

Using Integer Programming Techniques to Solve Real World Planning and Scheduling Problems

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1. Introduction to integer programming
2. Lagrangian relaxation (bundle method)
 - 2a. Cyclic scheduling for nurses
3. Benders decomposition
 - 3a. Intensity Modulated Radiation Therapy (IMRT) planning
 - 3b. Equipment scheduling in high volume factories
3. Branch and cut
 - 3a. The vehicle routing problem with time windows (VRPTW)
4. Branch and price (column generation)
 - 4a. Cyclic scheduling for nurses
 - 4b. Scheduling home healthcare therapists for patients with fixed visit times
 - 4c. Production-Inventory-Distribution Routing Problem (PIDRP)
5. Stochastic optimization
 - 5a. Daily scheduling of baggage handlers at airports
 - 5b. Designing appointment schedules for multi-disciplinary outpatient clinics.
6. Applications – Clustering
 - 6a. FedEx, Designing driver work areas
 - 6b. AccentCare, Assigning clinicians to homebound patients
7. Applications – Texas Instruments, Scheduling semiconductor assemble & test operations
8. Applications – Vehicle routing problems
 - 7a. U.S. Postal Service, Resource planning for powered industrial vehicles (PIVs) at the mail processing and distribution centers.
 - 7b. Kroger, Daily route design for last-in, first-out deliveries with backhauling
 - 7c. Key Rehabilitation, Routing home healthcare workers