

* Assignment 1 ** Title:- The transportation problem.

* Problem statement:- Milk in a milk shed area is collected on 3 routes A, B, C. There are 4 chilling centres P, Q, R, S where milk is kept before transporting it to a milk center. Each route is able to supply on an avg. one thousand litres of milk per day. The supply of milk on routes A, B, C are 150, 160, 90 thousand litres resp. The cost of transporting thousand litres of milk from each route to each chilling center differs according to distance. Cost in Rs is shown in table below.

Routes	Chilling Center.			
	P	Q	R	S
A	16	18	21	12
B	17	19	14	13
C	32	11	15	10

Minimize the total transportation cost.

* Objective:- To understand the implementation of various transportation problem methods like north-west corner, least cost, Vogel's approximation method.

* Slw & Hlw requirements:-

Visual studio Code 2GB RAM, 500GB HDD, windows OS, i5 processor.

OutCome:- After Completion of this assignment of various methods the student will be able to Calculate the minimum transportation Cost.

Theory:-

North-west Corner method:-

This is a method adapted to Compute the initial Cost of Feasible Solution to the transportation problem. The name is given to this method because the basic Variables are selected from extreme left Corner.

Code:-

```
def north-west-Corner(supply, demand):
    supply-copy = supply.copy()
    demand-copy = demand.copy()
    i = 0
    j = 0
    bfs = []
    while len(bfs) < len(supply) + len(demand):
        s = supply-copy[i]
        d = demand-copy[j]
        v = min(s, d)
        supply-copy[i] -= v
        demand-copy[j] -= v
        bfs.append((i, j, v))
```


if supply - copy[i] == 0 & i < len(supply) - 1
i += 1

elif demand - copy[j] == 0 & j < len(demand) - 1
j += 1.

return bfs:

* Least Cost method :-

The Least Cost method is another method used to obtain the initial feasible solution for the transportation problem. Here, the allocation begins with the cell which has the minimum cost. The lower cost cells are chosen over the higher cost cells with the objective to have the least cost of transportation.

* Algorithm:-

Step 1:- Select the cell having minimum unit cost C_{ij} and allocate as much as possible. i.e. $\min(s_i, d_j)$

Step 2:- (a) subtract this minimum value from supply s_i and demand d_j

(b) If the supply s_i is 0 then cross that row and if demand d_j is 0 then cross the column.

(c) If min unit cost cell is not unique, then select the cell where maximum allocation can be possible.

step 3:- Repeat above steps for all uncrossed rows & columns until supply and demand values are zero.

* Vogel's Approximation Method:-

VAM is an iterative procedure calculated to find out the initial feasible solution of the transportation problem like least cell method, here also the shipping cost is taken into consideration but in relative sense.

* Algorithm:-

step 1:- Find the cells having smallest cost to smallest cost in each row & write the difference along the side of the table in row ~~penalty~~ penalty.

step 2:- Find the cells having smallest cost in each column and write the difference along the side of the table in each column penalty.

step 3:- select the row or column with the maximum penalty and find cell that has least cost in selected row or column. Allocate as much as possible in this cell.

step 4:- Adjust the supply and demand and cross-out the satisfied row or column.

step 5:- Repeat this step until all supply and demand values are 0.

Conclusion:-

I have successfully studied and implement the north-west Corner, least Cost and Vogel's approximation method for calculating the transportation cost. where VAM gave the least cost among the 3 costs for transportation.