```
1 C:\Users\vince\anaconda3\python.exe "D:/
  Documents/Choses école/UQAC/Session7/8INF436-
  Forage_de_donnees/TP3/main.py"
2 2021-04-06 10:38:13.933437: W tensorflow/
  stream_executor/platform/default/dso_loader.
  cc:60] Could not load dynamic library '
  cudart64_110.dll'; dlerror: cudart64_110.dll
  not found
3 2021-04-06 10:38:13.933542: I tensorflow/
  stream_executor/cuda/cudart_stub.cc:29]
  Ignore above cudart dlerror if you do not
  have a GPU set up on your machine.
4 C:\Users\vince\anaconda3\lib\site-packages\
  pandas\core\indexing.py:1736:
  SettingWithCopyWarning:
5 A value is trying to be set on a copy of a
  slice from a DataFrame.
6 Try using .loc[row_indexer,col_indexer] =
  value instead
7
8 See the caveats in the documentation: https
  ://pandas.pydata.org/pandas-docs/stable/
  user_guide/indexing.html#returning-a-view-
  versus-a-copy
9   isetter(loc, value[:, i].tolist())
10 Missing values per attribute:
11  id                   0
12 gender               0
13 age                  0
14 hypertension         0
15 heart_disease        0
16 ever_married         0
17 work_type            0
18 Residence_type       0
19 avg_glucose_level    0
20 bmi                  0
21 smoking_status       0
22 stroke               0
```

```
23 dtype: int64
24 <class 'pandas.core.frame.DataFrame'>
25 Int64Index: 4860 entries, 0 to 5109
26 Data columns (total 10 columns):
27  #    Column             Non-Null Count  Dtype

28 ---   ------             --------------  -----

29  0    gender             4860 non-null
    float64
30  1    age                4860 non-null
    float64
31  2    hypertension       4860 non-null
    float64
32  3    heart_disease      4860 non-null
    float64
33  4    ever_married       4860 non-null
    float64
34  5    work_type          4860 non-null
    float64
35  6    Residence_type     4860 non-null
    float64
36  7    avg_glucose_level  4860 non-null
    float64
37  8    bmi                4860 non-null
    float64
38  9    smoking_status     4860 non-null
    float64
39 dtypes: float64(10)
40 memory usage: 417.7 KB
41 None
42
43 Auto-encodeur linéaire complet à 2 couches
44 2021-04-06 10:38:15.722707: I tensorflow/
   compiler/jit/xla_cpu_device.cc:41] Not
   creating XLA devices,
   tf_xla_enable_xla_devices not set
45 2021-04-06 10:38:15.723163: I tensorflow/
```

45 stream_executor/platform/default/dso_loader.cc:49] Successfully opened dynamic library nvcuda.dll

46 2021-04-06 10:38:15.748511: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1720] Found device 0 with properties:

47 pciBusID: 0000:08:00.0 name: GeForce RTX 2080 computeCapability: 7.5

48 coreClock: 1.71GHz coreCount: 46 deviceMemorySize: 8.00GiB deviceMemoryBandwidth: 417.23GiB/s

49 2021-04-06 10:38:15.749223: W tensorflow/stream_executor/platform/default/dso_loader.cc:60] Could not load dynamic library 'cudart64_110.dll'; dlerror: cudart64_110.dll not found

50 2021-04-06 10:38:15.749753: W tensorflow/stream_executor/platform/default/dso_loader.cc:60] Could not load dynamic library 'cublas64_11.dll'; dlerror: cublas64_11.dll not found

51 2021-04-06 10:38:15.750284: W tensorflow/stream_executor/platform/default/dso_loader.cc:60] Could not load dynamic library 'cublasLt64_11.dll'; dlerror: cublasLt64_11.dll not found

52 2021-04-06 10:38:15.751095: W tensorflow/stream_executor/platform/default/dso_loader.cc:60] Could not load dynamic library 'cufft64_10.dll'; dlerror: cufft64_10.dll not found

53 2021-04-06 10:38:15.751647: W tensorflow/stream_executor/platform/default/dso_loader.cc:60] Could not load dynamic library 'curand64_10.dll'; dlerror: curand64_10.dll not found

54 2021-04-06 10:38:15.752161: W tensorflow/stream_executor/platform/default/dso_loader.

