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Project in Scientific Computing
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A high performance procedure for feasible initial guesses generation for nonlinear optimization

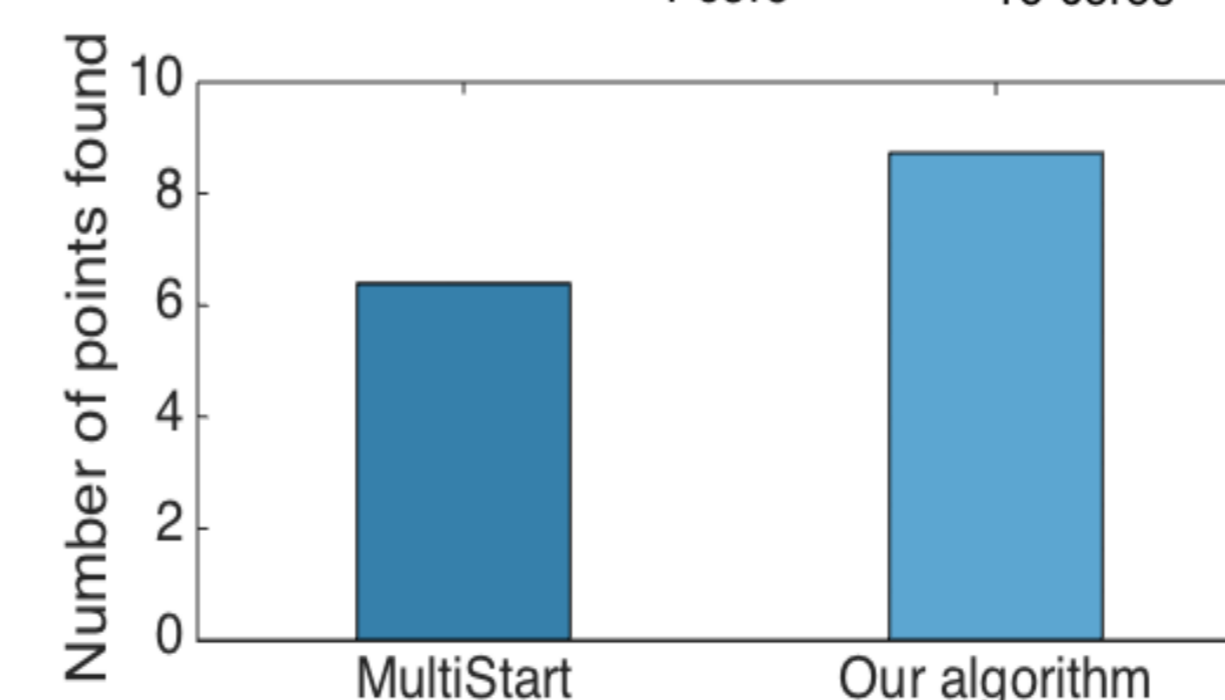
