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1 C:\Users\nguye\.virtualenvs\lab4_clustering\Scripts\
  python.exe "C:/Users/nguye/OneDrive/Documents/
  HpSepctrex360/GeneralClassDownloads/CSC 466/
  lab4_clustering/clustering/hclustering.py" ./data/
  4clusters.csv 0
2 Cluster 0:
3 2 points:
4 Point: 19          Col1          Col2
5 19  0.272727  0.772727
6 Point: 21          Col1  Col2
7 21  0.25  0.75
8 Cluster 1:
9 2 points:
10 Point: 38          Col1          Col2
11 38  0.886364  0.181818
12 Point: 39          Col1          Col2
13 39  0.931818  0.181818
14 Cluster 2:
15 2 points:
16 Point: 3           Col1          Col2
17 3  0.931818  0.954545
18 Point: 4           Col1          Col2
19 4  0.977273  0.954545
20 Cluster 3:
21 2 points:
22 Point: 1           Col1  Col2
23 1  0.909091  1.0
24 Point: 2           Col1          Col2
25 2  0.863636  0.977273
26 Cluster 4:
27 2 points:
28 Point: 8           Col1          Col2
29 8  0.909091  0.909091
30 Point: 13          Col1          Col2
31 13  0.931818  0.863636
32 Cluster 5:
33 2 points:
34 Point: 9           Col1          Col2
35 9  0.272727  0.886364
36 Point: 15          Col1          Col2
37 15  0.25  0.840909

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38 Cluster 6:
39 2 points:
40 Point: 11          Col1          Col2
41 11  0.136364  0.863636
42 Point: 18          Col1          Col2
43 18  0.113636  0.818182
44 Cluster 7:
45 2 points:
46 Point: 24          Col1          Col2
47 24  0.863636  0.522727
48 Point: 26          Col1  Col2
49 26  0.818182  0.5
50 Cluster 8:
51 2 points:
52 Point: 5           Col1          Col2
53 5  0.204545  0.931818
54 Point: 7           Col1          Col2
55 7  0.159091  0.909091
56 Cluster 9:
57 3 points:
58 Point: 14          Col1          Col2
59 14  0.181818  0.840909
60 Point: 11          Col1          Col2
61 11  0.136364  0.863636
62 Point: 18          Col1          Col2
63 18  0.113636  0.818182
64 Cluster 10:
65 3 points:
66 Point: 28          Col1          Col2
67 28  0.840909  0.454545
68 Point: 24          Col1          Col2
69 24  0.863636  0.522727
70 Point: 26          Col1  Col2
71 26  0.818182  0.5
72 Cluster 11:
73 2 points:
74 Point: 32          Col1          Col2
75 32  0.681818  0.272727
76 Point: 35          Col1          Col2
77 35  0.636364  0.227273
78 Cluster 12:

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79 2 points:
80 Point: 6          Col1          Col2
81 6  0.840909  0.931818
82 Point: 12         Col1          Col2
83 12 0.840909  0.863636
84 Cluster 13:
85 2 points:
86 Point: 34         Col1          Col2
87 34 0.840909  0.272727
88 Point: 37         Col1          Col2
89 37 0.818182  0.204545
90 Cluster 14:
91 2 points:
92 Point: 25         Col1  Col2
93 25 0.75  0.5
94 Point: 29         Col1          Col2
95 29 0.772727  0.431818
96 Cluster 15:
97 4 points:
98 Point: 3          Col1          Col2
99 3  0.931818  0.954545
100 Point: 4          Col1          Col2
101 4 0.977273  0.954545
102 Point: 1          Col1  Col2
103 1 0.909091  1.0
104 Point: 2          Col1          Col2
105 2 0.863636  0.977273
106 Cluster 16:
107 3 points:
108 Point: 10         Col1          Col2
109 10 1.0  0.886364
110 Point: 8          Col1          Col2
111 8  0.909091  0.909091
112 Point: 13         Col1          Col2
113 13 0.931818  0.863636
114 Cluster 17:
115 3 points:
116 Point: 20         Col1  Col2
117 20 0.181818  0.75
118 Point: 19         Col1          Col2
119 19 0.272727  0.772727

