Transportation Analytics

Final Project - Uber Load Management

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Optimization Variables

- m_{ij} := The number of cars relocated from location i to location j.

Model Parameters

- D_i := true demand for Ubers from location i
- y_{ij} := number of people who open app in location i matched with car from location j.
- x_{ij} := probability customers in location i will select Uber given it is in location j
- N_{0j} := number of cars in location j prior to relocation
- $N_{1j} = N_{0j} + \sum_i m_{ij} - \sum_i m_{ji}$:= number of cars in location j after relocation
- c_{ij} := cost of relocating Uber from location i to location j
- r := revenue from picking up a customer

Model

$$\max \sum_i \sum_j y_{ij} x_{ij} r - m_{ij} c_{ij}$$

$$\text{such that } N_{1j} = N_{0j} + \sum_i m_{ij} - \sum_i m_{ji} \quad \forall j$$

$$N_{0j} \geq \sum_i m_{ij} \quad \forall j$$

$$y_i j \geq 0 \quad \forall i, j$$

$$\sum_j y_{ij} \leq D_i \quad \forall i \text{ [consider equality]}$$

$$\sum_i y_{ij} x_{ij} \leq N_{1j} \quad \forall j$$