PB_05_Kushagra Suryawanshi Submission Date: 12/09/2021

CN-LAB ASSIGNMENT 4

Title: Distance Vector Algorithm

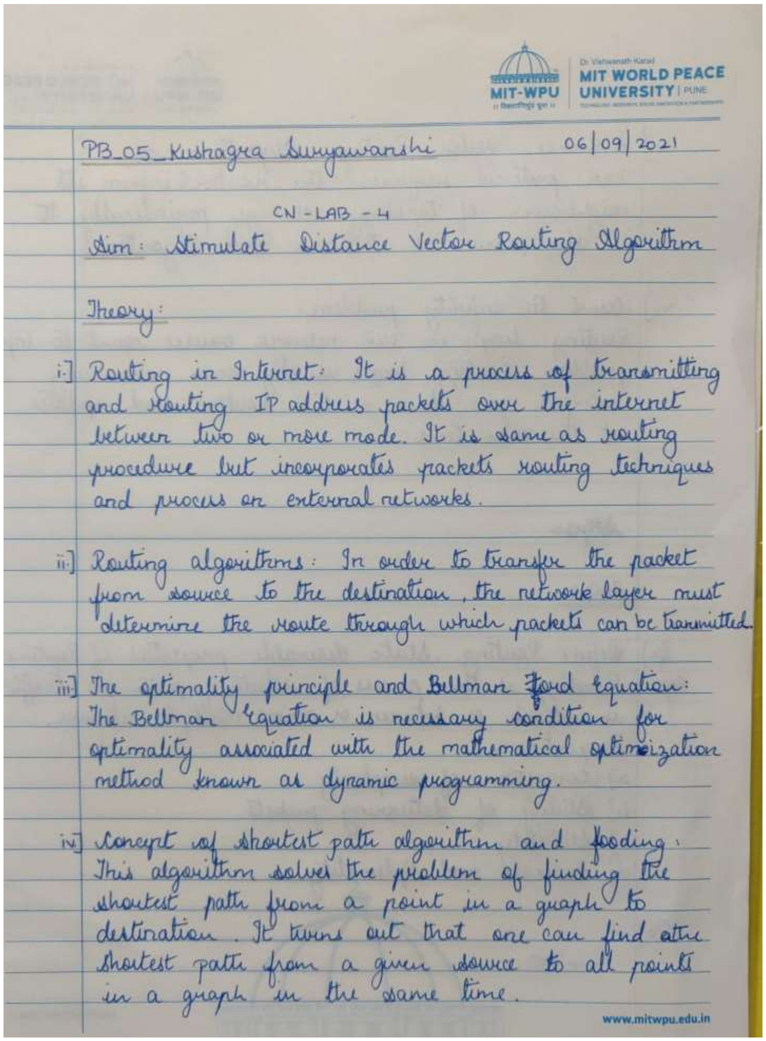
Aim:

Write program to simulate distance routing algorithm

Objective:

To study concept of routing mechanism:

Theory:



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PB_05_Kushagra Suryawanshi 06/09/2021

CN-LAB-4

Aim: Stimulate Distance Vector Routing Algorithm

Theory:

i.] Routing in Internet: It is a process of transmitting and routing IP address packets over the internet between two or more mode. It is same as routing procedure but incorporates packets routing techniques and process on external networks.

ii.] Routing algorithms: In order to transfer the packet from source to the destination, the network layer must determine the route through which packets can be transmitted.

iii.] The optimality principle and Bellman Ford Equation: The Bellman Equation is necessary condition for optimality associated with the mathematical optimization method known as dynamic programming.

iv.] Concept of shortest path algorithm and fooding: This algorithm solves the problem of finding the shortest path from a point in a graph to destination. It turns out that one can find athe shortest path from a given source to all points in a graph in the same time.

