FIM Nachdiplomvorlesung

Complexity and Simplicity of Optimization Problems

Abstract:

In this course, we address a wide spectrum of questions related to theoretical justification of optimization algorithms and complexity of optimization problems. We start from comparing the mathematical and engineering paradigms, related to the concepts of problem instances, their importance and complexity. Computational Mathematics, and Optimization as its essential part, inherits somehow both alternative approaches. In particular, we discuss different definitions of the input data size and their consequences for our abilities to construct efficient optimization schemes. In the next lectures of the course, we look at intrinsic complexity of Black-Box Nonlinear Optimization, resulted in the lower complexity bounds and optimal first-order schemes. We also present new second-order methods, provided with the global efficiency estimates. After that, we discuss different approaches of Structural Optimization, which lead to significant acceleration of Black-Box minimization schemes. Next topics are optimization in relative scale and huge-scale optimization problems. Last lectures of the course are devoted to some applications (nonlinear analysis of combinatorial problems and algorithmic models of human behavior).

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February 23 - May 18, 2015
Mondays 14.15 - 16.00h
HG G 19.1, ETH Zürich Rämistrasse 101

Exception: Monday, May 18
HG G 19.2, ETH Zürich Rämistrasse 101

No lecture on: *April 6 & April 13*

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