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120 Point: 21      Col1  Col2
121 21  0.25  0.75
122 Cluster 18:
123 3 points:
124 Point: 36      Col1      Col2
125 36  0.75  0.227273
126 Point: 34      Col1      Col2
127 34  0.840909  0.272727
128 Point: 37      Col1      Col2
129 37  0.818182  0.204545
130 Cluster 19:
131 5 points:
132 Point: 28      Col1      Col2
133 28  0.840909  0.454545
134 Point: 24      Col1      Col2
135 24  0.863636  0.522727
136 Point: 26      Col1  Col2
137 26  0.818182  0.5
138 Point: 25      Col1  Col2
139 25  0.75  0.5
140 Point: 29      Col1      Col2
141 29  0.772727  0.431818
142 Cluster 20:
143 5 points:
144 Point: 5      Col1      Col2
145 5  0.204545  0.931818
146 Point: 7      Col1      Col2
147 7  0.159091  0.909091
148 Point: 14     Col1      Col2
149 14  0.181818  0.840909
150 Point: 11     Col1      Col2
151 11  0.136364  0.863636
152 Point: 18     Col1      Col2
153 18  0.113636  0.818182
154 Cluster 21:
155 7 points:
156 Point: 3      Col1      Col2
157 3  0.931818  0.954545
158 Point: 4      Col1      Col2
159 4  0.977273  0.954545
160 Point: 1      Col1  Col2

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161 1  0.909091  1.0
162 Point: 2      Col1      Col2
163 2  0.863636  0.977273
164 Point: 10     Col1      Col2
165 10  1.0  0.886364
166 Point: 8      Col1      Col2
167 8  0.909091  0.909091
168 Point: 13     Col1      Col2
169 13  0.931818  0.863636
170 Cluster 22:
171 7 points:
172 Point: 9      Col1      Col2
173 9  0.272727  0.886364
174 Point: 15     Col1      Col2
175 15  0.25  0.840909
176 Point: 5      Col1      Col2
177 5  0.204545  0.931818
178 Point: 7      Col1      Col2
179 7  0.159091  0.909091
180 Point: 14     Col1      Col2
181 14  0.181818  0.840909
182 Point: 11     Col1      Col2
183 11  0.136364  0.863636
184 Point: 18     Col1      Col2
185 18  0.113636  0.818182
186 Cluster 23:
187 9 points:
188 Point: 6      Col1      Col2
189 6  0.840909  0.931818
190 Point: 12     Col1      Col2
191 12  0.840909  0.863636
192 Point: 3      Col1      Col2
193 3  0.931818  0.954545
194 Point: 4      Col1      Col2
195 4  0.977273  0.954545
196 Point: 1      Col1  Col2
197 1  0.909091  1.0
198 Point: 2      Col1      Col2
199 2  0.863636  0.977273
200 Point: 10     Col1      Col2
201 10  1.0  0.886364

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202 Point: 8          Col1      Col2
203 8  0.909091  0.909091
204 Point: 13         Col1      Col2
205 13 0.931818  0.863636
206 Cluster 24:
207 2 points:
208 Point: 23         Col1      Col2
209 23 0.568182  0.545455
210 Point: 27         Col1      Col2
211 27 0.477273  0.477273
212 Cluster 25:
213 10 points:
214 Point: 20         Col1      Col2
215 20 0.181818  0.75
216 Point: 19         Col1      Col2
217 19 0.272727  0.772727
218 Point: 21         Col1      Col2
219 21 0.25  0.75
220 Point: 9          Col1      Col2
221 9  0.272727  0.886364
222 Point: 15         Col1      Col2
223 15 0.25  0.840909
224 Point: 5          Col1      Col2
225 5  0.204545  0.931818
226 Point: 7          Col1      Col2
227 7  0.159091  0.909091
228 Point: 14         Col1      Col2
229 14 0.181818  0.840909
230 Point: 11         Col1      Col2
231 11 0.136364  0.863636
232 Point: 18         Col1      Col2
233 18 0.113636  0.818182
234 Cluster 26:
235 2 points:
236 Point: 30         Col1      Col2
237 30 0.681818  0.386364
238 Point: 31         Col1      Col2
239 31 0.568182  0.340909
240 Cluster 27:
241 3 points:
242 Point: 33         Col1      Col2

