Title of the talk : Evaluation Complexity in Nonlinear Optimization Using Lispschitz-Continuous Hessians

Authors : C. Cartis, N. Gould, Ph. Toint (speaker)

Abstract:
We review the available results on the evaluation complexity of algorithms using Lipschitz-continuous Hessians for the approximate solution of nonlinear and potentially nonconvex optimization problems. Here, evaluation complexity is a bound on the largest number of problem functions (objective, constraints) and derivatives evaluations that are needed before an approximate first-order critical point of the problem is guaranteed to be found. We start by considering the unconstrained case and examine classical methods (such as Newton's method) and the more recent ARC2 method, which we show is optimal under reasonable assumptions. We then turn to constrained problems and analyze the case of convex constraints first, showing that a suitable adaptation ARC2CC of the ARC2 approach also possesses remarkable complexity properties. We finally extend the results obtained in simpler settings to the general equality and inequality constrained nonlinear optimization problem by constructing a suitable ARC2GC algorithm whose evaluation complexity also exhibits the same remarkable properties.