54 cc:60] Could not load dynamic library 'cusolver64_10.dll'; dlerror: cusolver64_10.dll not found

55 2021-04-06 10:38:15.752691: W tensorflow/stream_executor/platform/default/dso_loader.cc:60] Could not load dynamic library 'cusparse64_11.dll'; dlerror: cusparse64_11.dll not found

56 2021-04-06 10:38:15.753208: W tensorflow/stream_executor/platform/default/dso_loader.cc:60] Could not load dynamic library 'cudnn64_8.dll'; dlerror: cudnn64_8.dll not found

57 2021-04-06 10:38:15.753300: W tensorflow/core/common_runtime/gpu/gpu_device.cc:1757] Cannot dlopen some GPU libraries. Please make sure the missing libraries mentioned above are installed properly if you would like to use GPU. Follow the guide at https://www.tensorflow.org/install/gpu for how to download and setup the required libraries for your platform.

58 Skipping registering GPU devices...

59 2021-04-06 10:38:15.754226: I tensorflow/core/platform/cpu_feature_guard.cc:142] This TensorFlow binary is optimized with oneAPI Deep Neural Network Library (oneDNN) to use the following CPU instructions in performance-critical operations: AVX2

60 To enable them in other operations, rebuild TensorFlow with the appropriate compiler flags.

61 2021-04-06 10:38:15.755059: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1261] Device interconnect StreamExecutor with strength 1 edge matrix:

62 2021-04-06 10:38:15.755146: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1267]

63 2021-04-06 10:38:15.755194: I tensorflow/
   compiler/jit/xla_gpu_device.cc:99] Not
   creating XLA devices,
   tf_xla_enable_xla_devices not set

64 2021-04-06 10:38:15.812999: I tensorflow/
   compiler/mlir/mlir_graph_optimization_pass.
   cc:116] None of the MLIR optimization passes
    are enabled (registered 2)

65 31/31 [==============================] - 0s
   300us/step

66 31/31 [==============================] - 0s
   300us/step

67 31/31 [==============================] - 0s
   300us/step

68 31/31 [==============================] - 0s
   333us/step

69 31/31 [==============================] - 0s
   300us/step

70 31/31 [==============================] - 0s
   300us/step

71 31/31 [==============================] - 0s
   300us/step

72 31/31 [==============================] - 0s
   300us/step

73 31/31 [==============================] - 0s
   300us/step

74 31/31 [==============================] - 0s
   300us/step

75 Mean average precision over 10 runs: 0.
   11757325618504852

76 Coefficient of variation over 10 runs: {0.
   3224}

77 [0.15135268286397677, 0.12060939073411814, 0
   .1137975102384984, 0.12829648062033366, 0.
   08695640354028256, 0.05547637197478297, 0.
   1739750829715552, 0.12505630637853288, 0.
   06035588231862396, 0.15985645020977834]