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243 33  0.568182  0.340909
244 Point: 30          Col1          Col2
245 30  0.681818  0.386364
246 Point: 31          Col1          Col2
247 31  0.568182  0.340909
248 Cluster 28:
249 5 points:
250 Point: 32          Col1          Col2
251 32  0.681818  0.272727
252 Point: 35          Col1          Col2
253 35  0.636364  0.227273
254 Point: 33          Col1          Col2
255 33  0.568182  0.340909
256 Point: 30          Col1          Col2
257 30  0.681818  0.386364
258 Point: 31          Col1          Col2
259 31  0.568182  0.340909
260 Cluster 29:
261 5 points:
262 Point: 38          Col1          Col2
263 38  0.886364  0.181818
264 Point: 39          Col1          Col2
265 39  0.931818  0.181818
266 Point: 36          Col1          Col2
267 36  0.75  0.227273
268 Point: 34          Col1          Col2
269 34  0.840909  0.272727
270 Point: 37          Col1          Col2
271 37  0.818182  0.204545
272 Cluster 30:
273 2 points:
274 Point: 16          Col1          Col2
275 16  0.409091  0.840909
276 Point: 17          Col1          Col2
277 17  0.545455  0.840909
278 Cluster 31:
279 6 points:
280 Point: 22          Col1          Col2
281 22  0.704545  0.590909
282 Point: 28          Col1          Col2
283 28  0.840909  0.454545

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284 Point: 24          Col1      Col2
285 24  0.863636  0.522727
286 Point: 26          Col1  Col2
287 26  0.818182   0.5
288 Point: 25          Col1  Col2
289 25  0.75      0.5
290 Point: 29          Col1      Col2
291 29  0.772727  0.431818
292 Cluster 32:
293 8 points:
294 Point: 23          Col1      Col2
295 23  0.568182  0.545455
296 Point: 27          Col1      Col2
297 27  0.477273  0.477273
298 Point: 22          Col1      Col2
299 22  0.704545  0.590909
300 Point: 28          Col1      Col2
301 28  0.840909  0.454545
302 Point: 24          Col1      Col2
303 24  0.863636  0.522727
304 Point: 26          Col1  Col2
305 26  0.818182   0.5
306 Point: 25          Col1  Col2
307 25  0.75      0.5
308 Point: 29          Col1      Col2
309 29  0.772727  0.431818
310 Cluster 33:
311 13 points:
312 Point: 32          Col1      Col2
313 32  0.681818  0.272727
314 Point: 35          Col1      Col2
315 35  0.636364  0.227273
316 Point: 33          Col1      Col2
317 33  0.568182  0.340909
318 Point: 30          Col1      Col2
319 30  0.681818  0.386364
320 Point: 31          Col1      Col2
321 31  0.568182  0.340909
322 Point: 23          Col1      Col2
323 23  0.568182  0.545455
324 Point: 27          Col1      Col2

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325 27 0.477273 0.477273
326 Point: 22          Col1          Col2
327 22 0.704545 0.590909
328 Point: 28          Col1          Col2
329 28 0.840909 0.454545
330 Point: 24          Col1          Col2
331 24 0.863636 0.522727
332 Point: 26          Col1 Col2
333 26 0.818182 0.5
334 Point: 25          Col1 Col2
335 25 0.75 0.5
336 Point: 29          Col1          Col2
337 29 0.772727 0.431818
338 Cluster 34:
339 12 points:
340 Point: 20          Col1 Col2
341 20 0.181818 0.75
342 Point: 19          Col1          Col2
343 19 0.272727 0.772727
344 Point: 21          Col1 Col2
345 21 0.25 0.75
346 Point: 9           Col1          Col2
347 9 0.272727 0.886364
348 Point: 15          Col1          Col2
349 15 0.25 0.840909
350 Point: 5           Col1          Col2
351 5 0.204545 0.931818
352 Point: 7           Col1          Col2
353 7 0.159091 0.909091
354 Point: 14          Col1          Col2
355 14 0.181818 0.840909
356 Point: 11          Col1          Col2
357 11 0.136364 0.863636
358 Point: 18          Col1          Col2
359 18 0.113636 0.818182
360 Point: 16          Col1          Col2
361 16 0.409091 0.840909
362 Point: 17          Col1          Col2
363 17 0.545455 0.840909
364 Cluster 35:
365 18 points:

