Is it possible to improve the Bellman-Ford algorithm? If possible then how can you improve it? Write pseudocode and show an example using a chart.

Answer:

Yes, it is possible to improve the Bellman-Ford algorithm. The Shortest path faster algorithm (SPFA) is an improvement of the Bellman-Ford algorithm. It follows a similar approach as Bellman-Ford, but instead of trying all vertices at once, SPFA creates a queue of candidate vertices and only adds a vertex to the queue if it is relaxed.

Pseudocode:

```
shortest-Path-Faster-Algorithm(G, s)
    for each vertex v ≠ s in V(G)
        d(v) := ∞
    d(s) := 0
    push s into Q
    while Q is not empty do
        u := poll Q
        for each edge (u, v) in E(G) do
            if d(u) + w(u, v) < d(v) then
                d(v) := d(u) + w(u, v)
                if v is not in Q then
                    push v into Q
```

Example:

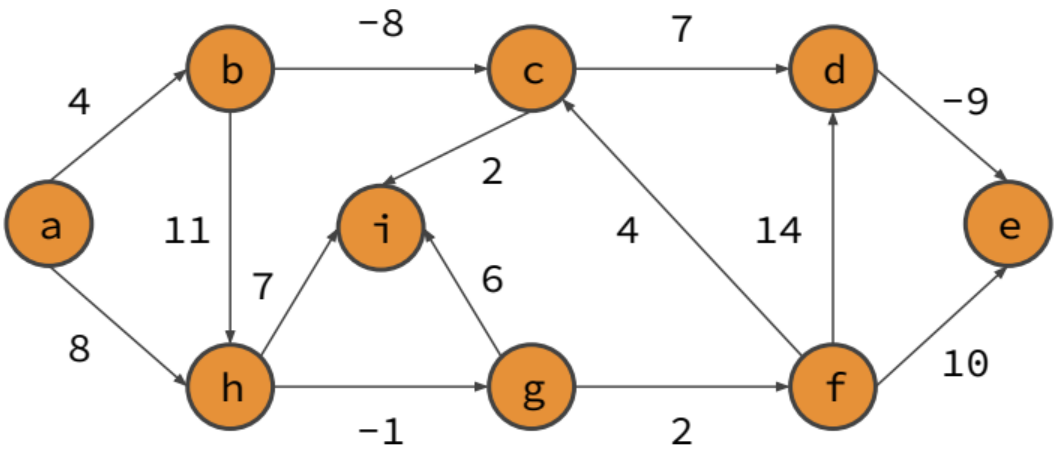

Table:

Vertex	a	b	c	d	e	f	g	h	i
initial	0	∞	∞	∞	∞	∞	∞	∞	∞
1	-	4	- 4	3	- 6	-	7	8	- 2
2	-	-	-	-	-	9	-	-	-
3	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-

Queue:

Front Back

e	c	i	d	b	g	h	f