```
 1 C:\Users\ziyao\Anaconda3\python.exe C:/Users/ziyao/PycharmProjects/
   broc_ne_lab/score_bash.py
 2 Reducing empty vertices...
 3 0 vertices reduced...
 4 READ TIME: 0.11
 5 0 nodes read in Louvain...
 6 Looping 1 of the first stage. increase=7477.4604
 7 Looping 2 of the first stage. increase=2081.3876
 8 Looping 3 of the first stage. increase=397.7231
 9 Looping 4 of the first stage. increase=114.9777
10 Looping 5 of the first stage. increase=74.3286
11 Looping 6 of the first stage. increase=63.7731
12 Looping 7 of the first stage. increase=25.8456
13 Looping 8 of the first stage. increase=23.2888
14 Looping 9 of the first stage. increase=9.6254
15 Looping 10 of the first stage. increase=18.0759
16 Looping 11 of the first stage. increase=4.9513
17 Looping 12 of the first stage. increase=12.2033
18 Looping 13 of the first stage. increase=1.0654
19 Looping 14 of the first stage. increase=0.0000
20 1 iteration finished. first stage increase:10304.7063
21 Looping 1 of the first stage. increase=1832.8136
22 Looping 2 of the first stage. increase=303.6996
23 Looping 3 of the first stage. increase=30.1545
24 Looping 4 of the first stage. increase=5.4826
25 Looping 5 of the first stage. increase=13.1053
26 Looping 6 of the first stage. increase=0.0000
27 2 iteration finished. first stage increase:2185.2556
28 Looping 1 of the first stage. increase=149.3527
29 Looping 2 of the first stage. increase=0.0000
30 3 iteration finished. first stage increase:149.3527
31 Looping 1 of the first stage. increase=0.0000
32 4 iteration finished. first stage increase:0.0000
33 GROUP TIME: 0.75
34 607 vertices selected among 2363 in total (0.26).
35 Covered 2363 / 2363 (1.00) vertices in total.
36 SAMPLE TIME: 0.01
37 Fetch matrix time: 0.11
38 Calculate remembered matrix time: 0.02
39 INITIAL OPTIMIZER TIME (SVD): 0.29
40 Start training group 4.  994 Vertices.
41 Fetch matrix time: 0.33
42 Calculate G_0 and b_0 time: 0.09
43 Warning: optimization doesn't converge for group 4, residuals 0.0002
44 Optimization iterations time: 39.85. Average: 0.27
45 Start training group 6.  362 Vertices.
46 Fetch matrix time: 0.28
47 Calculate G_0 and b_0 time: 0.05
48 Warning: optimization doesn't converge for group 6, residuals 0.0004
49 Optimization iterations time: 20.04. Average: 0.13
50 Start training group 9.   27 Vertices.
51 Fetch matrix time: 0.03
52 Calculate G_0 and b_0 time: 0.02
53 Warning: optimization doesn't converge for group 9, residuals 0.0008
54 Optimization iterations time: 9.85. Average: 0.07
55 Start training group 2.  160 Vertices.
56 Fetch matrix time: 0.05
57 Calculate G_0 and b_0 time: 0.03
58 Warning: optimization doesn't converge for group 2, residuals 0.0005
59 Optimization iterations time: 12.89. Average: 0.09
```

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60 Start training group 1.   73 Vertices.
61 Fetch matrix time: 0.05
62 Calculate G_0 and b_0 time: 0.03
63 Warning: optimization doesn't converge for group 1, residuals 0.0009
64 Optimization iterations time: 10.68. Average: 0.07
65 Start training group 7.   91 Vertices.
66 Fetch matrix time: 0.06
67 Calculate G_0 and b_0 time: 0.03
68 Warning: optimization doesn't converge for group 7, residuals 0.0005
69 Optimization iterations time: 11.86. Average: 0.08
70 Start training group 8.   14 Vertices.
71 Fetch matrix time: 0.02
72 Calculate G_0 and b_0 time: 0.02
73 Optimization iterations time: 2.40. Average: 0.06
74 Start training group 5.   27 Vertices.
75 Fetch matrix time: 0.02
76 Calculate G_0 and b_0 time: 0.02
77 Warning: optimization doesn't converge for group 5, residuals 0.0005
78 Optimization iterations time: 9.52. Average: 0.06
79 Start training group 11.    1 Vertices.
80 Fetch matrix time: 0.02
81 Calculate G_0 and b_0 time: 0.02
82 Optimization iterations time: 0.52. Average: 0.06
83 Start training group 3.    5 Vertices.
84 Fetch matrix time: 0.02
85 Calculate G_0 and b_0 time: 0.02
86 Warning: optimization doesn't converge for group 3, residuals 0.0014
87 Optimization iterations time: 9.11. Average: 0.06
88 Start training group 10.    2 Vertices.
89 Fetch matrix time: 0.02
90 Calculate G_0 and b_0 time: 0.02
91 Optimization iterations time: 0.57. Average: 0.06
92 C:\Users\ziyao\Anaconda3\lib\site-packages\sklearn\metrics\classification.py
   :1135: UndefinedMetricWarning: F-score is ill-defined and being set to 0.0
   in labels with no predicted samples.
93   'precision', 'predicted', average, warn_for)
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95   'precision', 'predicted', average, warn_for)
96 C:\Users\ziyao\Anaconda3\lib\site-packages\sklearn\metrics\classification.py
   :1137: UndefinedMetricWarning: F-score is ill-defined and being set to 0.0
   in labels with no true samples.
97   'recall', 'true', average, warn_for)
98 C:\Users\ziyao\Anaconda3\lib\site-packages\sklearn\metrics\classification.py
   :1135: UndefinedMetricWarning: F-score is ill-defined and being set to 0.0
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135   'precision', 'predicted', average, warn_for)
```