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366 Point: 38          Col1          Col2
367 38  0.886364  0.181818
368 Point: 39          Col1          Col2
369 39  0.931818  0.181818
370 Point: 36          Col1          Col2
371 36  0.75  0.227273
372 Point: 34          Col1          Col2
373 34  0.840909  0.272727
374 Point: 37          Col1          Col2
375 37  0.818182  0.204545
376 Point: 32          Col1          Col2
377 32  0.681818  0.272727
378 Point: 35          Col1          Col2
379 35  0.636364  0.227273
380 Point: 33          Col1          Col2
381 33  0.568182  0.340909
382 Point: 30          Col1          Col2
383 30  0.681818  0.386364
384 Point: 31          Col1          Col2
385 31  0.568182  0.340909
386 Point: 23          Col1          Col2
387 23  0.568182  0.545455
388 Point: 27          Col1          Col2
389 27  0.477273  0.477273
390 Point: 22          Col1          Col2
391 22  0.704545  0.590909
392 Point: 28          Col1          Col2
393 28  0.840909  0.454545
394 Point: 24          Col1          Col2
395 24  0.863636  0.522727
396 Point: 26          Col1  Col2
397 26  0.818182  0.5
398 Point: 25          Col1  Col2
399 25  0.75  0.5
400 Point: 29          Col1          Col2
401 29  0.772727  0.431818
402 Cluster 36:
403 21 points:
404 Point: 6          Col1          Col2
405 6  0.840909  0.931818
406 Point: 12          Col1          Col2

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407 12  0.840909  0.863636
408 Point: 3      Col1      Col2
409 3   0.931818  0.954545
410 Point: 4      Col1      Col2
411 4   0.977273  0.954545
412 Point: 1      Col1  Col2
413 1   0.909091  1.0
414 Point: 2      Col1      Col2
415 2   0.863636  0.977273
416 Point: 10     Col1      Col2
417 10   1.0  0.886364
418 Point: 8      Col1      Col2
419 8   0.909091  0.909091
420 Point: 13     Col1      Col2
421 13  0.931818  0.863636
422 Point: 20     Col1  Col2
423 20  0.181818  0.75
424 Point: 19     Col1      Col2
425 19  0.272727  0.772727
426 Point: 21     Col1  Col2
427 21  0.25  0.75
428 Point: 9      Col1      Col2
429 9   0.272727  0.886364
430 Point: 15     Col1      Col2
431 15  0.25  0.840909
432 Point: 5      Col1      Col2
433 5   0.204545  0.931818
434 Point: 7      Col1      Col2
435 7   0.159091  0.909091
436 Point: 14     Col1      Col2
437 14  0.181818  0.840909
438 Point: 11     Col1      Col2
439 11  0.136364  0.863636
440 Point: 18     Col1      Col2
441 18  0.113636  0.818182
442 Point: 16     Col1      Col2
443 16  0.409091  0.840909
444 Point: 17     Col1      Col2
445 17  0.545455  0.840909
446 Cluster 37:
447 39 points:

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448	Point: 38	Col1	Col2
449	38	0.886364	0.181818
450	Point: 39	Col1	Col2
451	39	0.931818	0.181818
452	Point: 36	Col1	Col2
453	36	0.75	0.227273
454	Point: 34	Col1	Col2
455	34	0.840909	0.272727
456	Point: 37	Col1	Col2
457	37	0.818182	0.204545
458	Point: 32	Col1	Col2
459	32	0.681818	0.272727
460	Point: 35	Col1	Col2
461	35	0.636364	0.227273
462	Point: 33	Col1	Col2
463	33	0.568182	0.340909
464	Point: 30	Col1	Col2
465	30	0.681818	0.386364
466	Point: 31	Col1	Col2
467	31	0.568182	0.340909
468	Point: 23	Col1	Col2
469	23	0.568182	0.545455
470	Point: 27	Col1	Col2
471	27	0.477273	0.477273
472	Point: 22	Col1	Col2
473	22	0.704545	0.590909
474	Point: 28	Col1	Col2
475	28	0.840909	0.454545
476	Point: 24	Col1	Col2
477	24	0.863636	0.522727
478	Point: 26	Col1	Col2
479	26	0.818182	0.5
480	Point: 25	Col1	Col2
481	25	0.75	0.5
482	Point: 29	Col1	Col2
483	29	0.772727	0.431818
484	Point: 6	Col1	Col2
485	6	0.840909	0.931818
486	Point: 12	Col1	Col2
487	12	0.840909	0.863636
488	Point: 3	Col1	Col2

