Einladung

Im Oberseminar Reelle Geometrie und Algebra hält

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am Freitag, 08.05.2015, einen Vortrag zum Thema:

On the Shadow Simplex Method for Curved Polyhedra

Der Vortrag findet um 13:30 Uhr in F426 statt. Alle Interessenten sind herzlich eingeladen.

Abstract: Linear Programming (LP), which captures continuous optimization problems with linear constraints and objectives, is one of the main modelling languages used within Operations Research. The most popular technique for solving LPs in practice is the simplex method, which prescribes a rule for moving from solution to solution along the boundary of the feasible region until a global optima is reached. Despite its practical success, our theoretical understanding of simplex style algorithms remains relatively limited: the best worst case runtime achieved by a simplex algorithm (random facet rule) is subexponential in the number of variables, and polynomial runtimes are only known for random or restricted families of LPs.

In this work, we study the performance of the simplex method for a class of LPs whose feasible regions are suitably "curved", roughly speaking where the constraints of the feasible region meet at "sharp" angles. This class vastly generalizes that of totally unimodular LPs, which model many important combinatorial problems such as network flow. For our main results, we give a new variant and analysis of the shadow simplex algorithm – which follows a path over solutions induced by the boundary of a 2 dimensional projection (the so-called "shadow") of the feasible region – that achieves fast polynomial runtimes for "curved" LPs and substantially improves upon, both in terms of simplicity and efficiency, all previous works for this class.

Joint with Nicolai Hahnle (Bonn University)