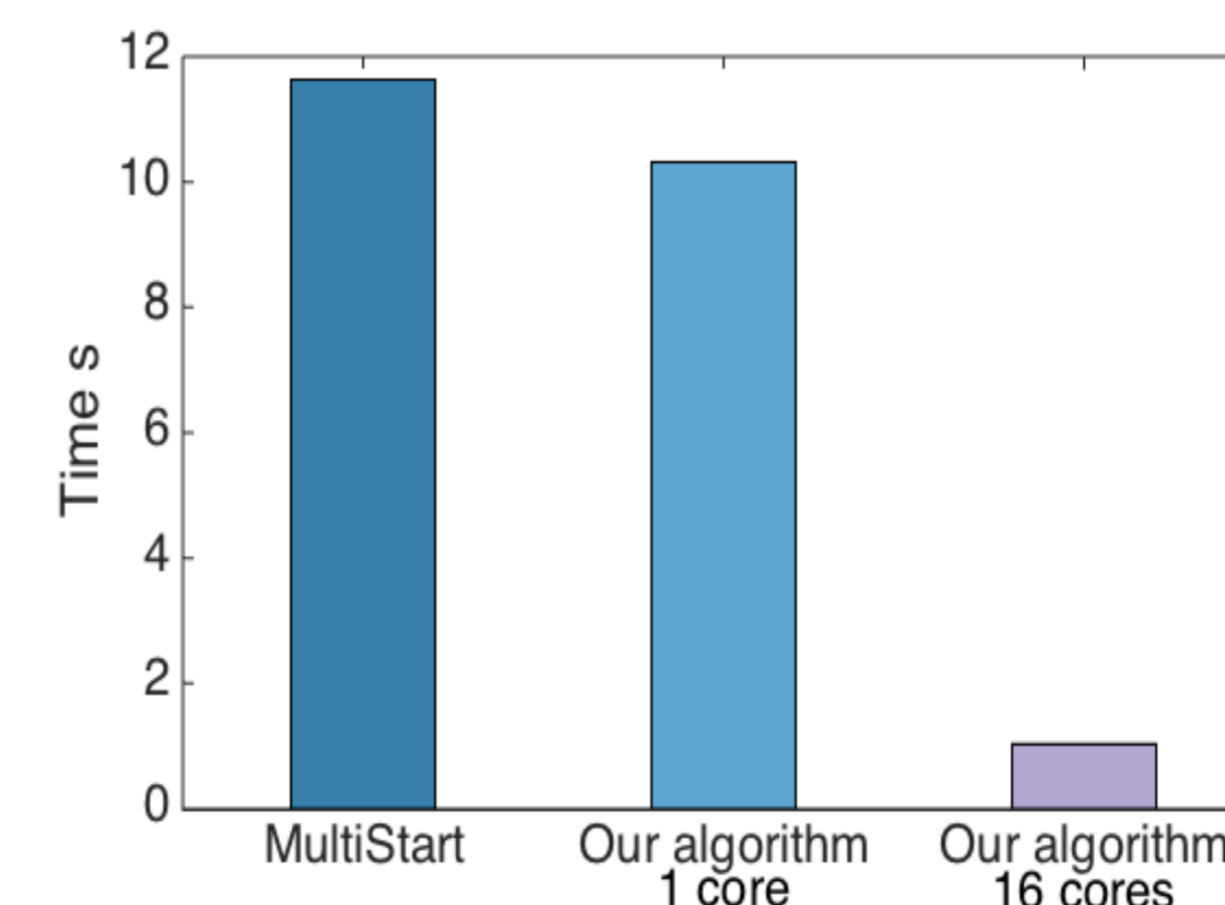
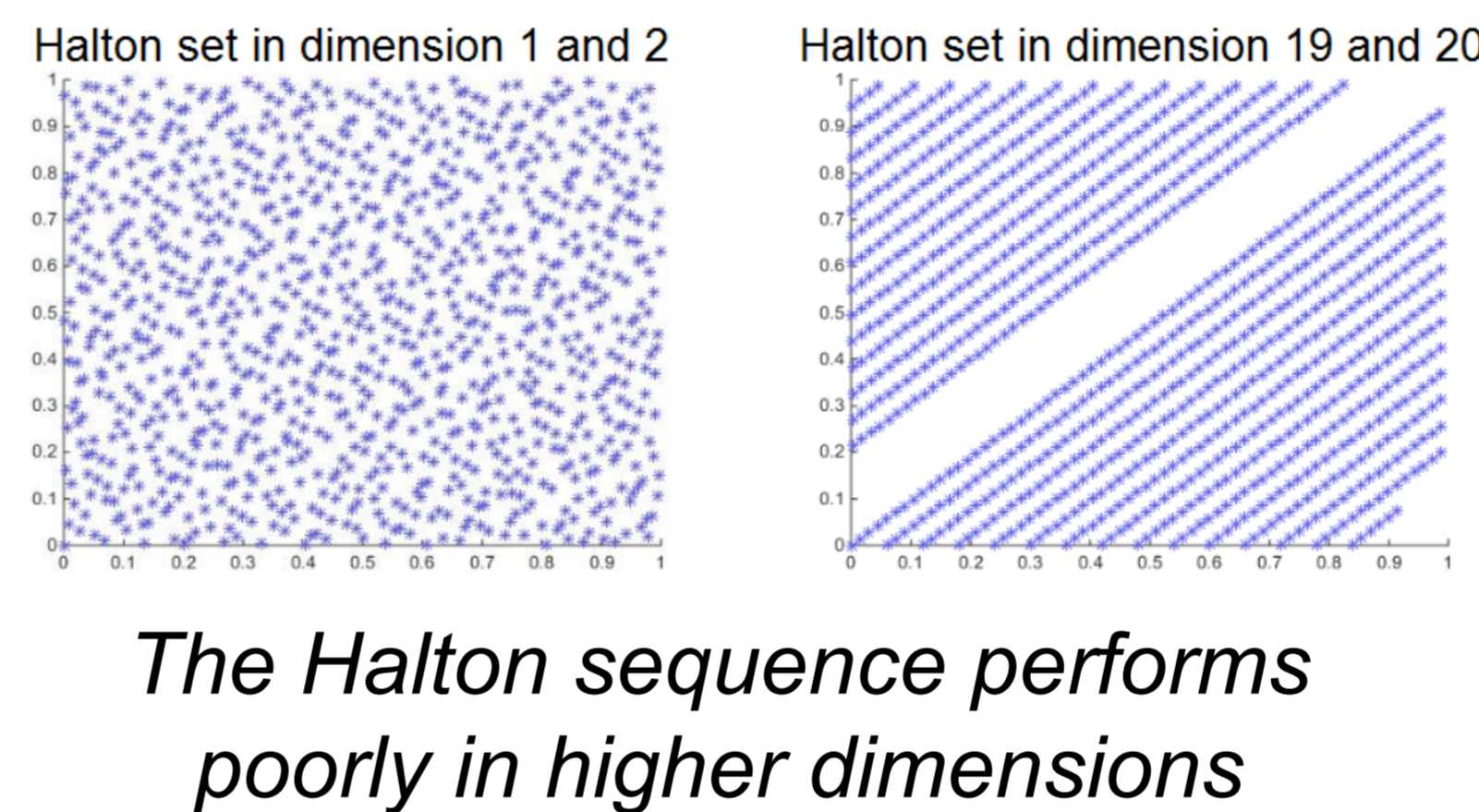
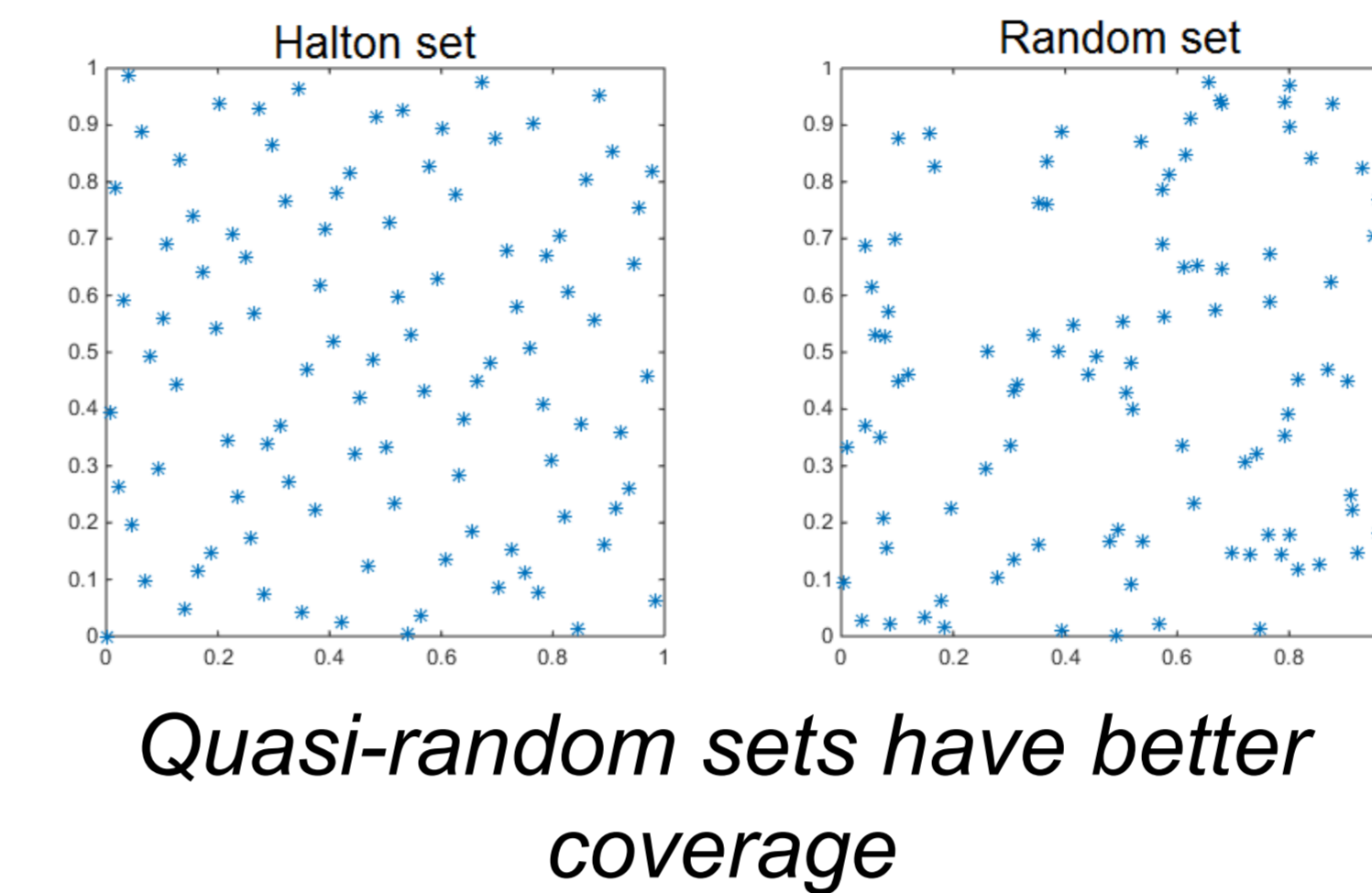
Problem

