Module 09 – Fixed Charge Problem

Exploratory Data Analysis

*In this section, you should perform some data analysis on the data provided to you. Please format your findings in a visually pleasing way and please be sure to include these cuts:*

* *Make a visual graph of your data on a map (coordinates should be within US borders)*
  + <https://mymaps.google.com/>
  + Find a map with latitude/longitude and place them approximately
  + Any alternative that gives the same effect

A map of the united states

AI-generated content may be incorrect.

Model Formulation

*Write the formulation of the model into here prior to implementing it in your Excel model. Be explicit with the definition of the decision variables, objective function, and constraints.*

Min:

2906X1+1809X1+1550X1+1508X1

Constraints:

All Yi must be binary

X1<=M1Y1

X2<=M2Y2

X3<=M3Y3

X4<=M4Y4

Nonnegativity

Xi>=0, i= 1, 2,…, 6

Model Optimized for Min Costs to Supply DCs



Model with Stipulation

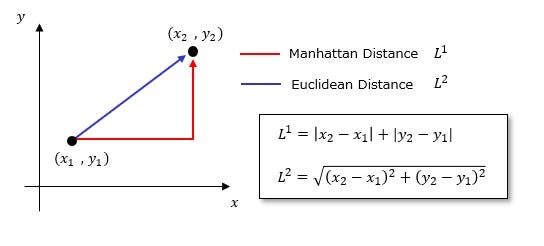
*Please copy the tab of your original model before continuing with the next part to avoid messing up your original solution.*

*Please perform 2 out of the 3 scenarios below with a short text description on what changed:*

1. *Instead of only being able to open 2 warehouses, what happens to our objective function when we only can open 1 warehouse?*

Our Objective function skyrockets to over $160,000 from the original $70,000

1. *Right now, we have $1 per unit shipped over the distance between the warehouse and the DC. What happens to our objective function when we increase this to $30? Does your DC assignment change at all?*
2. *For distance between each location, we used Manhattan distance but what happens to our model if we use Euclidean distance instead? Did the change impact the model at all? Do you feel this is a better distance metric to use in this scenario?*

This significantly decreases the objective function aka the total cost. Even though this lowers the cost, I believe the first way would be more accurate if shipments are conducted via ground travel, as the less direct roads is accounted for in the original calculation. On the other hand, if air travel is being used to ship, I believe the Euclidean distance is more accurate as you are taking an almost direct flight.