Computational Methods in Optimization

ECTS : 5

Volume horaire : 36

Description du contenu de l'enseignement :

Optimization is a powerful mathematical paradigm to model real-world problems. Convex formulations are the preferred optimization model, since the associated problems can be solved efficiently. This course will focus on efficient algorithms for solving convex optimization problems that arise in numerous areas, and particularly in data science. The major part of the course will dive into interior-point methods, that form the main paradigm used in state-of-the-art solvers. We will cover the key theoretical guarantees of these methods, as well as their implementation details. Other convex programming algorithms will be presented through numerical sessions, with a focus on conic and semidefinite formulations arising in data science and discrete mathematics.

Compétence à acquérir :

- Formulate or reformulate a problem into one of the main classes of convex optimization problems.
- Understand the main properties of interior-point methods for such convex problems.
- Adapt a basic interior-point framework to a specific problem.

Bibliographie, lectures recommandées :

G. C. Calafiore and L. El Ghaoui, Optimization models (2014)

H. Wolkowicz, R. Saigal, L. Vandenberghe (eds), Handbook of Semidefinite Programming (2000)

S. J. Wright, Primal-dual interior point methods (1996)

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