



Multilevel/Multistage Mixed Integer Linear Optimization

Motivation

Many real-world applications have:

- Discrete/indivisible decisions
- Multiple decision-makers

Application Areas

• Airline pricing and capacity allocation	•]
 Natural gas shipping 	• (
 Road network construction 	• (
 Toll revenue maximization 	• 1
 Hazardous material transportation 	•]

Methodology

- Generalized Benders' decomposition framework
- Theory of Duality
- Algorithm for problems with two decision-makers
- Coding in an open-source optimization solver (C++)

Parametric Valid Inequalities in Discrete Optimization

¹COR@L Lab, Department of Industrial and Systems Engineering, Lehigh University

- Multiple objectives • Multiple time periods
- Electricity demand management Chemical process optimization Gene-deletion strategy development Attacker-defender type problems
- Pollution control

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- Suresh Bolusani¹
- Ph.D. Advisor: Ted K. Ralphs¹

Warm Starting for Mixed Integer Linear Optimization

Motivation

- any applications require re-solving a problem:
- housands of times per minute
- losely-related problems
- inor data changes

Application Areas

Online optimization

- Routing
- Stochastic matching
- Resource allocation
- **Optimization problem** classes
- Bilevel optimization
- Multi-criteria optimization
- Stochastic optimization

Methodology

- olving a problem
- athering relevant information
- eusing above information for solving another problem oding in an open-source optimization solver (C/C++)





Algorithms

- Decomposition
- Lagrangian relaxation