

Computational Optimization

Introduction

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Training Level 1

- ▶ Introduction to Applied Optimization
 - presenting some of the most useful optimization technology
 - introducing some of the key intuitions behind them
 - Illustrating them on some “interesting” applications
- ▶ Core optimization techniques
 - Linear programming,
 - mixed-integer programming,
 - constraint programming

Cases and Teaser

Try a MIP Solver first

check the quality
of the linear
relaxation

If the problem is combinatorial,
try a CP Solver

scheduling,
sequencing and
time tabling

Repeat with
different models

What If nothing works?

Try a MIP Solver first

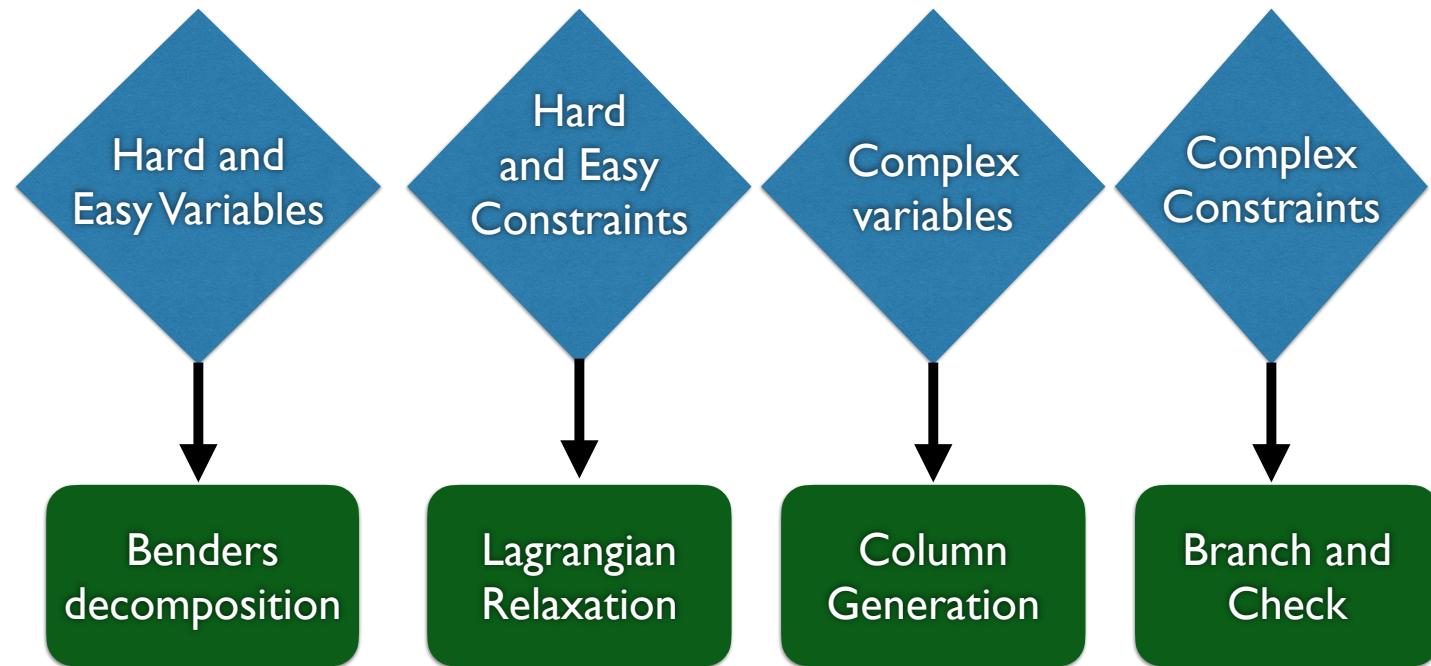
check the quality
of the linear
relaxation

If the problem is combinatorial,
try a CP Solver

scheduling,
sequencing and
time tabling

Take Optimization Training Level 2

Decomposition Techniques



Moving to Hyperspace



Moving to Hyperspace

- ▶ Solving problems
 - with exponentially many variables
 - with exponentially many constraints
 - with incredibly complex subproblems



Decomposition Techniques

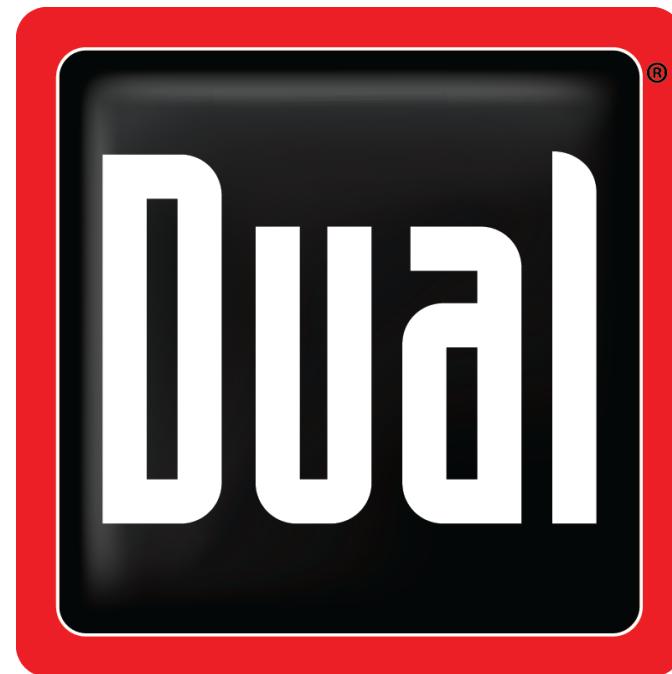


Exact Decomposition!

- ▶ The proposed techniques will be globally optimal



Two Key Insights



Welcome to Computational Optimization

- ▶ Refresher
- ▶ Benders decomposition
- ▶ Column generation and branch and price
- ▶ Lagrangian relaxation
- ▶ Advanced topics
 - Logical Benders decomposition, branch and price and check

Welcome to Computational Optimization

- ▶ Refresher
- ▶ Benders decomposition
 - evacuation planning
- ▶ Column generation and branch and price
 - community-based trip sharing
- ▶ Lagrangian relaxation
 - optimal discount of perishable products
- ▶ Advanced topics
 - logistics missions

The Organization

- ▶ You know the routine
 - lectures / videos
 - Q&A
 - practice sessions

