

```
1 C:\ProgramData\Anaconda3\python.exe "C:/Users/gince/Documents/GitHub/DecisionTrees-NeuralNetworks/Projet Final AI/Code/
main.py"
2 #####
3 Partie 1 - Decision Tree
4 #####
5
6 Decision Tree Train ratio: 0.7
7
8
9 -----
10 Iris dataset classification:
11
12
13 Train results:
14 Data set size: 105
15
16 Confusion Matrix:
17 [[34  0  0]
18 [ 0 33  0]
19 [ 0  0 38]]
20 Accuracy: 100.00 %
21 Precision [%]: [100. 100. 100.]
22 Mean Precision: 100.00 %
23 Recall [%]: [100. 100. 100.]
24 Mean Recall: 100.00 %
25 Training time: 2.15e-02 [s]
26 Mean prediction time: 2.35e-04 [s]
27
28 Test results:
29 Data set size: 45
30
31 Confusion Matrix:
32 [[16  0  0]
33 [ 0 15  1]
34 [ 0  2 11]]
35 Accuracy: 93.33 %
36 Precision [%]: [100.   93.75  84.62]
37 Mean Precision: 92.79 %
38 Recall [%]: [100.   88.24  91.67]
39 Mean Recall: 93.30 %
40 Training time: 2.15e-02 [s]
41 Mean prediction time: 2.29e-04 [s]
42
43 --- Elapse time: 2151.90 ms ---
44
45 -----
46 Congressional dataset classification:
47
48
49 Train results:
50 Data set size: 304
51
52 Confusion Matrix:
53 [[109  0]
54 [ 0 195]]
55 Accuracy: 100.00 %
56 Precision [%]: [100. 100.]
57 Mean Precision: 100.00 %
58 Recall [%]: [100. 100.]
59 Mean Recall: 100.00 %
60 Training time: 5.09e-02 [s]
61 Mean prediction time: 1.97e-05 [s]
62
63 Test results:
64 Data set size: 131
65
66 Confusion Matrix:
67 [[53  5]
68 [ 6 67]]
69 Accuracy: 91.60 %
70 Precision [%]: [91.38 91.78]
71 Mean Precision: 91.58 %
72 Recall [%]: [89.83 93.06]
73 Mean Recall: 91.44 %
74 Training time: 5.09e-02 [s]
75 Mean prediction time: 2.06e-05 [s]
76
77 --- Elapse time: 1882.91 ms ---
78
79 -----
80 Monks(1) dataset classification:
81
82
83 Train results:
84 Data set size: 124
85
86 Confusion Matrix:
87 [[62  0]
88 [ 0 62]]
89 Accuracy: 100.00 %
90 Precision [%]: [100. 100.]
91 Mean Precision: 100.00 %
92 Recall [%]: [100. 100.]
93 Mean Recall: 100.00 %
94 Training time: 3.66e-02 [s]
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95 Mean prediction time: 3.22e-05 [s]
96
97 Test results:
98 Data set size: 432
99
100 Confusion Matrix:
101 [[179  30]
102  [ 37 186]]
103 Accuracy: 81.48 %
104 Precision [%]: [85.58 83.04]
105 Mean Precision: 84.31 %
106 Recall [%]: [82.41 85.65]
107 Mean Recall: 84.03 %
108 Training time: 3.66e-02 [s]
109 Mean prediction time: 5.29e-05 [s]
110
111 --- Elapse time: 1647.65 ms ---
112
113 -----
114 Monks(2) dataset classification:
115
116
117 Train results:
118 Data set size: 169
119
120 Confusion Matrix:
121 [[105  0]
122  [  0 64]]
123 Accuracy: 100.00 %
124 Precision [%]: [100. 100.]
125 Mean Precision: 100.00 %
126 Recall [%]: [100. 100.]
127 Mean Recall: 100.00 %
128 Training time: 6.18e-02 [s]
129 Mean prediction time: 4.07e-05 [s]
130
131 Test results:
132 Data set size: 432
133
134 Confusion Matrix:
135 [[206  53]
136  [ 84  89]]
137 Accuracy: 69.21 %
138 Precision [%]: [80.08 52.63]
139 Mean Precision: 66.35 %
140 Recall [%]: [71.72 62.68]
141 Mean Recall: 67.20 %
142 Training time: 6.18e-02 [s]
143 Mean prediction time: 3.97e-05 [s]
144
145 --- Elapse time: 1675.18 ms ---
146
147 -----
148 Monks(3) dataset classification:
149
150
151 Train results:
152 Data set size: 122
153
154 Confusion Matrix:
155 [[62  0]
156  [  0 60]]
157 Accuracy: 100.00 %
158 Precision [%]: [100. 100.]
159 Mean Precision: 100.00 %
160 Recall [%]: [100. 100.]
161 Mean Recall: 100.00 %
162 Training time: 2.39e-02 [s]
163 Mean prediction time: 2.26e-05 [s]
164
165 Test results:
166 Data set size: 432
167
168 Confusion Matrix:
169 [[200  14]
170  [  4 214]]
171 Accuracy: 95.37 %
172 Precision [%]: [91.74 98.13]
173 Mean Precision: 94.94 %
174 Recall [%]: [98.04 92.98]
175 Mean Recall: 95.51 %
176 Training time: 2.39e-02 [s]
177 Mean prediction time: 2.84e-05 [s]
178
179 --- Elapse time: 1831.61 ms ---
180
181 -----
182 #####
183                               Partie 2 - NeuralNet
184 #####
185
186 NeuralNet Train ratio: 0.7
187
188
189 -----
```

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189 -----
190 Iris dataset classification:
191
192 Best number of neurones for Iris: 6, Best number of layers for Iris: 1
193
194 Train results:
195 Data set size: 105
196
197 Confusion Matrix:
198 [[34  0  0]
199 [ 0 31  1]
200 [ 0  2 37]]
201 Accuracy: 97.14 %
202 Precision [%]: [100.    96.88  94.87]
203 Mean Precision: 97.25 %
204 Recall [%]: [100.    93.94  97.37]
205 Mean Recall: 97.10 %
206 Training time: 8.36e-01 [s]
207 Mean prediction time: 2.86e-05 [s]
208
209 Test results:
210 Data set size: 45
211
212 Confusion Matrix:
213 [[16  0  0]
214 [ 0 14  0]
215 [ 0  3 12]]
