

GREEDY APPROACH

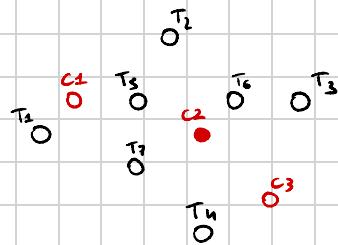
WE WANT TO MINIMIZE

$$\sum_j y_j c_j + \sum_{ij} x_{ij} d_{ij} t_i$$

THE APPROACH CONSISTS IN:

- ① SELECT THE MINIMUM COST CENTER AND SET IT ACTIVE
- ② "CONNECT" THE CLOSEST THAT FITS INSIDE THE CENTER

Step 1: Min cost is C_2



T_6 is the closest with demand 12
LEFT 15

T_5 is the closest with demand 7
LEFT 8

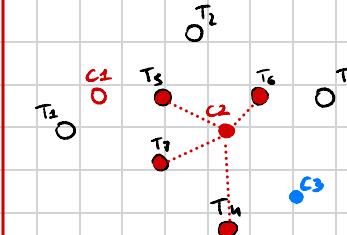
T_7 is the closest with demand 4
LEFT 4

T_4 is the closest with demand 3
LEFT 1

NEXT CENTER

$$\begin{array}{llll} t=25 & c_1=10 & c_2=5 & c_3=7 \\ t_1=5 & t_3=10 & t_5=7 & t_7=4 \\ t_2=7 & t_4=3 & t_6=12 & \end{array}$$

Step 2: Min cost is C_3

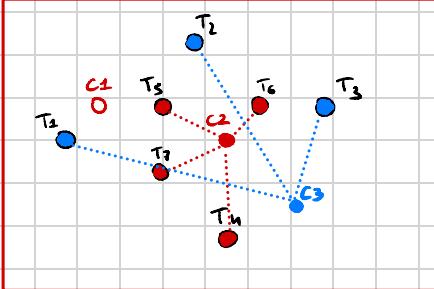


T_3 is the closest with demand 10
LEFT 15

T_2 is the closest with demand 7
LEFT 9

T_1 is the closest with demand 5
LEFT 4

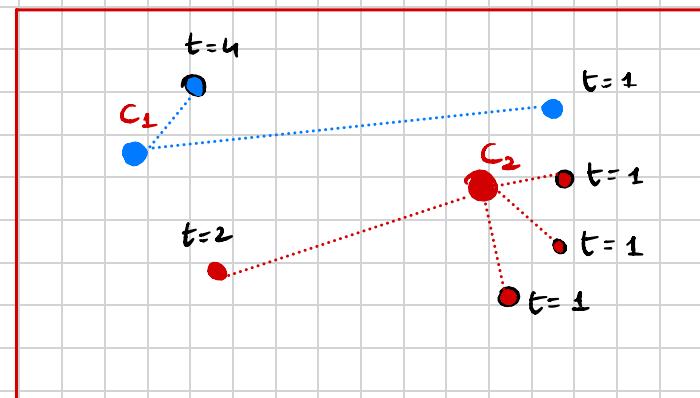
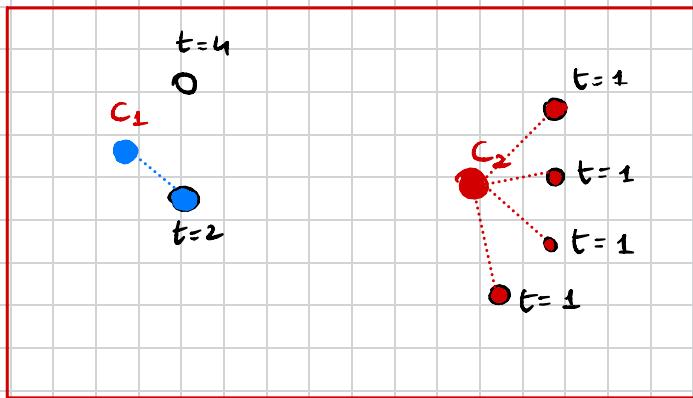
Step 3: Finished



UNFEASIBILITY

$$c_1 = 3 \quad c_2 = 2 \quad \Delta = 5$$

IN THIS CASE OUR GREEDY IS INFEASIBLE BUT THERE EXISTS A FEASIBLE SOLUTION

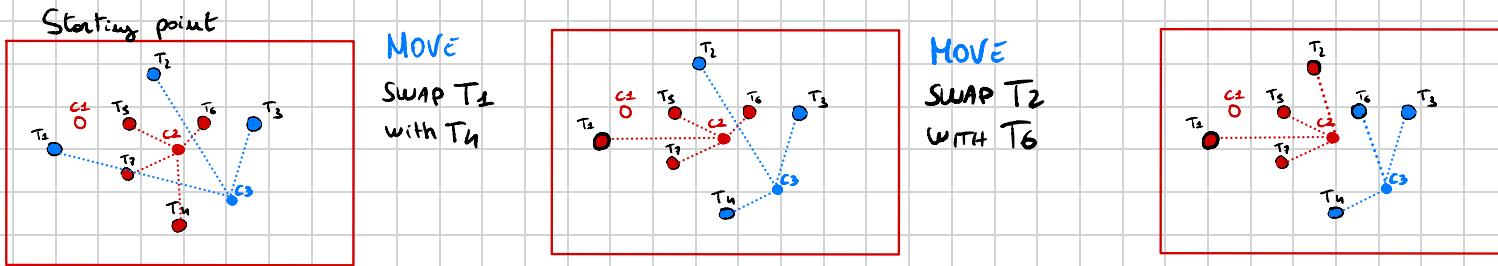


WE PROVED THAT OUR GREEDY CAN BE INFEASIBLE.

LOCAL SEARCH

ASSUMPTIONS: WE ALREADY CHOSE MINIMUM COST FACILITIES WITH THE GREEDY APPROACH.
SO WE DON'T CHANGE y_j VARIABLES SINCE CHANGING WILL INCREMENT THE OBJECTIVE FUNCTION
VALUE AND IT WILL BE MORE DIFFICULT TO IMPROVE.

APPROACH: WE JUST SWAP BETWEEN CENTERS THE TOWNSHIP TRYING TO IMPROVE THE SOLUTION BASED ON THE DISTANCE
PART OF THE OBJECTIVE FUNCTION.



PSEUDO CODE FOR MOVE

First improvement

Chose randomly two centers [AKA 2 columns]
repeat m times:
 Swap two random township
 if improving and feasible
 break

20 times

20 most
big

choose two random center

You put max distance = +00

for n times :

choose the furthest V towns from each \checkmark ^{but < max distance}

You try to swap them
if they don't fit:

you put max distance to the value

5

1

5

COMPARISON WITH ILP

ILP
objfunc
443403
178706
740271
652272
839167.3623
72453180.29

Greedy
objfunc
522465 → No Better
310725 → 289671
993617 → 969820
846301 → No Better
38977900 → 12164428
196180000 → 19602750

PABLO'S COMPUTER

Time PABLO
0.0030 s
0.0038 s
0.0205 s
0.0208 s
0.0324 s
0.1055 s

Time MATTIA
0.0083 s
0.0057 s
0.0334 s
0.0366 s
0.0478 s
0.3928 s

RAM 8GB 16GB
CORES 4 8