

Transportation Analytics

Final Project - Uber Load Management

April 24, 2018

Optimization Variables

- $m_{ij} :=$ The number of cars relocated from location i to location j
- $y_{ij} :=$ number of people who open app in location i matched with car from location j

Model Parameters

- $D_i :=$ true demand for Ubers from location i
- $x_{ij} :=$ 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

$$\begin{aligned} & \max \sum_i \sum_j y_{ij} x_{ij} r - m_{ij} c_{ij} \\ \text{such that } & N_{1j} = N_{0j} + \sum_i m_{ij} - \sum_i m_{ji} \quad \forall j \\ & N_{0j} \geq \sum_i m_{ij} \quad \forall j \\ & y_{ij} \geq 0 \quad \forall i, j \\ & \sum_j y_{ij} \leq D_i \quad \forall i \text{ [consider equality]} \\ & \sum_i y_{ij} x_{ij} \leq N_{1j} \quad \forall j \end{aligned}$$