Optimizing high dimensional non-linear constrained functions in MATLAB with MultiStart is time consuming. This is a common problem in the industry. Improving the way of searching initial feasible points may cut down the computation time.

Aims

Our goal is twofold:

1. Investigate different methods of finding feasible initial points, namely the Halton and the Sobol sequence, based on the speed and distribution of points.
2. Develop a high performance algorithm to find feasible initial points. The algorithm should be able to run in parallel.



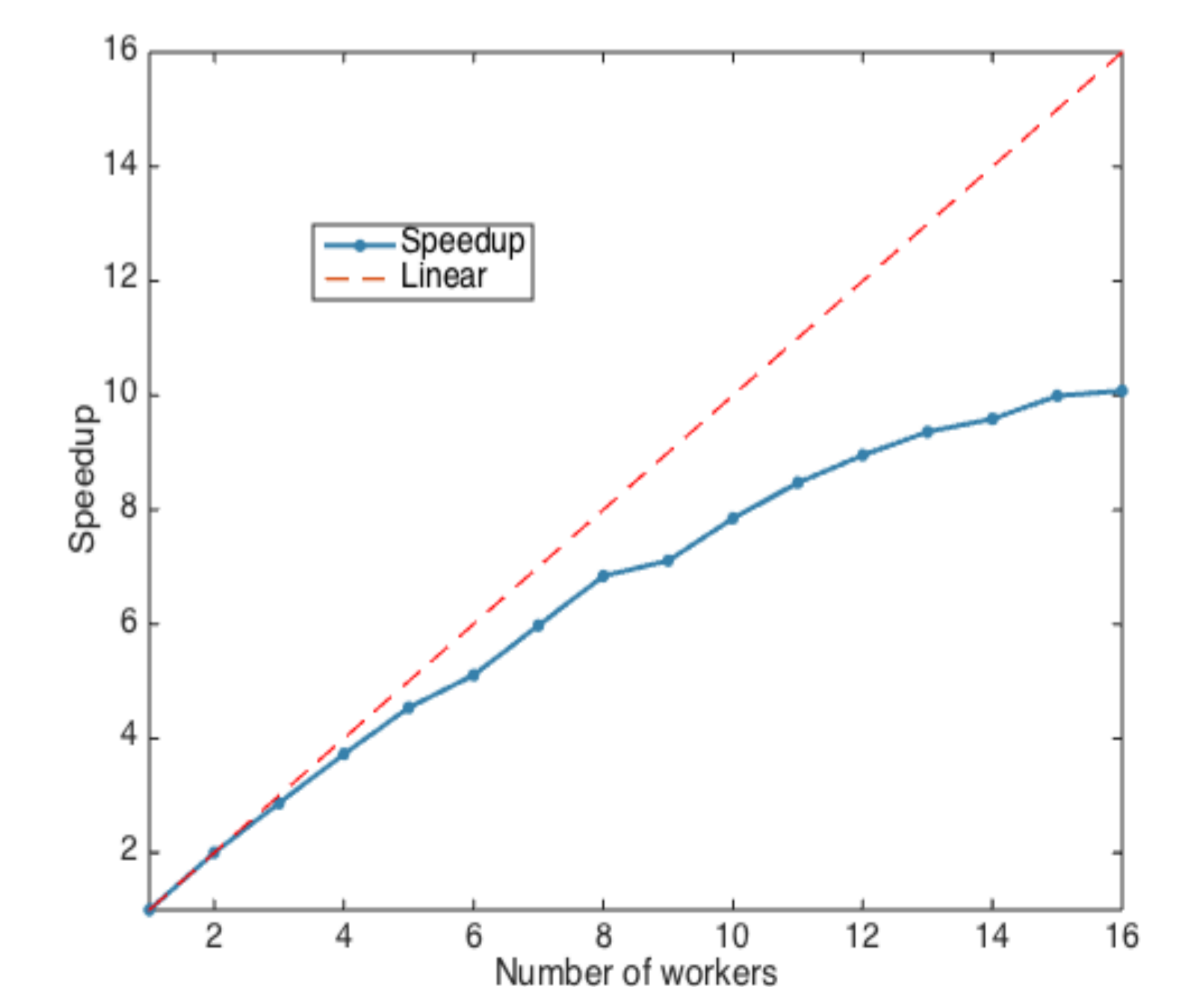
Our algorithm is faster and finds more points than MultiStart

Quasi-random sequences

We have investigated two quasi-random sequences, Halton and Sobol, which act as random sequences but cover the space better.

Results

We have developed an algorithm that runs on an arbitrary number of cores. The algorithm uses a scrambled Sobol sequence which has proved to be the most efficient choice. When feasible points have been found the algorithm focuses on that area to find more.



Speedup curve, 1 to 16 cores