Advanced Algorithms

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Targeted skills and objectives.

The course aims to familiarize students with advanced techniques and advanced methods for the design and analysis of algorithms according to several models and complexity measures (randomized algorithms, approximation, on-line, parallel model, distributed model, ...).

The course starts with an introduction to randomized algorithms. This part presents different notions of convergence (Monte-Carlo, Las Vegas, "with high probability" CS notion, ...) for algorithms. The course then returns to various algorithmic problems to consider several possible approaches such as the mean analysis, approximate solutions and approximation algorithms for optimization or even competitiveness measures for on-line algorithms. These notions will then be extended in the distributed and parallel context.

Each chapter of this course is designed to succinctly show the content of a given research problem in the field of the chapter concerned.

Program.

1. Randomized algorithms

2. Approximation algorithms

3. Online algorithms

4. Parallel algorithms

5. Distributed algorithms

6. Algorithms in the context of Distributed Ledger Technology