File - main

```
C:\ProgramData\Anaconda3\python.exe "C:/Users/gince/Documents/GitHub/DecisionTrees-NeuralNetworks/Projet Final AI/Code/main.py"
########################################################################################################################
                                        Partie 1 - Decision Tree
########################################################################################################################

Decision Tree Train ratio: 0.7


------------------------------------------------------------------------------------------------------------------------
Iris dataset classification:


 Train results:
Data set size: 105

Confusion Matrix:
 [[34  0  0]
 [ 0 33  0]
 [ 0  0 38]]
Accuracy: 100.00 %
Precision [%]: [100. 100. 100.]
Mean Precision: 100.00 %
Recall [%]: [100. 100. 100.]
Mean Recall: 100.00 %
Training time: 2.15e-02 [s]
Mean prediction time: 2.35e-04 [s]

 Test results:
Data set size: 45

Confusion Matrix:
 [[16  0  0]
 [ 0 15  1]
 [ 0  2 11]]
Accuracy: 93.33 %
Precision [%]: [100.    93.75  84.62]
Mean Precision: 92.79 %
Recall [%]: [100.    88.24  91.67]
Mean Recall: 93.30 %
Training time: 2.15e-02 [s]
Mean prediction time: 2.29e-04 [s]

 --- Elapse time: 2151.90 ms ---

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Congressional dataset classification:


 Train results:
Data set size: 304

Confusion Matrix:
 [[109   0]
 [  0 195]]
Accuracy: 100.00 %
Precision [%]: [100. 100.]
Mean Precision: 100.00 %
Recall [%]: [100. 100.]
Mean Recall: 100.00 %
Training time: 5.09e-02 [s]
Mean prediction time: 1.97e-05 [s]

 Test results:
Data set size: 131

Confusion Matrix:
 [[53  5]
 [ 6 67]]
Accuracy: 91.60 %
Precision [%]: [91.38 91.78]
Mean Precision: 91.58 %
Recall [%]: [89.83 93.06]
Mean Recall: 91.44 %
Training time: 5.09e-02 [s]
Mean prediction time: 2.06e-05 [s]

 --- Elapse time: 1882.91 ms ---

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Monks(1) dataset classification:


 Train results:
Data set size: 124

Confusion Matrix:
 [[62  0]
 [ 0 62]]
Accuracy: 100.00 %
Precision [%]: [100. 100.]
Mean Precision: 100.00 %
Recall [%]: [100. 100.]
Mean Recall: 100.00 %
Training time: 3.66e-02 [s]
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File - main

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Mean prediction time: 3.22e-05 [s]

 Test results:
Data set size: 432

Confusion Matrix:
 [[179  30]
 [ 37 186]]
Accuracy: 81.48 %
Precision [%]: [85.58 83.04]
Mean Precision: 84.31 %
Recall [%]: [82.41 85.65]
Mean Recall: 84.03 %
Training time: 3.66e-02 [s]
Mean prediction time: 5.29e-05 [s]

 --- Elapse time: 1647.65 ms ---

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Monks(2) dataset classification:


 Train results:
Data set size: 169

Confusion Matrix:
 [[105   0]
 [  0  64]]
Accuracy: 100.00 %
Precision [%]: [100. 100.]
Mean Precision: 100.00 %
Recall [%]: [100. 100.]
Mean Recall: 100.00 %
Training time: 6.18e-02 [s]
Mean prediction time: 4.07e-05 [s]

 Test results:
Data set size: 432

Confusion Matrix:
 [[206  53]
 [ 84  89]]
Accuracy: 69.21 %
Precision [%]: [80.08 52.63]
Mean Precision: 66.35 %
Recall [%]: [71.72 62.68]
Mean Recall: 67.20 %
Training time: 6.18e-02 [s]
Mean prediction time: 3.97e-05 [s]

 --- Elapse time: 1675.18 ms ---

------------------------------------------------------------------------------------------------------------------------
Monks(3) dataset classification:


 Train results:
Data set size: 122

Confusion Matrix:
 [[62  0]
 [ 0 60]]
Accuracy: 100.00 %
Precision [%]: [100. 100.]
Mean Precision: 100.00 %
Recall [%]: [100. 100.]
Mean Recall: 100.00 %
Training time: 2.39e-02 [s]
Mean prediction time: 2.26e-05 [s]

 Test results:
Data set size: 432

Confusion Matrix:
 [[200  14]
 [  4 214]]
Accuracy: 95.37 %
Precision [%]: [91.74 98.13]
Mean Precision: 94.94 %
Recall [%]: [98.04 92.98]
Mean Recall: 95.51 %
Training time: 2.39e-02 [s]
Mean prediction time: 2.84e-05 [s]

 --- Elapse time: 1831.61 ms ---

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########################################################################################################################
                                    Partie 2 - NeuralNet
########################################################################################################################

NeuralNet Train ratio: 0.7


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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

```
[  7 216]]
Accuracy: 98.38 %
Precision [%]: [100.    96.86]
Mean Precision: 98.43 %
Recall [%]: [ 96.76 100.  ]
Mean Recall: 98.38 %
Training time: 8.83e-01 [s]
Mean prediction time: 3.68e-05 [s]

 --- Elapse time: 7789.25 ms ---

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Monks(2) dataset classification:

Best number of neurones for Monks(2): 4, Best number of layers for Monks(2): 2

 Train results:
Data set size: 169

Confusion Matrix:
 [[23  1]
 [82 63]]
Accuracy: 50.89 %
Precision [%]: [95.83 43.45]
Mean Precision: 69.64 %
Recall [%]: [21.9  98.44]
Mean Recall: 60.17 %
Training time: 1.72e+00 [s]
Mean prediction time: 5.17e-05 [s]

 Test results:
Data set size: 432

Confusion Matrix:
 [[ 67   3]
 [223 139]]
Accuracy: 47.69 %
Precision [%]: [95.71 38.4 ]
Mean Precision: 67.06 %
Recall [%]: [23.1  97.89]
Mean Recall: 60.50 %
Training time: 1.72e+00 [s]
Mean prediction time: 4.77e-05 [s]

 --- Elapse time: 8338.15 ms ---

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Monks(3) dataset classification:

Best number of neurones for Monks(3): 7, Best number of layers for Monks(3): 3

 Train results:
Data set size: 122

Confusion Matrix:
 [[59 15]
 [ 3 45]]
Accuracy: 85.25 %
Precision [%]: [79.73 93.75]
Mean Precision: 86.74 %
Recall [%]: [95.16 75.  ]
Mean Recall: 85.08 %
Training time: 1.85e+00 [s]
Mean prediction time: 5.51e-05 [s]

 Test results:
Data set size: 432

Confusion Matrix:
 [[185  67]
 [ 19 161]]
Accuracy: 80.09 %
Precision [%]: [73.41 89.44]
Mean Precision: 81.43 %
Recall [%]: [90.69 70.61]
Mean Recall: 80.65 %
Training time: 1.85e+00 [s]
Mean prediction time: 7.11e-05 [s]

 --- Elapse time: 8223.25 ms ---

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########################################################################################################################
                                    Partie 3 - Comparison
########################################################################################################################


Process finished with exit code 0

```