1: \(d(a, z)\), shortest path} shortestPath(weighted, connected, simple graph \(G\),
vertex \(a\), vertex \(z\))

2:  # Initialization

3: \(B = \{a\}\)

4: \(n = 0\)  # initial iteration

5: \(r = a\)  # the most recent vertex added to \(B\)

6: \(d(a, a) = 0\)  # the distance from \(a\) to \(a\) is known

7: for each vertex \(v\) in \(G - \{a\}\)

8: \(d_0(v) = \infty\)  

9:  # Start the main loop

10: while \(z \not\in B\)

11: \(n = n + 1\)

12: \(A\) becomes the set of vertices in \(V - B\) which are adjacent to \(r\)

13: for each vertex, \(u\) in \(A\)  # a shorter estimate may be possible

14: \(d_n(u) = \min\{d_{n-1}(u), d(a, r) + w(r, u)\}\)

15: if \(d_n(u) \neq d_{n-1}(u)\)

16: \(p(u) = r\)  # \(u\) is currently best reached by passing through \(r\)

17: for each vertex, \(v \in (V - A)\)  # no change in the estimate

18: \(d_n(v) = d_{n-1}(v)\)

19: \(x = a\) vertex in \(V - B\) with minimum value for \(d_n(u)\) among vertices \(u \in V - B\)

20: \(d(a, x) = d_n(x)\)  # the true distance from \(a\) to \(x\) is now known

21: add \(x\) to \(B\)

22: \(r = x\)  # \(x\) becomes the most recently added vertex

23:  # \(z\) has been reached, now construct the path

24: \(P = \) an ordered list with \(z\) as its only element  # start building the path

25: \(r = z\)  # the most recently added vertex

26: while \(r \neq a\)

27: \(x = p(r)\)  # \(r\) can be reached by passing through \(x\)

28: prepend \(x\) to \(P\)  # add next vertex to the front of \(P\)

29: \(r = x\)

30: return \([d(a, z), P]\)

31: end shortestPath

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| \(n\) | \(B\) | \(r\) | \(A\) | \(a\) | \(q\) | \(y\) | \(s\) | \(t\) | \(m\) | \(u\) | \(z\) | \(a\) | \(q\) | \(y\) | \(s\) | \(t\) | \(m\) | \(u\) | \(z\) |
| 0 | \(\{a\}\) | \(a\) | \(\{u, y\}\) | \(0\) | \(\infty\) | \(\infty\) | \(\infty\) | \(\infty\) | \(\infty\) | \(\infty\) | \(\infty\) | \(a\) | \(a\) |
| 1 | \(\{a, y\}\) | \(y\) | \(\{q, u, t\}\) | \(9\) | \(3\) | \(4\) | \(y\) | \(y\) |
| 2 | \(\{a, u, y\}\) | \(u\) | \(\{t\}\) | \(6\) |
| 3 | \(\{a, t, u, y\}\) | \(t\) | \(\{q, m\}\) | \(7\) | \(11\) | \(t\) | \(t\) |
| 4 | \(\{a, q, t, u, y\}\) | \(q\) | \(\{s\}\) | \(12\) | \(11\) | \(q\) |
| 5 | \(\{a, m, q, t, u, y\}\) | \(m\) | \(\{s, z\}\) | \(12\) | \(18\) | \(m\) |
| 6 | \(\{a, m, q, t, u, y\}\) | \(s\) | \(\{z\}\) | \(16\) | \(s\) |