

DEF BFS_SET(v , color, d , pred):

$v.color \leftarrow color$

$v.d \leftarrow d$

$v.pred \leftarrow pred$

$\Theta(1)$

END DEF

DEF BFS_INIT(G , s):

FOR v IN $G.V$:

BFS_SET(v , WHITE, ∞ , NIL)

END FOR

BFS_SET(s , GRAY, 0, s)

RETURN BUILD_QUEUE(E_s)

END DEF

DEF BFS(G , s):

$Q \leftarrow$ BFS_INIT(G , s)

WHILE Q is NOT EMPTY:

$u \leftarrow$ DEQUEUE(Q)

FOR v IN $G.Ads[u]$:

IF $v.color = WHITE$:

BFS_SET(v , GRAY, $u.d + 1$, u)

ENQUEUE(Q , v)

ENDIF

ENDFOR

$u.color \leftarrow BLACK$

ENDWHILE

END DEF

$\parallel \Theta(1) \parallel \Theta(|V|)$

$\parallel \Theta(|V|)$

$\parallel \Theta(1)$

$\parallel O(|E|)$

$\parallel \Theta(1) \parallel O(|E|)$

$\parallel \Theta(1)$

$\parallel O(|V|)$

$$T_{BFS}((V, E)) = \Theta(|V|) + O(|E|) + O(|V|)$$

$\in O(|E| + |V|)$

DEF EXTRACT_PATH(v):

PATH \leftarrow ARRAY[$v.d + 1$]

$i \leftarrow v.d + 1$

WHILE $v.pred \neq v$:

PATH[i] $\leftarrow v$

$i \leftarrow i - 1$

$v \leftarrow v.pred$

ENDWHILE

PATH[i] $\leftarrow v$

RETURN PATH

END DEF

HANDLE NON-REACHABLE
NODES