

Heuristics for Mixed-Integer Nonlinear Programming

Heuristics and algorithms for Mixed-Integer nonlinear programs

Why join Artelys

Artelys is an international company based in France (HQ), with offices in Brussels (Belgium), Chicago (US) and Montréal (Canada). Artelys is specialized in optimization, decision-making and modeling. Relying on their high level of expertise in quantitative methods, Artelys' consultants deliver efficient solutions to complex business problems. They provide services to numerous industries: Energy & Environment, Logistics & Transportation, Telecommunications, Finance, Defense, etc.

Artelys offers a wide variety of services, including software solutions (optimization solvers, business specific solutions & specific software developments), consulting, project management assistance, training, etc. For instance, Artelys develops Artelys Knitro, a state-of-the-art solver for nonlinear and mixed-integer nonlinear optimization.

Description

This internship focuses on solving mixed-integer nonlinear problems (MINLP). A major challenge when solving such problems is the ability to quickly compute good solutions. A key to getting such solutions and improve the resolution time is heuristics executed during the branch-and-bound search. Knitro already includes a large number of heuristics: feasibility pump, complementarity constraints, rounding, diving, ...

The internship will focus on one of the following subjects:

- Study the state of the art and design, implement and benchmark new heuristics for MINLP.
- Investigate algorithms and heuristic techniques for globalization in order to find a global optimum (or a better local optimum) on non-convex models.

The developed algorithms will be tested on various Mixed-Integer nonlinear programming applications from the literature in particular in the energy field with hydro energy system scheduling, gas transmission and compression, power system or water network optimization.

What we are looking for

The candidate must be in his/her last year of master's degree in computer science and/or applied mathematics with a solid background in Operations Research.

Required skills:

- Knowledge of discrete optimization techniques, heuristics and meta-heuristics
- Programming in C and C++
- Fluent in English

Additional relevant skills:

- Knowledge of convex optimization and nonlinear programming
- Knowledge of linear and mixed-Integer linear programming
- Combinatorial optimization, graph theory, computational complexity
- Skills in algorithms design and implementation
- Programming in Python, R, Java
- Fluent in French

Benefits

The duration of the internship is 6 months. The internship will take place in our Paris office. The internship may lead to a long-term job offer.

Application

Send us your cover letter and curriculum vitae via the Artelys website: www.artelys.com/careers/