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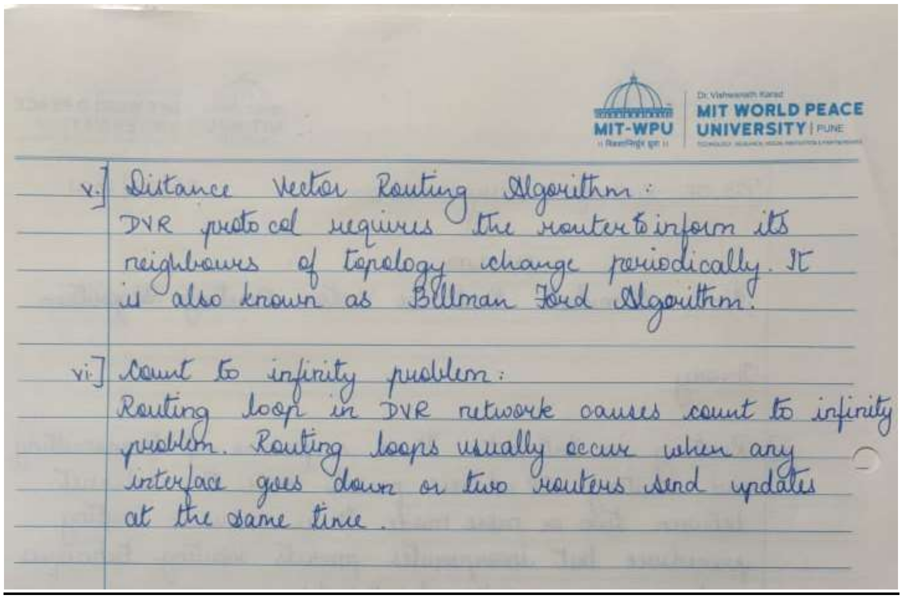

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v.] Distance Vector Routing Algorithm:
DVR protocol requires the router to inform its neighbours of topology change periodically. It is also known as Bellman Ford Algorithm.

vi.] Count to infinity problem:
Routing loop in DVR network causes count to infinity problem. Routing loops usually occur when any interface goes down or two routers send updates at the same time.

Steps:

1. Prepare Input Table
2. Specify delays between routers
3. Enter Neighbours for specific router
4. Compare and note minimum distance
5. Print table

Code:

```
#PB_05_Kushagra Suryawanshi

import string
matrix_initial = []
matrix_initial1 = []
Num_Routers = int(input("Number of routers: "))
New_Tab = input("New routing table for: ")
Num_Neighs = int(input("Number of neighbours: "))
neighbours = []
for  i in range( 0,Num_Neighs):
   neighbours.append(input(f"Enter neighbour of {New_Tab}: "))

for i in range(0,Num_Routers):
   temp = []
   for j in range(0,Num_Neighs):
      temp.append(int(-1))
   matrix_initial.append(temp)

alphabet_string = string.ascii_uppercase
ch = list(alphabet_string)
```

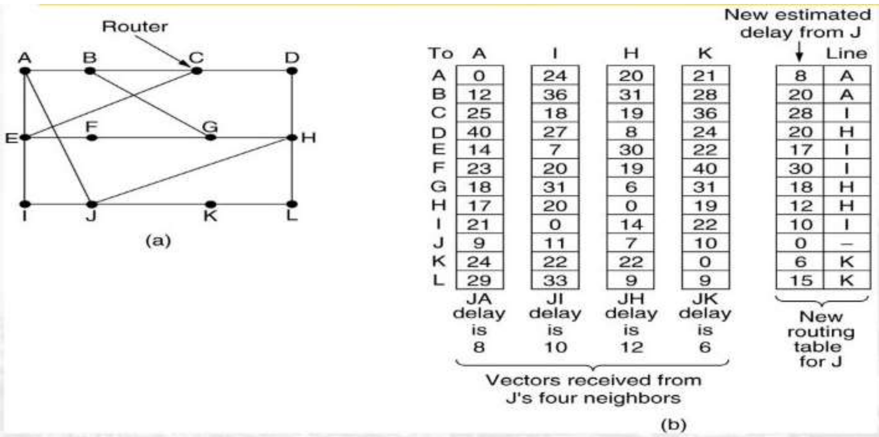
```
for i in range(0,Num_Routers):
    for j in range(0,Num_Neighs):
        x = 0
        y = -1
        if(ch[i] == neighbours[j]):
            matrix_initial[i][j] = x
        if(int(str(matrix_initial[i][j])) == y):
            temp1 = (int(input(f"Enter distance between {ch[i]} and {neighbours[j]}: ")))
            matrix_initial[i][j] = temp1

for i in range(Num_Neighs):
    print("  ",neighbours[i],end =' ')
print()
for i in range (Num_Routers):
    print(ch[i], end = '  ')
    for j in range(Num_Neighs):
        print(matrix_initial[i][j],"  ",end=' ')
    print()

t = []
for i in range(Num_Neighs):
    t.append(int(input(f"Enter delay time for {New_Tab} {neighbours[i]}: ")))
Vector_Table = []
for i in range(Num_Routers):
    Vector_Table.append(0)

p = 0
for i in range(Num_Routers):
    min1 = 999
    for j in range(Num_Neighs):
        if(matrix_initial[i][j] < min1):
            min1 = matrix_initial[i][j]
            p = j
    Vector_Table[i] = min1 + t[p]

print(f"\n\nNEW ROUTING TABLE FOR {New_Tab} is:")
print(" ",New_Tab)
for i in range (Num_Routers):
    if(ch[i] == New_Tab):
        Vector_Table[i] = 0
        print(ch[i],Vector_Table[i])
    else:
        print(ch[i],Vector_Table[i])
```



