

Input: Custom taxonomy table with capacity \mathcal{C} with column taxa as List \mathcal{L}_{taxa7} **Output:** NCBI-TREE nodes.dmp and names.dmp for custom taxonomy

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1: Initializing NCBI-Tree as Directed Acyclic Graph(DAG) with Dict  $\mathcal{D}_{dag}$ 
2: Initializing vertices and edges in DAG with List  $\mathcal{L}_{vertices}$  and  $\mathcal{L}_{edges}$ 
3: Initializing taxa node ever seen with Dict  $\mathcal{D}_{taxa_{seen}}$ 
4: Initializing taxa node ID with Dict  $\mathcal{D}_{taxid_{node}}$ 
5:
6: for  $genome = 1, \mathcal{C}$  do
7:   for  $\varepsilon, taxon$  in enumerate( $\mathcal{L}_{taxa7}$ ) do
8:     Adding Vertex  $taxon$  into  $\mathcal{D}_{dag}$  when not in  $\mathcal{D}_{dag}$ , or nothing to do
9:     if  $taxon$  NOT in  $\mathcal{D}_{dag}$  then
10:        $\mathcal{D}_{dag}[taxon] = []$ 
11:       Updating Taxa Node ID with occurrence order of incrementing by 1
12:        $\mathcal{D}_{taxid_{node}}[taxon] = \text{len}(\mathcal{D}_{taxid_{node}}) + 1$ 
13:     end if
14:
15:     Updating Edges from root to leaf(RTL) in Linked List
16:     if  $\varepsilon = 0$  then
17:       Adding Edge  $taxon$  from root of  $\mathcal{D}_{dag}$ 
18:        $\mathcal{D}_{dag}[root] = [taxon]$ 
19:     else
20:       Adding Edge  $taxon$  to  $taxon_{before}$  denoted with  $\mathcal{L}_{taxa7}[\varepsilon - 1]$  of  $\mathcal{D}_{dag}$ 
21:        $\mathcal{D}_{dag}[taxon_{before}] = [taxon]$ 
22:     end if
23:   end for
24: end for
25:
26: Recursive DFS to generate node.dmp and names.dmp
27: Initializing nodes and names as List  $\mathcal{L}_{name}$  and  $\mathcal{L}_{node}$ 
28: DFS( $taxon, \mathcal{L}_{name}, \mathcal{L}_{node}$ )
29: for  $taxon_{child}$  in  $\mathcal{D}_{dag}[taxon]$  do
30:   if  $taxon_{child}$  in  $\mathcal{D}_{taxa_{seen}}$  then
31:     Continue
32:   end if
33:    $\mathcal{D}_{taxa_{seen}}[taxon_{child}] = flag$ 
34:
35:   Appending nodes with  $taxid, parent_id, rank, \dots$  format
36:    $\mathcal{L}_{node}.append(\mathcal{D}_{taxid_{node}}[taxon_{child}], \mathcal{D}_{taxid_{node}}[taxon], \mathcal{D}_{rank}[taxon_{child}], \dots)$ 
37:
38:   Appending names with  $taxid, name, 'scientificname'$  format
39:    $\mathcal{L}_{name}.append(\mathcal{D}_{taxid_{node}}[taxon_{child}], taxon_{child}, 'scientific name')$ 
40:   DFS( $taxon_{child}, \mathcal{L}_{name}, \mathcal{L}_{node}$ )
41: end for
42:

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