216 Accuracy: 93.33 %
217 Precision [%]: [100. 100.  80.]
218 Mean Precision: 93.33 %
219 Recall [%]: [100.    82.35 100.  ]
220 Mean Recall: 94.12 %
221 Training time: 8.36e-01 [s]
222 Mean prediction time: 2.77e-05 [s]
223
224 --- Elapse time: 7233.66 ms ---
225
226 -----
227 Congressional dataset classification:
228
229 Best number of neurones for Congressional: 4, Best number of layers for Congressional: 1
230
231 Train results:
232 Data set size: 304
233
234 Confusion Matrix:
235 [[108  0]
236 [  1 195]]
237 Accuracy: 99.67 %
238 Precision [%]: [100.    99.49]
239 Mean Precision: 99.74 %
240 Recall [%]: [ 99.08 100.  ]
241 Mean Recall: 99.54 %
242 Training time: 2.91e+00 [s]
243 Mean prediction time: 5.09e-05 [s]
244
245 Test results:
246 Data set size: 131
247
248 Confusion Matrix:
249 [[52  2]
250 [  7 70]]
251 Accuracy: 93.13 %
252 Precision [%]: [96.3  90.91]
253 Mean Precision: 93.60 %
254 Recall [%]: [88.14 97.22]
255 Mean Recall: 92.68 %
256 Training time: 2.91e+00 [s]
257 Mean prediction time: 4.59e-05 [s]
258
259 --- Elapse time: 10129.96 ms ---
260
261 -----
262 Monks(1) dataset classification:
263
264 Best number of neurones for Monks(1): 4, Best number of layers for Monks(1): 1
265
266 Train results:
267 Data set size: 124
268
269 Confusion Matrix:
270 [[62  0]
271 [  0 62]]
272 Accuracy: 100.00 %
273 Precision [%]: [100. 100.]
274 Mean Precision: 100.00 %
275 Recall [%]: [100. 100.]
276 Mean Recall: 100.00 %
277 Training time: 8.83e-01 [s]
278 Mean prediction time: 2.81e-05 [s]
279
280 Test results:
281 Data set size: 432
282
283 Confusion Matrix:
284 [[209  0]
```

File - main

```
285 [ 7 216]]
286 Accuracy: 98.38 %
287 Precision [%]: [100.    96.86]
288 Mean Precision: 98.43 %
289 Recall [%]: [ 96.76 100.  ]
290 Mean Recall: 98.38 %
291 Training time: 8.83e-01 [s]
292 Mean prediction time: 3.68e-05 [s]
293
294 --- Elapse time: 7789.25 ms ---
295
296 -----
297 Monks(2) dataset classification:
298
299 Best number of neurones for Monks(2): 4, Best number of layers for Monks(2): 2
300
301 Train results:
302 Data set size: 169
303
304 Confusion Matrix:
305 [[23  1]
306  [82 63]]
307 Accuracy: 50.89 %
308 Precision [%]: [95.83 43.45]
309 Mean Precision: 69.64 %
310 Recall [%]: [21.9  98.44]
311 Mean Recall: 60.17 %
312 Training time: 1.72e+00 [s]
313 Mean prediction time: 5.17e-05 [s]
314
315 Test results:
316 Data set size: 432
317
318 Confusion Matrix:
319 [[ 67  3]
320  [223 139]]
321 Accuracy: 47.69 %
322 Precision [%]: [95.71 38.4 ]
323 Mean Precision: 67.06 %
324 Recall [%]: [23.1  97.89]
325 Mean Recall: 60.50 %
326 Training time: 1.72e+00 [s]
327 Mean prediction time: 4.77e-05 [s]
328
329 --- Elapse time: 8338.15 ms ---
330
331 -----
332 Monks(3) dataset classification:
333
334 Best number of neurones for Monks(3): 7, Best number of layers for Monks(3): 3
335
336 Train results:
337 Data set size: 122
338
339 Confusion Matrix:
340 [[59 15]
341  [ 3 45]]
342 Accuracy: 85.25 %
343 Precision [%]: [79.73 93.75]
344 Mean Precision: 86.74 %
345 Recall [%]: [95.16 75.  ]
346 Mean Recall: 85.08 %
347 Training time: 1.85e+00 [s]
348 Mean prediction time: 5.51e-05 [s]
349
350 Test results:
351 Data set size: 432
352
353 Confusion Matrix:
354 [[185  67]
355  [ 19 161]]
356 Accuracy: 80.09 %
357 Precision [%]: [73.41 89.44]
358 Mean Precision: 81.43 %
359 Recall [%]: [90.69 70.61]
360 Mean Recall: 80.65 %
361 Training time: 1.85e+00 [s]
362 Mean prediction time: 7.11e-05 [s]
363
364 --- Elapse time: 8223.25 ms ---
365
366 -----
367 #####
368                               Partie 3 - Comparison
369 #####
370
371
372 Process finished with exit code 0
373
```