To	A	I	H	K	New estimated delay from J	Line
A	0	24	20	21	8	A
B	12	36	31	28	20	A
C	25	18	19	36	28	I
D	40	27	8	24	20	H
E	14	7	30	22	17	I
F	23	20	19	40	30	I
G	18	31	6	31	18	H
H	17	20	0	19	12	H
I	21	0	14	22	10	I
J	9	11	7	10	0	–
K	24	22	22	0	6	K
L	29	33	9	9	15	K
	JA delay is 8	JI delay is 10	JH delay is 12	JK delay is 6	New routing table for J	

Vectors received from J's four neighbors

(a) A subnet. (b) Input from A, I, H, K, and the new routing table for J.

Output:

```
Number of routers: 12
New routing table for: J
Number of neighbours: 4
Enter neighbour of J: A
Enter neighbour of J: I
Enter neighbour of J: H
Enter neighbour of J: K
Delays:  A and I: 24
Delays:  A and H: 20
Delays:  A and K: 21
Delays:  B and A: 12
Delays:  B and I: 36
Delays:  B and H: 31
Delays:  B and K: 28
Delays:  C and A: 25
Delays:  C and I: 18
Delays:  C and H: 19
Delays:  C and K: 36
Delays:  D and A: 40
Delays:  D and I: 27
Delays:  D and H: 8
Delays:  D and K: 24
Delays:  E and A: 14
Delays:  E and I: 7
Delays:  E and H: 30
Delays:  E and K: 22
Delays:  F and A: 23
Delays:  F and I: 20
Delays:  F and H: 19
Delays:  F and K: 40
Delays:  G and A: 18
Delays:  G and I: 31
Delays:  G and H: 6
Delays:  G and K: 31
Delays:  H and A: 17
Delays:  H and I: 20
Delays:  H and K: 19
Delays:  I and A: 21
Delays:  I and H: 14
```

```
Delays:  I and K: 22
Delays:  J and A: 9
Delays:  J and I: 11
Delays:  J and H: 7
Delays:  J and K: 10
Delays:  K and A: 24
Delays:  K and I: 22
Delays:  K and H: 22
Delays:  L and A: 0
Delays:  L and I: 33
Delays:  L and H: 9
Delays:  L and K: 9

   A    I    H    K
A  0    24   20   21
B  12   36   31   28
C  25   18   19   36
D  40   27   8    24
E  14   7    30   22
F  23   20   19   40
G  18   31   6    31
H  17   20   0    19
I  21   0    14   22
J  9    11   7    10
K  24   22   22   0
L  0    33   9    9

Delay between J A: 8
Delay between J I: 10
Delay between J H: 12
Delay between J K: 6


NEW ROUTING TABLE FOR J is:
  J
A 8
B 20
C 28
D 20
E 17
F 31
G 18
H 12
I 10
J 0
K 6
L 8
```

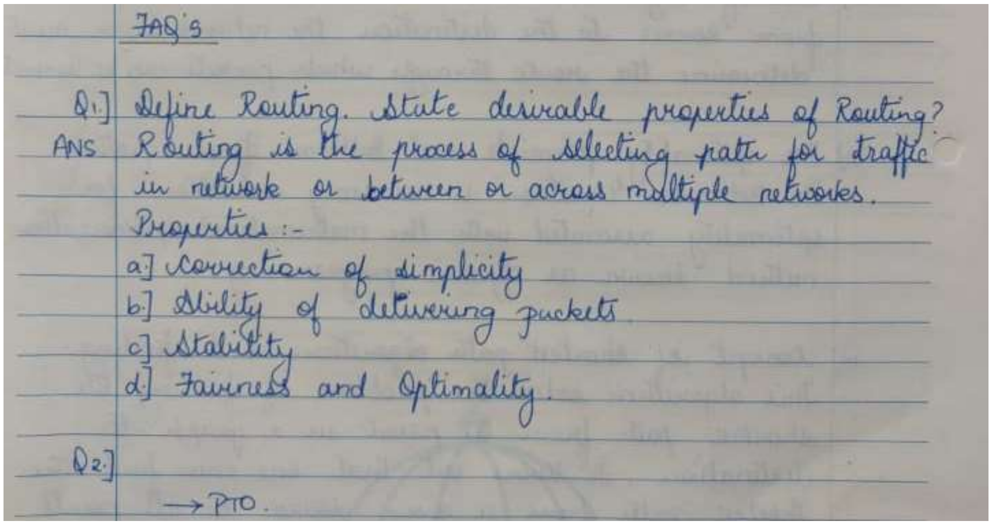
Student’s Observation:

We learnt the working of distance vector algorithm and it’s mechanism.

