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A New Efficient Step-Size in Karmarkar's Projective Interior Point Method for Optimization Problems

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Abstract: In this paper, we are concerned with the optimization problem by using the logarithmic penalty method via new upper bound and lower bound functions in the Karmarkar's algorithm to find the solution. Then, we establish the direction by Newton's method. Also, we propose a new approach based on new upper bound and lower bound functions to determine the step size. To lend further support to our theoretical results, a simulation study is carried out to illustrate the good accuracy of the studied method.

Keywords: *Karmarkar's projective method; logarithmic barrier method; upper and lower bound functions; averaging of perturbations; step size; mathematical modeling; interior point methods.*

Mathematics Subject Classification (2010): 90C05, 70K65, 90C51, 93A30.

1 Introduction

The appearance, rapid evolution and success of interior point methods since their revival by Karmarkar (1984) in the field of linear optimization problems, have prompted researchers around the world to develop a whole arsenal of methods (software) allowing to properly deal with several classes of problems once considered difficult to solve, including nonlinear programming, semi-definite programming, etc.

Linear optimization is a general mathematical framework for modelling and solving some optimization problems and it appears in many areas of applications such as agriculture, finance, economics, geometric problems and optimal control.

Mathematically, the problem is to optimize a linear function under linear constraints on the variables.

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