Assignment 5- Srijan Yenamula , Adithya Job

Question -5.1

Formulation of Indexes

$i \in I = \{1..16\}$ = Collection of distribution centers.

$j \in J = \{1…4879\}$= Collection of Stores

Yij= The decision to send the pizzas across the distribution center to stores

Si = Supply of the Pizzas from Distribution Center [i] to Stores[j]

Dj = Demand of pizzas in each store

Ci = Cost of Sending a van from distribution center to stores

Mij = Miles to travel from Distribution Center [i] to Stores[j]

Define and develop the data sets you will need to solve this problem

Stores Table: This table consist of Store Numbers and their Lat/ Long Data

Distribution Centers Table: This table consists of the Distribution Center's Serial Number, Cost, LAt/Long, Supply Capacity of the same.

Avg. Stores Demand Table: This table consists of the Store Number and their average Demand

Demand Table: this table consists of the daily demand of the stores

Miles Table: This table consists of the distance between distribution center and the stores.

Objective function

$$\text{Min} \left(\sum_{i=1}^{16} \sum_{j=1}^{4879} Y_{ij} * Dj * Ci * Mij \right) / 9900.0 \qquad i \in I \; j \in J$$

Constraints

s,t

1. $\sum_{j \in J}^{4879} Y_{ij} * D_j \leq (4/7)\, S_i \; ; \forall \; i \in I$
2. $\sum_{j \in I}^{4879} Y_{ij} = 1 \quad \forall i \in I \qquad , \qquad Y_{ij} = \{1,0\} \; ; \forall j \in J, i \in I$

Question 5.2

Formulation of Indexes

m $\in$ mills = Number of mills {1 to38}

d $\in$ dc= Number of distribution centers {1 to 16}

Mil = distance from mill 'm' to distribution center 'd' in miles

Sup[m]=supply of four days in fifty lbs sacks of flour at mill 'm'

Dem[d]=demand of four days at distribution center 'd' in Fifty lbs sacks

Ct[m]=Cost per mile for each mill 'm'

Cm[m]= Cost to make a sack of flour at mill 'm'

Fc[m]= Cost for tooling mill 'm'

edge[m,d]=Decision of mill 'm' is providing flour to distribution center 'd', 1- Yes, 0-No

tool[m]=Decision of mill 'm' is selected to provide flour to distribution centers. 1 –Yes, 0-No

Datasets

Supplier Data – provided the mill information, Lat and Long , capacity,cost/unit, fixed cost and cost/mile

Supplier and Distribution Center Distance – This table provides the distance between mill and Distribution center in miles

Flour Demand : this table holds how much each Distribution Center requires flour based on their pizza demand.

Objective function:

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Objective Function:

$$\text{Min: } \sum_{m}^{\text{mills}} \sum_{d}^{DC} edge[m,d] * dem[d] \left(cm[m] + \left(\frac{mill[m,d] * ct[m]}{880} \right) + \sum_{m}^{mill} tool[m] * Fc[m] \right)$$

Constraints:

$$\sum_{d \in dc}^{16} edge[m,d] * dem[d] \leq \left(\frac{4}{7.0}\right) sup[m] * tool[m]; \quad \forall m \in mills.$$

$$\sum_{m \in Units}^{38} edge[m,d] = 1; \quad \forall d \in dc$$

$$edge[m,d] = \{1,0\}; \quad \forall m \in mills, \; d \in dc$$

$$tool[m] = \{1,0\}; \quad \forall m \in mills.$$