

Solving Linear Programs

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This is a tutorial lecture about linear programming. I will begin with a historical survey of many of the methods which have been proposed for the solution of LPs. I will address, in particular, the Fourier-Motzkin, simplex, barrier, ellipsoid, subgradient, and bundle methods and will provide brief reviews of these methods and their theoretical and practical advantages and disadvantages.

I will finish the lecture by answering the obvious question: Is there a best LP solver? And if so, which algorithm/code is the method of choice for the solution of large-scale linear programming instances?

Solving Mixed-Integer Programs

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This lecture is a continuation of my LP tutorial. I will address here what happens when, in a linear program, some or all variables are required to be integral or when combinatorial optimization problems are attacked by means of LP-technology. I will discuss methods such as branch&bound, cutting planes, column generation, Lagrangian relaxation. The key issue again is: What combinations of which techniques work well in practice? There is no general answer. I will show, by means of many practical examples from my research group (telecommunication, transport, traffic and logistics, energy), how large scale MIPs and combinatorial optimization problems are successfully attacked today and which role linear programming plays in this methodology.