Conclusion:

Thus, we studied and implemented the working of Distance Vector Routing Algorithm.

Faqs:



FAQ's

Q1.] Define Routing. State desirable properties of Routing?

ANS Routing is the process of selecting path for traffic in network or between or across multiple networks.

Properties :-

a.] Correction of simplicity

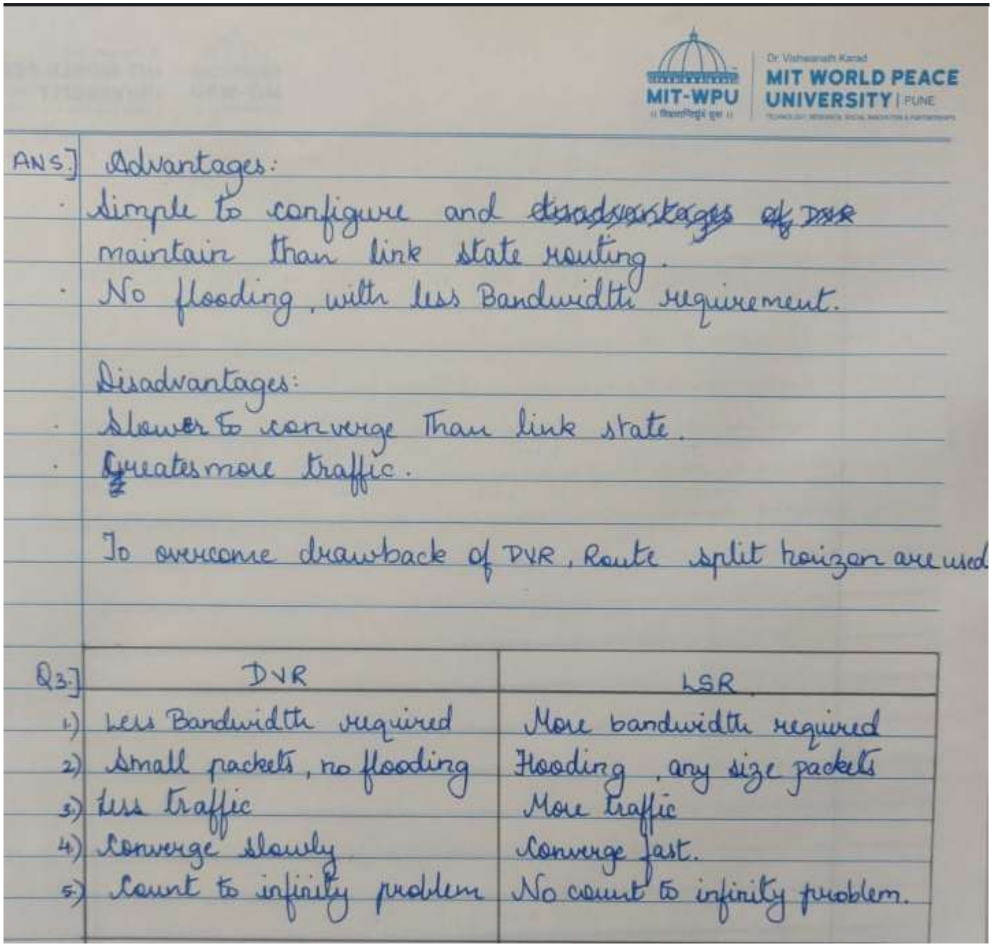
b.] Ability of delivering packets.

c.] Stability

d.] Fairness and Optimality.

Q2.]

→ PTO.



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ANS.] Advantages:

- Simple to configure and ~~disadvantages of DVR~~ maintain than link state routing.
- No flooding, with less Bandwidth requirement.

Disadvantages:

- Slower to converge Than link state.
- Createsmore traffic.

To overcome drawback of DVR, Route split horizon are used

Q3.]	DVR	LSR.
1)	Less Bandwidth required	More bandwidth required
2)	Small packets, no flooding	Flooding, any size packets
3)	Less traffic	More traffic
4)	Converge slowly	Converge fast.
5)	Count to infinity problem	No count to infinity problem.