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A Derivative-Free and Ready-to-Use NLP Solver for Matlab or Octave

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Resumen. Applications in engineering frequently require the adjustment of certain parameters. While the mathematical laws that determine these parameters often are well understood, due to time limitations in every day industrial life, it is typically not feasible to derive an explicit computational procedure for adjusting the parameters based on some given measurement data. This talk aims at showing that in such situations, direct optimization offers a very simple approach that can be of great help. More precisely, we introduce a derivative-free and ready-to-use solver for nonlinear programs with nonlinear equality and inequality constraints (NLPs). Using finite differences and a sequential quadratic programming (SQP) approach, the algorithm aims at finding a local minimizer and no extra attempt is made to generate a globally optimal solution. Due to the use of finite differences, approximations of the derivatives are expensive compared to the numerical computations that usually dominate the computational effort of NLP solvers. This fact motivates the use of a somewhat effortful trust-region SQP-subproblem that is solved by second orde cone programs. The implementation in Matlab or Octave is easy to use and public domain; numerical experiments indicate that the algorithm is well suitable for problems with m inequality constraints depending on n variables when $n + m \leq 500$.

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