
Algorithm 1 3DO refinement

Require: $\forall v \in \text{graph} \quad v.\text{updated} \leftarrow \text{True}$

Require: $\forall v \in \text{graph} \quad v.\text{unambiguousFinal} \neq \text{NULL}$

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1:  $\text{order} \leftarrow \mathcal{S}(V)$ 
2:  $\text{graph} \leftarrow (V, E)$ 
3:  $\text{maxTimes} \leftarrow ??$ 
4:  $\text{metaconvergence} \leftarrow \text{False}$ 
5:  $\text{stateStack} \leftarrow \text{empty}$ 
6:  $\text{times} \leftarrow 0$ 
7: repeat
8:    $\text{convergence} \leftarrow \text{True}$ 
9:   for  $v \in \text{graph}$  do
10:    if  $v$  is a leaf node then
11:      continue
12:    else if  $\exists n \in v.\text{neighbors} \text{ s.t. } n.\text{updated} = \text{True}$  then
13:      continue
14:    else
15:       $\text{prevValue} \leftarrow v.\text{unambiguousFinal}$ 
16:       $\triangleright$  remember current value for later comparison
17:       $(v.\text{ungappedMedianResult}, v.\text{gappedMedianResult}) \leftarrow$ 
18:         $3DO(\text{neighbor1}.\text{unambiguousFinal}$ 
19:           $, \text{neighbor2}.\text{unambiguousFinal}$ 
20:           $, \text{neighbor3}.\text{unambiguousFinal})$ 
21:       $v.\text{unambiguousFinal} \leftarrow \text{disambiguate}(v.\text{ungappedMedianResult})$ 
22:      if  $\text{prevValue} = v.\text{unambiguousFinal}$  then
23:         $v.\text{updated} \leftarrow \text{False}$ 
24:      else
25:         $v.\text{updated} \leftarrow \text{True}$ 
26:         $\text{convergence} \leftarrow \text{False}$ 
27:       $\text{times} \leftarrow \text{time} + 1$ 
28:    if  $\text{convergence}$  then
29:      break
30:    else
31:       $\text{stateStack.push}(\text{graph})$ 
32:      if prefix cycle in  $\text{stateStack}$  then  $\triangleright$  Metaconvergence defined as
        cycle through one or more previous states
33:         $\text{metaconvergence} \leftarrow \text{True}$ 
34:      else
35:         $\text{metaconvergence} \leftarrow \text{False}$ 
36: until  $\text{times} = \text{maxTimes}$  or  $\text{metaconvergence}$ 
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