Decomposition-Invariant Conditional Gradient Method in Boscia Framework

Your Name

Month Year

Abstract

Your abstract goes here.

Acknowledgments

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1 Introduction

1.1 Background

Provide background information on convex optimization and the Frank-Wolfe algorithm.

1.2 Thesis Structure

Provide an overview of the structure of your thesis.

2 Preliminaries

This section covers the preliminary concepts and assumptions used in this thesis, based on the DICG and Boscia papers.

Definition 1 (Strongly convex function)**.** *A differentiable function $f : \mathcal{X} \to \mathbb{R}$ is μ-strongly convex if*

$$f(y) - f(x) \geq \langle \nabla f(x), y - x \rangle + \frac{\mu}{2}\|y - x\|^2 \quad \textit{for all } x, y \in \mathcal{X}.$$

Definition 2 (Smooth function)**.** *A differentiable function $f : \mathcal{X} \to \mathbb{R}$ is L-smooth convex if*

$$f(y) - f(x) \geq \langle \nabla f(x), y - x \rangle + \frac{L}{2}\|y - x\|^2 \quad \textit{for all } x, y \in \mathcal{X}.$$

2.1 Assumptions from Boscia Paper

The Boscia framework makes the following assumptions:

2.2 Problem Setting

Throughout this paper, we use $\|\cdot\|$ to denote the Euclidean norm and we consider the optimization problem

$$\min_{x \in \mathcal{P}} f(x),$$

where we have following assumptions:

1. $f(x)$ is α-strong and β-smooth convex function with respect to the Euclidean norm.
2. $\mathcal{P}$ is a polytope with all vertices lying on the hypercube $\{0,1\}^n$.
3. $\mathcal{P}$ can be algebraically described as $P = \{x \in \mathbb{R}^n \mid x \geq 0,\ Ax = b\}$.

3 Framwork

In this section, we outline the workflow for decomposition-invariant based mixed integer convex optimization over structured polytopes. We begin by introducing the Boscia Framework and the decomposition-invariant Frank-Wolfe algorithm, and then provide a detailed description of how these two methods are integrated.

3.1 Boscia Framework

3.2 Decomposition-invariant Frank-Wolfe(DICG)

4 Experiment

5 Discussion

6 Conclusion

References

A Appendix A