Algorithm 1 Modified Dijkstra's Algorith

Input: A graph $G(V, E)$, weights $w : E \to \mathbb{R}_{\geq 0}$, source vertex s,
time threshold t and i denotes the index of the service type
Output Assign $v.r[i] = 1$ for vertices that can reach to s within threshold t

```
Q ← ∅
INSERT(Q, s)
while Q ≠ ∅ do
    v ←EXTRACT-MIN(Q)
    if v.d > t then
        Q ← ∅
    else
        v.r[i] ← 1
        for each vertex u ∈ Adj[v] do
            if u ∉ Q then
                u.d ← v.d + w(u, v)
                INSERT(Q, u)
            else if u.d > v.d + w(u, v) then
                u.d ← v.d + w(u, v)
                DECREASE-KEY(Q, u, u.d)
            end if
        end for
    end if
end while
```

Algorithm 2 15-Minute City Algorithm

Input: A graph $G(V, E)$, weights $w : E \to \mathbb{R}_{\geq 0}$, a time threshold t
and a list S of service vertices of p types
Output Set $R \subseteq V$ representing the t-Minute City

```
for all vertex v ∈ V do
    v.r ← {0}^p
    v.l ← {0}^p
end for
for all service v ∈ S do
    v.l[i] ← 1 for each service type i which belongs to vertex v
end for
for each service type i ∈ {1, ..., p} do
    Create a new vertex s
    Add edges from s to all vertices v where v.l[i] = 1 and w(s, v) ← 0
    Modified_Dijkstra_2(G, w, s, t, i)
    Remove s and all edges connected to it
end for
R ← ∅
for each vertex v ∈ V do
    if v.r = 1 then
        R ← R ∪ {v}
    end if
end for
```