

Benchmarking Large-Scale Optimization Software

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Services we provide

1. Guide to Software: "**Decision Tree**"
2. Software Archive
3. Software Evaluation: "**Benchmarks**"
4. Archive of Testproblems
5. Web-based Solvers (**1/3 of NEOS**)

Outline of Talk

- **Software, Testproblem Archives**
- **NEOS Solvers**
- Report on **recent** benchmarks in mostly **discrete** optimization
 - **MILP, MIQP** commercial and free
 - **MINLP** GAMS Performance Tools
 - **SDP** DIMACS, sparse SDP
- **Conclusions**

large **Software Archive**

- held in ftp area
- DONLP2 (NLP-SQP) and related
- some f90 versions
- binaries (source not public)
- codes not available otherwise

Testproblem Archive

- benchmarks not available elsewhere
- converted formats
- large library of AMPL models
- miscellaneous

Our AMPL Collection

- MILP, MIQP
- convex QP
- smooth & nonsmooth NLP
- nonlinear systems
- PDE-constrained NLP

NEOS Solvers

(20 solvers, 30 formats, 3 Kestrel)

LP

- BPMPD, MOSEK

MILP

- BonsaiG, GLPK

Non-differentiable

- ACCPM, BT, DFO, NDA

NEOS Solvers (cont)

NLP

- DONLP2

SDP/SOCP

- CirCut, CSDP, MOSEK, PENNON, SDPA, SDP-LR, SDPT3, SeDuMi

Semi-infinite

- NSIPS

Global

- GLCF, GLOBMIN

Some Benchmarks

Benchmark Policy

- absolute reproducibility
- datafiles, codes available
- default options
- (some) logfiles posted

Conclusions

- **MILP:** CPLEX, XPRESS competitive, GLPK decent in B&B
- **MIQP:** CPLEX seems to have edge, see new XPRESS, MOSEK
- **MINLP:** DICOPT, MINLP, SBB competitive
- **SDP/SOCP:** CSDP, SDPA improved for large, sparse problems, MOSEK, PENNON, SDPT3, SeDuMi have clear strenghts