

Inapplicable algorithm description

1 First downpass

1. Enter on any of the tips of the tree and focus on its closest ancestor (hereafter referred as the “focal node”) then go to 2.
2. **If** there is a state in common between both descendants of the focal node, **set** the focal node state to the states in common **then** go to 3. **Else** go to 4.
3. **If** the state of the focal node is now only the inapplicable token but that both descendants also have at least one applicable state, **set** the focal node state to be the union of both descendants states; **then** go to 6.
4. **If** there is a no state in common between both descendants, **set** the focal node state to be the union of both descendants states; **then** go to 5.
5. **If** both descendants have also applicable states, **remove** the inapplicable token from the the focal node state; **then** go to 6.
6. Go to the closest ancestor from the focal node and repeat from 2 until all the nodes in the tree have been visited.

2 First uppass

1. Enter the tree on the root. **If** if the root has both inapplicable *and* applicable states, **remove** the inapplicable state; then go to 2.
2. Select the next focal node after the root; then go to 3.
3. **If** that focal node as an inapplicable token go to 4; **else** go to 6.
4. **If** the focal node also has any applicable state *and* **if** the state of the focal node’s ancestor has an inapplicable token, **set** the focal node state to be the inapplicable token; **then** go to 9. **Else** go to 5.
5. **Remove** the inapplicable token from the focal node states; **then** go to 9.

6. **If** the focal node's ancestor state has an inapplicable token, **set** the focal node state to be the inapplicable token **then** go to 9. **Else** go to 7.
7. **If** the union between the descendants is applicable **set** the nodal state to be this union *and* **remove** any eventual inapplicable tokens; **then** go to 9. **Else** go to 7.
8. **Set** the focal node state to be the inapplicable token only; **then** go to 9.
9. Select to the next node and repeat from 3 until all nodes have been visited; then go to 6.
10. Exit the first uppass.

3 Second downpass

1. Enter on any of the tips of the tree and focus on its closest ancestor then go to 2.
2. **If** the focal node state has an applicable state, go to 3. **Else** go to 4.
3. **If** the the focal node's two descendants have both in common at least on state that is not the inapplicable token, **set** the focal node state to be this common state (without any inapplicable token); **then** go to 5.
4. **Else** the **set** the focal node's state to be the union between both descendants without any eventual inapplicable token; **then** go to 5.
5. **Else** leave the the focal node's state unchanged and repeat from 2 until all nodes have been visited; **then** go to 6.
6. Exit the second downpass

4 Second uppass

1. Enter the node next to the root; **then** go to 2
2. **If** any state on the focal node is applicable; **then** go to 3. **Else** go to 12.

3. **If** the ancestor also has at least one applicable state; **then** go to 4.
Else go to 11.
4. **If** the common state between the ancestor and the previous nodal state that is in common with the ancestor's state, **set** the focal node's state to be the state of it's ancestor; **then** go to 12. **Else** go to 5.
5. **If** there is a state in common between the focal node's descendants, **set** the focal node's state to be the union between states in common with the focal node and the ancestor and the states in common between the focal node's ancestor and the union of the focal node's descendants; **then** go to 12. **Else** go to 6.
6. **If** the union between the focal node's descendants have an inapplicable token, go to 7; **else** go to 9.
7. **If** the union of the focal node's descendants have a state in common with its ancestor, **set** the node state to be the union of the ancestral states and the states in common between the union of descendants and the ancestor; **then** go to 12. **Else** go to 8.
8. **Set** the focal node state to be the union between the descendants and the ancestral states without any inapplicable token; **then** go to 12.
9. **Set** the focal node state to be the union between the node state from the previous pass and its ancestor state. **then**, go to 10.
10. **If** the state in common between the focal node and its ancestor is the state of the ancestor, **set** the focal node's state to be the state in common between the focal node and its ancestor; **then** go to 12. **Else**, go to 12.
11. **If** there is a state in common between the focal node's descendants, **set** the focal node state to be the states in common between it's descendants **then** go to 12. **Else**, go to 12.
12. Leave the focal node's state unchanged and repeat from 2 until all nodes have been visited; **then** go to 13.
13. Exit the second uppass