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489 3  0.931818  0.954545
490 Point: 4      Col1      Col2
491 4  0.977273  0.954545
492 Point: 1      Col1  Col2
493 1  0.909091   1.0
494 Point: 2      Col1      Col2
495 2  0.863636  0.977273
496 Point: 10     Col1      Col2
497 10  1.0  0.886364
498 Point: 8      Col1      Col2
499 8  0.909091  0.909091
500 Point: 13     Col1      Col2
501 13  0.931818  0.863636
502 Point: 20     Col1  Col2
503 20  0.181818  0.75
504 Point: 19     Col1      Col2
505 19  0.272727  0.772727
506 Point: 21     Col1  Col2
507 21  0.25  0.75
508 Point: 9      Col1      Col2
509 9  0.272727  0.886364
510 Point: 15     Col1      Col2
511 15  0.25  0.840909
512 Point: 5      Col1      Col2
513 5  0.204545  0.931818
514 Point: 7      Col1      Col2
515 7  0.159091  0.909091
516 Point: 14     Col1      Col2
517 14  0.181818  0.840909
518 Point: 11     Col1      Col2
519 11  0.136364  0.863636
520 Point: 18     Col1      Col2
521 18  0.113636  0.818182
522 Point: 16     Col1      Col2
523 16  0.409091  0.840909
524 Point: 17     Col1      Col2
525 17  0.545455  0.840909
526 Cluster 38:
527 40 points:
528 Point: 0      Col1  Col2
529 0  0.0  0.0

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530	Point: 38	Col1	Col2
531	38	0.886364	0.181818
532	Point: 39	Col1	Col2
533	39	0.931818	0.181818
534	Point: 36	Col1	Col2
535	36	0.75	0.227273
536	Point: 34	Col1	Col2
537	34	0.840909	0.272727
538	Point: 37	Col1	Col2
539	37	0.818182	0.204545
540	Point: 32	Col1	Col2
541	32	0.681818	0.272727
542	Point: 35	Col1	Col2
543	35	0.636364	0.227273
544	Point: 33	Col1	Col2
545	33	0.568182	0.340909
546	Point: 30	Col1	Col2
547	30	0.681818	0.386364
548	Point: 31	Col1	Col2
549	31	0.568182	0.340909
550	Point: 23	Col1	Col2
551	23	0.568182	0.545455
552	Point: 27	Col1	Col2
553	27	0.477273	0.477273
554	Point: 22	Col1	Col2
555	22	0.704545	0.590909
556	Point: 28	Col1	Col2
557	28	0.840909	0.454545
558	Point: 24	Col1	Col2
559	24	0.863636	0.522727
560	Point: 26	Col1	Col2
561	26	0.818182	0.5
562	Point: 25	Col1	Col2
563	25	0.75	0.5
564	Point: 29	Col1	Col2
565	29	0.772727	0.431818
566	Point: 6	Col1	Col2
567	6	0.840909	0.931818
568	Point: 12	Col1	Col2
569	12	0.840909	0.863636
570	Point: 3	Col1	Col2

```
571 3 0.931818 0.954545
572 Point: 4 Col1 Col2
573 4 0.977273 0.954545
574 Point: 1 Col1 Col2
575 1 0.909091 1.0
576 Point: 2 Col1 Col2
577 2 0.863636 0.977273
578 Point: 10 Col1 Col2
579 10 1.0 0.886364
580 Point: 8 Col1 Col2
581 8 0.909091 0.909091
582 Point: 13 Col1 Col2
583 13 0.931818 0.863636
584 Point: 20 Col1 Col2
585 20 0.181818 0.75
586 Point: 19 Col1 Col2
587 19 0.272727 0.772727
588 Point: 21 Col1 Col2
589 21 0.25 0.75
590 Point: 9 Col1 Col2
591 9 0.272727 0.886364
592 Point: 15 Col1 Col2
593 15 0.25 0.840909
594 Point: 5 Col1 Col2
595 5 0.204545 0.931818
596 Point: 7 Col1 Col2
597 7 0.159091 0.909091
598 Point: 14 Col1 Col2
599 14 0.181818 0.840909
600 Point: 11 Col1 Col2
601 11 0.136364 0.863636
602 Point: 18 Col1 Col2
603 18 0.113636 0.818182
604 Point: 16 Col1 Col2
605 16 0.409091 0.840909
606 Point: 17 Col1 Col2
607 17 0.545455 0.840909
608
609 Process finished with exit code 0
610
```