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算法 1: 基于局部方向中心性度量的分簇机制

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输入: 轨迹数据集  $P = \{p_1, p_2, \dots, p_n\}$

$k$ : 寻找最近邻点的数量

$ratio$ : 用于确定  $T_{DCM}$  值的比例系数

输出: 带标签的簇  $C$

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1: for  $p_i$  in  $P$  do
2:     寻找每个轨迹点的最近邻点  $KNN(p_i)$ 
3:     计算轨迹点与最近邻点  $KNN(p_i)$ 形成的角度
         $\alpha_1, \alpha_2, \dots, \alpha_k$ 
4:      $DCM = \frac{k}{4 \cdot (k-1)\pi^2} \sum_{i=1}^k (\alpha_i - \frac{2\pi}{k})^2$ 
5: end for
6: 对所有  $DCM(p_i)$  降序排列
7:  $T_{DCM} = DCM[n \cdot (1 - ratio)]$ 
8: 定义内部点集合  $I$ , 边界点集合  $B$ 
9: for  $p_i$  in  $P$  do
10:    if  $DCM(p_i) \leq T_{DCM}$  then
11:        添加  $p_i$  到  $I$ 
12:    else
13:        添加  $p_i$  到  $B$ 
14:    end if
15: end for
16: /*计算可达距离*/
17: for  $p_i$  in  $I$  do
18:     $r_i = \min(d(p_i, q_j))$  for all  $q_j$  in  $B$ 
19: end for
20: /*根据可达距离连接成簇*/
21: 初始化一个空的列表  $C$  用于存储簇
22: for  $p_i$  in  $I$  do
23:    if  $d(p_i, p_j) \leq r_i + r_j$  then
24:        将  $p_i$  添加到  $p_j$  所在的簇  $C_j$  中
25:    end if
26: end for
27: 为内部点簇分配田标签 field
28: 为边界点分配路标签 road
29: return  $C$ 

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算法 2: 基于空间距离特征的簇边界重置策略

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输入: 初步分簇结果  $C$

$T_p$ : 田点邻域点密度阈值

$ratio_{1/2/3}$ : 乘法比例系数

输出: 簇边界重置结果  $C'$

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1: /* 计算空间距离 */
2: 计算田路间的距离  $d_{fr}, d_{rr}$ ,
   轨迹点间的距离矩阵 distances[]
3: /* 簇边界重置策略 */
4: Initialize  $flag[i] = 0, count = 0$ 
5: for  $i$  from 0 to  $len(C)$ 
6:    if label( $C[i]$ ) = field then
7:         $count = \sum (distances[i, :] \leq ratio_1 * d_{rr} \ \& \ label(C[i]) == field)$ 

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8:         if  $count \geq T_p$  then
9:              $flag[i] = 1$ 
10:         end if
11:     end if
12: end for
13:  $label[flag[i] = 1] = road, count = 0$ 
14: for  $i$  from 0 to  $len(C)$ 
15:     if  $label(C[i]) = road$  then
16:          $count = \sum (distances[i, :] \leq ratio_2 * d_p \ \& \ label(C[i]) == field)$ 
17:         if  $count > 0$  then
18:              $flag[i] = 2$ 
19:         end if
20:     end if
21: end for
22:  $label[flag[i] = 2] = field, count = 0$ 
23: for  $i$  from 0 to  $len(C)$ 
24:     if  $label(C[i]) = field$  then
25:         if  $count > 0$  then
26:              $flag[i] = 3$ 
27:         end if
28:     end if
29: end for
30:  $label[flag[i] = 3] = road$ 
31:

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