ORIE 6300 Mathematical Programming I September 11, 2014

Lecture 6

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1 Transportation Example

We want to transport 10 pianos from three locations to another two according to the following network (See Figure 1). What's the cheapest way?

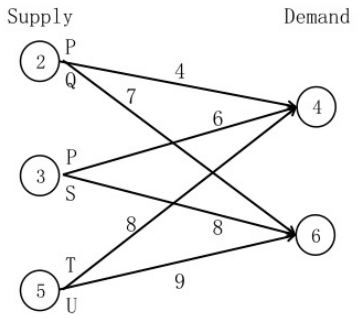

Figure 1: Transportation network example. Numbers on arcs are unit transportation cost.

2 LP formation

$$\begin{aligned} \min \quad & 4P + 7Q + 6R + 8S + 8T + 9V \\ s.t. \quad & P + Q = 2 \\ & R + S = 3 \\ & T + U = 5 \\ & P + R + T = 4 \\ & Q + S + U = 6 \\ & P, Q, R, S, T, U \geq 0, \text{integer} \end{aligned}$$

3 Tools

- Modeling Language: Specify your optimization problem. AMPL
- Solver: The software that solves optimization problem. MINOS

User $\leftrightarrow$ Modeling Language $\leftrightarrow$ Solver

Simple transportation model:

⋆ "var": define variables.

⋆ "minimize" (objective name): specify objective function.

⋆ "subject to" (constraint name): specify constraints.

For more complicated problem, we may want to specify model and data separately.

- Model file1 (.mod): specify optimization model (what kind of problem).
  - ⋆ "set": define index.
  - ⋆ "param": define parameters/coefficients.
- Data file (.dat): specify parameters to use for this problem.