
Algorithm 1: C-Phasing Hypergraph Construction

Input: Pore-C Table

Output: Incidence matrix H

```
1 for each concatemer  $j$  do
2   if fragment locus in contig  $i$  then
3     if number of contigs  $2 \leq n_j \leq 15$  and alignment length  $l_i \geq 500$ 
4       then
5          $H(i, j) = 1$ 
6       else
7          $H(i, j) = 0$ 
8       end
9     else
10       $H(i, j) = 0$ 
11    end
12 end
```

Algorithm 2: C-Phasing HyperPartition

Input: Hypergraph incidence matrix H

Output: Cluster assignments C

// Compute adjacency matrix

```
1  $W = I$ ; // initial input unweighted graph
2  $A = HW(D_e - I)^{-1}H^T$ ;
3  $A = \text{zero\_diag}(A)$ ;
4  $C = \text{LOUVAIN\_ALGORITHM}(A)$ ;
5  $c = \text{length}(C)$ ; // Number of cluster
6  $W_{prev} = W$ ;
7 repeat
    // reweight for each hyperedge
8   for  $e \in E$  do
9       for  $i \in [1, \dots, c]$  do
10           $k_i = |e \cap C_i|$ ;
11       end
12        $e_n = \text{length}(e)$ ; // Number of contig in  $e$ 
13        $W_{new}(e) = \frac{1}{m} \sum_{i=1}^c \frac{1}{k_i+1} (e_n + c)$ ;
14        $W(e) = \frac{1}{2} (W_{new}(e) + W_{prev}(e))$ 
15   end
16    $A = HW(D_e - I)^{-1}H^T$ ;
17    $A = \text{zero\_diag}(A)$ ;
18    $C = \text{LOUVAIN\_ALGORITHM}(A)$ ;
19    $c = \text{length}(C)$ ;
20    $W_{prev} = W$ 
21 until  $\|W - W_{prev}\| < 0.01$ ;
```
