



A Primal-Dual IPM Algorithm for LO Problem Based on a New Kernel Function with a Logarithmic Barrier Term

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Received: April 7, 2024; Revised: May 20, 2025

Abstract: In this paper, we consider a primal-dual Interior Point Method (IPM) for the linear optimization (LO) problem, based on a new kernel function with a logarithmic barrier term, which plays an important role for developing a new design of primal-dual IPM algorithms. New search directions and proximity functions are proposed based on this kernel function. We proved that our algorithm has $\mathbf{O}\left(qSn^{\frac{Sq+1}{2Sq}} \log\left(\frac{n}{\epsilon}\right)\right)$ iteration bound for large-update methods.

Keywords: *primal-dual interior point algorithm; kernel function; linear optimization problem; iteration bound; complexity.*

Mathematics Subject Classification (2020): 90C51, 49N15, 90C05, 68Q25.

1 Introduction

In this paper we deal with primal-dual IPMs for solving the standard linear optimization (LO) problem

$$(P) \quad \min \{c^T x : Ax = b, x \geq 0\},$$

and the dual problem of (P) is given by

$$(D) \quad \max \{b^T y + s = c, s \geq 0\},$$

where $A \in \mathbb{R}^{m \times n}$, $x, s, c \in \mathbb{R}^n$, and $y, b \in \mathbb{R}^m$.

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