78

```
79 Auto-encodeurs linéaires incomplets à 2
   couches
80 La couche 1 possède 2 unités
81 31/31 [==============================] - 0s
   333us/step
82 31/31 [==============================] - 0s
   300us/step
83 31/31 [==============================] - 0s
   333us/step
84 31/31 [==============================] - 0s
   300us/step
85 31/31 [==============================] - 0s
   300us/step
86 31/31 [==============================] - 0s
   300us/step
87 31/31 [==============================] - 0s
   300us/step
88 31/31 [==============================] - 0s
   300us/step
89 31/31 [==============================] - 0s
   300us/step
90 31/31 [==============================] - 0s
   333us/step
91 La couche 1 possède 3 unités
92 31/31 [==============================] - 0s
   333us/step
93 31/31 [==============================] - 0s
   300us/step
94 31/31 [==============================] - 0s
   300us/step
95 31/31 [==============================] - 0s
   300us/step
96 31/31 [==============================] - 0s
   300us/step
97 31/31 [==============================] - 0s
   300us/step
98 31/31 [==============================] - 0s
   300us/step
```

```
 99 31/31 [=============================] - 0s
    300us/step
100 31/31 [=============================] - 0s
    333us/step
101 31/31 [=============================] - 0s
    300us/step
102 La couche 1 possède 4 unités
103 31/31 [=============================] - 0s
    300us/step
104 31/31 [=============================] - 0s
    333us/step
105 31/31 [=============================] - 0s
    300us/step
106 31/31 [=============================] - 0s
    300us/step
107 31/31 [=============================] - 0s
    300us/step
108 31/31 [=============================] - 0s
    267us/step
109 31/31 [=============================] - 0s
    267us/step
110 31/31 [=============================] - 0s
    333us/step
111 31/31 [=============================] - 0s
    300us/step
112 31/31 [=============================] - 0s
    300us/step
113 La couche 1 possède 5 unités
114 31/31 [=============================] - 0s
    300us/step
115 31/31 [=============================] - 0s
    267us/step
116 31/31 [=============================] - 0s
    300us/step
117 31/31 [=============================] - 0s
    300us/step
118 31/31 [=============================] - 0s
    300us/step
```

```
119 31/31 [==============================] - 0s
    5ms/step
120 31/31 [==============================] - 0s
    300us/step
121 31/31 [==============================] - 0s
    300us/step
122 31/31 [==============================] - 0s
    300us/step
123 31/31 [==============================] - 0s
    300us/step
124 La couche 1 possède 6 unités
125 31/31 [==============================] - 0s
    300us/step
126 31/31 [==============================] - 0s
    300us/step
127 31/31 [==============================] - 0s
    300us/step
128 31/31 [==============================] - 0s
    300us/step
129 31/31 [==============================] - 0s
    333us/step
130 31/31 [==============================] - 0s
    300us/step
131 31/31 [==============================] - 0s
    300us/step
132 31/31 [==============================] - 0s
    300us/step
133 31/31 [==============================] - 0s
    267us/step
134 31/31 [==============================] - 0s
    300us/step
135 La couche 1 possède 7 unités
136 31/31 [==============================] - 0s
    300us/step
137 31/31 [==============================] - 0s
    300us/step
138 31/31 [==============================] - 0s
    300us/step
```

139 31/31 [==============================] - 0s 300us/step

140 31/31 [==============================] - 0s 300us/step

141 31/31 [==============================] - 0s 333us/step

142 31/31 [==============================] - 0s 300us/step

143 31/31 [==============================] - 0s 300us/step

144 31/31 [==============================] - 0s 300us/step

145 31/31 [==============================] - 0s 300us/step

146 La couche 1 possède 8 unités

147 31/31 [==============================] - 0s 300us/step

148 31/31 [==============================] - 0s 333us/step

149 31/31 [==============================] - 0s 333us/step

150 31/31 [==============================] - 0s 300us/step

151 31/31 [==============================] - 0s 300us/step

152 31/31 [==============================] - 0s 300us/step

153 31/31 [==============================] - 0s 267us/step

154 31/31 [==============================] - 0s 300us/step

155 31/31 [==============================] - 0s 267us/step

156 31/31 [==============================] - 0s 300us/step

157 Scores moyens(précision moyenne et écart-type) pour les auto-encodeurs linéaires incomplets à 2 couches:

158 {2: (0.15670054774325862, 0.077), 3: (0.14751780409455567, 0.1468), 4: (0.14726291511348985, 0.2282), 5: (0.12924405112646498, 0.1744), 6: (0.14467594318018256, 0.2508), 7: (0.11881988926054188, 0.2088), 8: (0.11344147232393904, 0.3445)}

