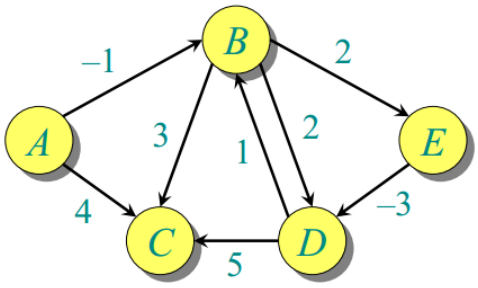
190031187 **NERELLA VENKATA RADHAKRISHNA**

Tutorial-4

Question: Single-Source Shortest Paths – Bellman Ford Algorithm

Given a source vertex from set of vertex V in a weighted graph when its edge weights w(u,v) can be negative, find the shortest-path weights d(s,v) from given s from all vertices v present in the graph. If the graph contains negative-weight cycle, report it. Consider the below graph.



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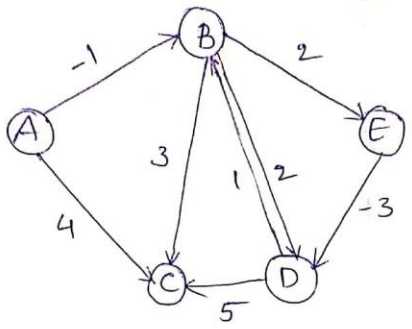
Radhakrishna

1.



No. of vertices = 5

let source vertex = A

Iteration to be done (atmost) = vertices - 1
= 4

Initially

A	B	C	D	E
0	∞	∞	∞	∞

Edges - (A,B) (A,C) (B,C) (B,D) (D,C) (D,B) (B,E) (E,D)

Note - Need not be in same order

Iteration - 1

After (A,B)

A	B	C	D	E
0	-1	∞	∞	∞

After (A,C)

A	B	C	D	E
0	-1	4	∞	∞

After (B,C)

A	B	C	D	E
0	-1	2	∞	∞

After (B,D)

A	B	C	D	E
0	-1	2	1	∞

After (D,C)

A	B	C	D	E
0	-1	2	1	∞

pass (D, B)

A	B	C	D	E
0	-1	2	1	∞

pass (B, E)

A	B	C	D	E
0	-1	2	1	1

pass (E, D)

A	B	C	D	E
0	-1	2	-2	1

Iteration - 2

pass (A, B)

A	B	C	D	E
0	-1	2	-2	1

pass (A, C)

A	B	C	D	E
0	-1	2	-2	1

pass (B, C)

A	B	C	D	E
0	-1	2	-2	1

pass (B, D)

A	B	C	D	E
0	-1	2	-2	1

pass (D, C)

A	B	C	D	E
0	-1	2	-2	1

pass (D, B)

A	B	C	D	E
0	-1	2	-2	1

pass (B, E)

A	B	C	D	E
0	-1	2	-2	1

pass (E, D)

A	B	C	D	E
0	-1	2	-2	1

we can observe that there is no change in this whole iteration. so we can stop here

Note:- While coding we cannot find out these things so we will do atmost of (Vertices - 1) iterations

So Final values of vertices are

A - 0

B - (-1)

C - 2

D - (-2)

E - 1