact either in case of questions, easiest via email to `lastname@lix.polytechnique.fr` or `firstname.lastname@mpii.de`. In any case, before choosing this project, you should talk to us to see (i) if the topic is still available and (ii) if this is a suitable project for you.

Ideal student profile: Given the nature of the project, the ideal group of students is a binome of students that have a strong background in computer science (in particular, algorithms) and in mathematics. Having followed INF421 is a clear advantage, following INF561 in the third year will create synergies. A good command of English is needed for writing the paper. The project is particularly suited to check if doing a PhD after the Master is a reasonable career path, or to prepare for such a career.