159

160 Auto-encodeurs linéaires trop complets à 2 couches

161 La couche 1 possède 11 unités

162 31/31 [==============================] - 0s 300us/step

163 31/31 [==============================] - 0s 334us/step

164 31/31 [==============================] - 0s 300us/step

165 31/31 [==============================] - 0s 300us/step

166 31/31 [==============================] - 0s 300us/step

167 31/31 [==============================] - 0s 300us/step

168 31/31 [==============================] - 0s 300us/step

169 31/31 [==============================] - 0s 300us/step

170 31/31 [==============================] - 0s 300us/step

171 31/31 [==============================] - 0s 300us/step

172 La couche 1 possède 12 unités

173 31/31 [==============================] - 0s 300us/step

174 31/31 [==============================] - 0s 300us/step

175 31/31 [==============================] - 0s 300us/step

```
176 31/31 [==============================] - 0s
    300us/step
177 31/31 [==============================] - 0s
    300us/step
178 31/31 [==============================] - 0s
    300us/step
179 31/31 [==============================] - 0s
    300us/step
180 31/31 [==============================] - 0s
    300us/step
181 31/31 [==============================] - 0s
    267us/step
182 31/31 [==============================] - 0s
    300us/step
183 La couche 1 possède 13 unités
184 31/31 [==============================] - 0s
    300us/step
185 31/31 [==============================] - 0s
    267us/step
186 31/31 [==============================] - 0s
    300us/step
187 31/31 [==============================] - 0s
    300us/step
188 31/31 [==============================] - 0s
    267us/step
189 31/31 [==============================] - 0s
    300us/step
190 31/31 [==============================] - 0s
    300us/step
191 31/31 [==============================] - 0s
    300us/step
192 31/31 [==============================] - 0s
    300us/step
193 31/31 [==============================] - 0s
    300us/step
194 La couche 1 possède 14 unités
195 31/31 [==============================] - 0s
    333us/step
```

```
196 31/31 [==============================] - 0s
    300us/step
197 31/31 [==============================] - 0s
    300us/step
198 31/31 [==============================] - 0s
    300us/step
199 31/31 [==============================] - 0s
    333us/step
200 31/31 [==============================] - 0s
    267us/step
201 31/31 [==============================] - 0s
    333us/step
202 31/31 [==============================] - 0s
    300us/step
203 31/31 [==============================] - 0s
    300us/step
204 31/31 [==============================] - 0s
    300us/step
205 La couche 1 possède 15 unités
206 31/31 [==============================] - 0s
    300us/step
207 31/31 [==============================] - 0s
    300us/step
208 31/31 [==============================] - 0s
    300us/step
209 31/31 [==============================] - 0s
    300us/step
210 31/31 [==============================] - 0s
    300us/step
211 31/31 [==============================] - 0s
    333us/step
212 31/31 [==============================] - 0s
    300us/step
213 31/31 [==============================] - 0s
    267us/step
214 31/31 [==============================] - 0s
    267us/step
215 31/31 [==============================] - 0s
```

```
215 333us/step
216 La couche 1 possède 16 unités
217 31/31 [==============================] - 0s
    300us/step
218 31/31 [==============================] - 0s
    300us/step
219 31/31 [==============================] - 0s
    267us/step
220 31/31 [==============================] - 0s
    300us/step
221 31/31 [==============================] - 0s
    333us/step
222 31/31 [==============================] - 0s
    300us/step
223 31/31 [==============================] - 0s
    300us/step
224 31/31 [==============================] - 0s
    300us/step
225 31/31 [==============================] - 0s
    267us/step
226 31/31 [==============================] - 0s
    300us/step
227 La couche 1 possède 17 unités
228 31/31 [==============================] - 0s
    300us/step
229 31/31 [==============================] - 0s
    300us/step
230 31/31 [==============================] - 0s
    267us/step
231 31/31 [==============================] - 0s
    300us/step
232 31/31 [==============================] - 0s
    300us/step
233 31/31 [==============================] - 0s
    300us/step
234 31/31 [==============================] - 0s
    300us/step
235 31/31 [==============================] - 0s
```

```
235 300us/step
236 31/31 [==============================] - 0s
    267us/step
237 31/31 [==============================] - 0s
    300us/step
238 La couche 1 possède 18 unités
239 31/31 [==============================] - 0s
    333us/step
240 31/31 [==============================] - 0s
    333us/step
241 31/31 [==============================] - 0s
    300us/step
242 31/31 [==============================] - 0s
    300us/step
243 31/31 [==============================] - 0s
    300us/step
