```
C:\Users\vince\anaconda3\python.exe "D:/Documents/Choses école/UQAC/Session7/8INF436-Forage_de_donnees/TP3/main.py"
2021-04-06 10:43:19.444463: W tensorflow/stream_executor/platform/default/dso_loader.cc:60] Could not load dynamic library 'cudart64_110.dll'; dlerror: cudart64_110.dll not found
2021-04-06 10:43:19.444569: 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.
Missing values per attribute:
 id                  0
gender               0
age                  0
hypertension         0
heart_disease        0
ever_married         0
work_type            0
Residence_type       0
avg_glucose_level    0
bmi                  0
smoking_status       0
stroke               0
dtype: int64
<class 'pandas.core.frame.DataFrame'>
Int64Index: 4860 entries, 0 to 5109
Data columns (total 10 columns):
 #   Column             Non-Null Count  Dtype

---  ------             --------------  -----

 0   gender             4860 non-null
float64
 1   age                4860 non-null
float64
 2   hypertension       4860 non-null
```

```
25 float64
26  3   heart_disease      4860 non-null
   float64
27  4   ever_married       4860 non-null
   float64
28  5   work_type          4860 non-null
   float64
29  6   Residence_type     4860 non-null
   float64
30  7   avg_glucose_level  4860 non-null
   float64
31  8   bmi                4860 non-null
   float64
32  9   smoking_status     4860 non-null
   float64
33 dtypes: float64(10)
34 memory usage: 417.7 KB
35 None
36
37 Auto-encodeur linéaire complet à 2 couches
38 C:\Users\vince\anaconda3\lib\site-packages\
   pandas\core\indexing.py:1736:
   SettingWithCopyWarning:
39 A value is trying to be set on a copy of a
   slice from a DataFrame.
40 Try using .loc[row_indexer,col_indexer] =
   value instead
41
42 See the caveats in the documentation: https
   ://pandas.pydata.org/pandas-docs/stable/
   user_guide/indexing.html#returning-a-view-
   versus-a-copy
43   isetter(loc, value[:, i].tolist())
44 2021-04-06 10:43:21.142007: I tensorflow/
   compiler/jit/xla_cpu_device.cc:41] Not
   creating XLA devices,
   tf_xla_enable_xla_devices not set
45 2021-04-06 10:43:21.142537: I tensorflow/
```

```
45 stream_executor/platform/default/dso_loader.
   cc:49] Successfully opened dynamic library
   nvcuda.dll
46 2021-04-06 10:43:21.162410: 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 10:43:21.163117: 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 10:43:21.163645: 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 10:43:21.164165: 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 10:43:21.164685: 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 10:43:21.165426: 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 10:43:21.165977: 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 10:43:21.166495: 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 10:43:21.167088: 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 10:43:21.167177: 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 10:43:21.167721: 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 10:43:21.168509: I tensorflow/core
   /common_runtime/gpu/gpu_device.cc:1261]
   Device interconnect StreamExecutor with
   strength 1 edge matrix:
62 2021-04-06 10:43:21.168593: I tensorflow/core
   /common_runtime/gpu/gpu_device.cc:1267]
```

```
2021-04-06 10:43:21.168645: I tensorflow/compiler/jit/xla_gpu_device.cc:99] Not creating XLA devices, tf_xla_enable_xla_devices not set
2021-04-06 10:43:21.224852: I tensorflow/compiler/mlir/mlir_graph_optimization_pass.cc:116] None of the MLIR optimization passes are enabled (registered 2)
23/23 [==============================] - 0s 318us/step
23/23 [==============================] - 0s 273us/step
23/23 [==============================] - 0s 318us/step
23/23 [==============================] - 0s 273us/step
23/23 [==============================] - 0s 318us/step
23/23 [==============================] - 0s 318us/step
23/23 [==============================] - 0s 318us/step
23/23 [==============================] - 0s 318us/step
23/23 [==============================] - 0s 318us/step
23/23 [==============================] - 0s 273us/step
Mean average precision over 10 runs:  0.141884141445072 94
Coefficient of variation over 10 runs: {0.2853}
[0.12250346613275195, 0.20013396723509352, 0.1016239173708244, 0.1855427884048969, 0.150211841308472, 0.189094508776244, 0.141712276708753 47, 0.1184374485140679 1, 0.14654555838176508, 0.063035641617860 52]

```

```
Auto-encodeurs linéaires incomplets à 2 couches
La couche 1 possède 2 unités
23/23 [==============================] - 0s 364us/step
23/23 [==============================] - 0s 318us/step
23/23 [==============================] - 0s 318us/step
23/23 [==============================] - 0s 273us/step
23/23 [==============================] - 0s 318us/step
23/23 [==============================] - 0s 273us/step
23/23 [==============================] - 0s 318us/step
23/23 [==============================] - 0s 273us/step
23/23 [==============================] - 0s 273us/step
23/23 [==============================] - 0s 318us/step
La couche 1 possède 3 unités
23/23 [==============================] - 0s 318us/step
23/23 [==============================] - 0s 273us/step
23/23 [==============================] - 0s 318us/step
23/23 [==============================] - 0s 318us/step
23/23 [==============================] - 0s 318us/step
23/23 [==============================] - 0s 318us/step
23/23 [==============================] - 0s 273us/step
```

```
 99 23/23 [==============================] - 0s
    318us/step
100 23/23 [==============================] - 0s
    318us/step
101 23/23 [==============================] - 0s
    318us/step
102 La couche 1 possède 4 unités
103 23/23 [==============================] - 0s
    273us/step
104 23/23 [==============================] - 0s
    273us/step
105 23/23 [==============================] - 0s
    273us/step
106 23/23 [==============================] - 0s
    273us/step
