

DOCTORAL THESIS

Interior point based continuous methods for linear programming

Sun, Liming

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Interior Point Based Continuous Methods for Linear Programming

SUN Liming

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for the degree of
Doctor of Philosophy

Principal Supervisor: Prof. Liao Li-Zhi

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Abstract

The continuous method for optimization has been used to solve many practical problems in linear programming, quadratic programming and convex programming and so on. The interior point method was firstly presented by Karmarkar (1984) for linear programming, lots of contributions have been made both theoretically and practically. Continuous trajectories related to these interior point methods have been studied by some people. The trajectories can be also viewed as the continuous realization of the corresponding interior point method for linear programming. In this thesis, we propose two continuous methods to solve linear programming. The first method called continuous path-following method can be viewed as the combinations of the affine scaling direction and the centering direction. The continuous trajectory of the method is the solution of an ordinary differential equation. The existence and convergence of the method are analyzed and discussed in details. The second method called a projective dynamics is proposed for minimizing general linear programming. The new method is based on the variational inequality properties. We extend the variational inequality method to construct a new ODE system. The new dynamics will be very useful to solve large scale optimization problems.

Keywords: Linear programming, path-following method, continuous method, projective dynamics

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