

Numerical optimization for large scale problems
Constrained optimization

Assignment 3: Interior Point Method applied to Quadratic programming problems

Consider the following problem:

$$\begin{array}{ll} \min_{x \in \mathbb{R}^n} & f(x) \\ \text{s.t.} & 0 \leq x_i \leq a \quad \forall i \end{array}$$

where a is a positive parameter and

$$f(x) = \sum_{i=1}^n x_i^2 - \sum_{i=1}^{n-1} x_i x_{i+1}$$

Use your own implementation of the Predictor-Corrector Interior Point Method (see sketch of the LAIB lessons for details about the method) to solve the problem with $n = 10^4$ and $n = 10^6$ and with $a = 2, 20, 200, 2000$. Compare the behavior of the method in the several test cases. The comparison should be made, for example, in terms of number of iterations and computing time.

Write a report summarizing the results with tables and/or figures, commenting the results obtained.