```
136 Results
137 -------------------------------------
138 Setting:
139 LAMBDA:      0.80
140 ETA:         0.10
141 MAX_ITER:    150
142 EPSILON:     1.0e-04
143 GROUPING:    Louvain
144 K SAMPLING:  set_cover_undir
145 -------------------------------------
146 Train percentage:  0.90
147 Iter          Micro        Macro
148 -------------------------------------
149 Shuffle #1:   0.6624       0.4974
150 Shuffle #2:   0.6709       0.5578
151 Shuffle #3:   0.6793       0.5079
152 Shuffle #4:   0.6582       0.4982
153 Shuffle #5:   0.6245       0.4362
154 -------------------------------------
155 Average:      0.6591       0.4995
156 Train percentage:  0.80
157 Iter          Micro        Macro
158 -------------------------------------
159 Shuffle #1:   0.6469       0.5471
160 Shuffle #2:   0.6131       0.5185
161 Shuffle #3:   0.5941       0.4846
162 Shuffle #4:   0.6004       0.5248
163 Shuffle #5:   0.6342       0.5268
164 -------------------------------------
165 Average:      0.6178       0.5203
166 Train percentage:  0.70
167 Iter          Micro        Macro
168 -------------------------------------
169 Shuffle #1:   0.6220       0.5184
170 Shuffle #2:   0.6234       0.5025
171 Shuffle #3:   0.6291       0.5425
172 Shuffle #4:   0.6432       0.5433
173 Shuffle #5:   0.6234       0.5046
174 -------------------------------------
175 Average:      0.6282       0.5222
176 Train percentage:  0.60
177 Iter          Micro        Macro
178 -------------------------------------
179 Shuffle #1:   0.5994       0.5006
180 Shuffle #2:   0.6131       0.5200
181 Shuffle #3:   0.6121       0.4956
182 Shuffle #4:   0.5814       0.4592
183 Shuffle #5:   0.6047       0.4728
184 -------------------------------------
185 Average:      0.6021       0.4896
186 Train percentage:  0.50
187 Iter          Micro        Macro
188 -------------------------------------
189 Shuffle #1:   0.6049       0.4650
190 Shuffle #2:   0.6117       0.4907
191 Shuffle #3:   0.5829       0.5083
192 Shuffle #4:   0.6184       0.4805
193 Shuffle #5:   0.6041       0.4759
194 -------------------------------------
195 Average:      0.6044       0.4841
```

```
196 Train percentage:  0.40
197 Iter           Micro       Macro
198 ----------------------------------
199 Shuffle #1:    0.5712      0.4860
200 Shuffle #2:    0.5712      0.5131
201 Shuffle #3:    0.6065      0.4929
202 Shuffle #4:    0.6178      0.5184
203 Shuffle #5:    0.5649      0.4716
204 ----------------------------------
205 Average:       0.5863      0.4964
206 Train percentage:  0.30
207 Iter           Micro       Macro
208 ----------------------------------
209 Shuffle #1:    0.5801      0.4719
210 Shuffle #2:    0.5776      0.4518
211 Shuffle #3:    0.5837      0.4547
212 Shuffle #4:    0.5952      0.4743
213 Shuffle #5:    0.5819      0.4449
214 ----------------------------------
215 Average:       0.5837      0.4595
216 Train percentage:  0.20
217 Iter           Micro       Macro
218 ----------------------------------
219 Shuffle #1:    0.5415      0.4349
220 Shuffle #2:    0.5436      0.4101
221 Shuffle #3:    0.5246      0.4650
222 Shuffle #4:    0.5325      0.4277
223 Shuffle #5:    0.5563      0.4141
224 ----------------------------------
225 Average:       0.5397      0.4304
226 Train percentage:  0.10
227 Iter           Micro       Macro
228 ----------------------------------
229 Shuffle #1:    0.5068      0.3803
230 Shuffle #2:    0.4071      0.3485
231 Shuffle #3:    0.4697      0.4077
232 Shuffle #4:    0.4875      0.3902
233 Shuffle #5:    0.4664      0.3768
234 ----------------------------------
235 Average:       0.4675      0.3807
236
237 Process finished with exit code 0
238
```