244 31/31 [==============================] - 0s
    300us/step
245 31/31 [==============================] - 0s
    300us/step
246 31/31 [==============================] - 0s
    300us/step
247 31/31 [==============================] - 0s
    300us/step
248 31/31 [==============================] - 0s
    5ms/step
249 La couche 1 possède 19 unités
250 31/31 [==============================] - 0s
    300us/step
251 31/31 [==============================] - 0s
    300us/step
252 31/31 [==============================] - 0s
    333us/step
253 31/31 [==============================] - 0s
    267us/step
254 31/31 [==============================] - 0s
    300us/step
255 31/31 [==============================] - 0s
```

```
255 300us/step
256 31/31 [==============================] - 0s
    300us/step
257 31/31 [==============================] - 0s
    300us/step
258 31/31 [==============================] - 0s
    333us/step
259 31/31 [==============================] - 0s
    300us/step
260 La couche 1 possède 20 unités
261 31/31 [==============================] - 0s
    300us/step
262 31/31 [==============================] - 0s
    300us/step
263 31/31 [==============================] - 0s
    300us/step
264 31/31 [==============================] - 0s
    300us/step
265 31/31 [==============================] - 0s
    300us/step
266 31/31 [==============================] - 0s
    300us/step
267 31/31 [==============================] - 0s
    300us/step
268 31/31 [==============================] - 0s
    333us/step
269 31/31 [==============================] - 0s
    300us/step
270 31/31 [==============================] - 0s
    300us/step
271 La couche 1 possède 21 unités
272 31/31 [==============================] - 0s
    333us/step
273 31/31 [==============================] - 0s
    333us/step
274 31/31 [==============================] - 0s
    333us/step
275 31/31 [==============================] - 0s
```

```
275 367us/step
276 31/31 [==============================] - 0s
    333us/step
277 31/31 [==============================] - 0s
    333us/step
278 31/31 [==============================] - 0s
    400us/step
279 31/31 [==============================] - 0s
    333us/step
280 31/31 [==============================] - 0s
    333us/step
281 31/31 [==============================] - 0s
    300us/step
282 La couche 1 possède 22 unités
283 31/31 [==============================] - 0s
    333us/step
284 31/31 [==============================] - 0s
    300us/step
285 31/31 [==============================] - 0s
    300us/step
286 31/31 [==============================] - 0s
    300us/step
287 31/31 [==============================] - 0s
    300us/step
288 31/31 [==============================] - 0s
    300us/step
289 31/31 [==============================] - 0s
    300us/step
290 31/31 [==============================] - 0s
    300us/step
291 31/31 [==============================] - 0s
    300us/step
292 31/31 [==============================] - 0s
    300us/step
293 La couche 1 possède 23 unités
294 31/31 [==============================] - 0s
    300us/step
295 31/31 [==============================] - 0s
```

```
295 300us/step
296 31/31 [==============================] - 0s
    300us/step
297 31/31 [==============================] - 0s
    300us/step
298 31/31 [==============================] - 0s
    333us/step
299 31/31 [==============================] - 0s
    300us/step
300 31/31 [==============================] - 0s
    300us/step
301 31/31 [==============================] - 0s
    300us/step
302 31/31 [==============================] - 0s
    367us/step
303 31/31 [==============================] - 0s
    333us/step
304 La couche 1 possède 24 unités
305 31/31 [==============================] - 0s
    300us/step
306 31/31 [==============================] - 0s
    367us/step
307 31/31 [==============================] - 0s
    5ms/step
308 31/31 [==============================] - 0s
    300us/step
309 31/31 [==============================] - 0s
    300us/step
310 31/31 [==============================] - 0s
    300us/step
311 31/31 [==============================] - 0s
    300us/step
312 31/31 [==============================] - 0s
    300us/step
313 31/31 [==============================] - 0s
    333us/step
314 31/31 [==============================] - 0s
    300us/step
```

```
315 Scores moyens(précision moyenne et écart-
    type) pour les auto-encodeurs linéaires trop
     complets à 2 couches:
316 {11: (0.1420525266795362, 0.2197), 12: (0.
    11564158724214924, 0.2815), 13: (0.
    13257749785332398, 0.1532), 14: (0.
    12948021636337528, 0.159), 15: (0.
    1192086981648189, 0.1307), 16: (0.
    12373397284612675, 0.1365), 17: (0.
    1260479446137803, 0.1786), 18: (0.
    12565392824174396, 0.1453), 19: (0.
    12027449411684259, 0.171), 20: (0.
    12400707173864127, 0.1211), 21: (0.
    12807266596109773, 0.1474), 22: (0.
    12334983554647146, 0.1235), 23: (0.
    12880891309282244, 0.1639), 24: (0.
    12326365241016683, 0.1522)}
317
318 Process finished with exit code 0
319
```