107 23/23 [==============================] - 0s
    273us/step
108 23/23 [==============================] - 0s
    273us/step
109 23/23 [==============================] - 0s
    273us/step
110 23/23 [==============================] - 0s
    318us/step
111 23/23 [==============================] - 0s
    318us/step
112 23/23 [==============================] - 0s
    318us/step
113 La couche 1 possède 5 unités
114 23/23 [==============================] - 0s
    318us/step
115 23/23 [==============================] - 0s
    318us/step
116 23/23 [==============================] - 0s
    273us/step
117 23/23 [==============================] - 0s
    273us/step
118 23/23 [==============================] - 0s
    273us/step
```

```
119 23/23 [==============================] - 0s
    6ms/step
120 23/23 [==============================] - 0s
    318us/step
121 23/23 [==============================] - 0s
    273us/step
122 23/23 [==============================] - 0s
    318us/step
123 23/23 [==============================] - 0s
    318us/step
124 La couche 1 possède 6 unités
125 23/23 [==============================] - 0s
    273us/step
126 23/23 [==============================] - 0s
    273us/step
127 23/23 [==============================] - 0s
    318us/step
128 23/23 [==============================] - 0s
    318us/step
129 23/23 [==============================] - 0s
    364us/step
130 23/23 [==============================] - 0s
    273us/step
131 23/23 [==============================] - 0s
    318us/step
132 23/23 [==============================] - 0s
    318us/step
133 23/23 [==============================] - 0s
    318us/step
134 23/23 [==============================] - 0s
    318us/step
135 La couche 1 possède 7 unités
136 23/23 [==============================] - 0s
    318us/step
137 23/23 [==============================] - 0s
    318us/step
138 23/23 [==============================] - 0s
    273us/step
```

```
139 23/23 [==============================] - 0s
    364us/step
140 23/23 [==============================] - 0s
    318us/step
141 23/23 [==============================] - 0s
    318us/step
142 23/23 [==============================] - 0s
    318us/step
143 23/23 [==============================] - 0s
    273us/step
144 23/23 [==============================] - 0s
    318us/step
145 23/23 [==============================] - 0s
    318us/step
146 La couche 1 possède 8 unités
147 23/23 [==============================] - 0s
    318us/step
148 23/23 [==============================] - 0s
    318us/step
149 23/23 [==============================] - 0s
    364us/step
150 23/23 [==============================] - 0s
    318us/step
151 23/23 [==============================] - 0s
    273us/step
152 23/23 [==============================] - 0s
    318us/step
153 23/23 [==============================] - 0s
    273us/step
154 23/23 [==============================] - 0s
    318us/step
155 23/23 [==============================] - 0s
    318us/step
156 23/23 [==============================] - 0s
    273us/step
157 Scores moyens(précision moyenne et écart-
    type) pour les auto-encodeurs linéaires
    incomplets à 2 couches:
```

```
158 {2: (0.20286355570203457, 0.0903), 3: (0.
    15224420187604726, 0.1863), 4: (0.
    16177228839391214, 0.1672), 5: (0.
    16829859497590058, 0.2092), 6: (0.
    16933771276028128, 0.2338), 7: (0.
    17423141076051870, 0.2823), 8: (0.
    12080628955290378, 0.264)}
159
160 Auto-encodeurs linéaires trop complets à 2
    couches
161 La couche 1 possède 11 unités
162 23/23 [==============================] - 0s
    273us/step
163 23/23 [==============================] - 0s
    318us/step
164 23/23 [==============================] - 0s
    318us/step
165 23/23 [==============================] - 0s
    273us/step
166 23/23 [==============================] - 0s
    318us/step
167 23/23 [==============================] - 0s
    318us/step
168 23/23 [==============================] - 0s
    318us/step
169 23/23 [==============================] - 0s
    273us/step
170 23/23 [==============================] - 0s
    318us/step
171 23/23 [==============================] - 0s
    273us/step
172 La couche 1 possède 12 unités
173 23/23 [==============================] - 0s
    318us/step
174 23/23 [==============================] - 0s
    318us/step
175 23/23 [==============================] - 0s
    318us/step
```

```
176 23/23 [==============================] - 0s
    273us/step
177 23/23 [==============================] - 0s
    273us/step
178 23/23 [==============================] - 0s
    273us/step
179 23/23 [==============================] - 0s
    318us/step
180 23/23 [==============================] - 0s
    318us/step
181 23/23 [==============================] - 0s
    318us/step
182 23/23 [==============================] - 0s
    273us/step
183 La couche 1 possède 13 unités
184 23/23 [==============================] - 0s
    273us/step
185 23/23 [==============================] - 0s
    318us/step
186 23/23 [==============================] - 0s
    273us/step
187 23/23 [==============================] - 0s
    273us/step
188 23/23 [==============================] - 0s
    318us/step
189 23/23 [==============================] - 0s
    273us/step
190 23/23 [==============================] - 0s
    273us/step
191 23/23 [==============================] - 0s
    318us/step
192 23/23 [==============================] - 0s
    318us/step
193 23/23 [==============================] - 0s
    318us/step
194 La couche 1 possède 14 unités
195 23/23 [==============================] - 0s
    318us/step
```

```
196 23/23 [==============================] - 0s
    318us/step
197 23/23 [==============================] - 0s
    364us/step
198 23/23 [==============================] - 0s
    318us/step
199 23/23 [==============================] - 0s
    318us/step
200 23/23 [==============================] - 0s
    318us/step
201 23/23 [==============================] - 0s
    318us/step
202 23/23 [==============================] - 0s
    364us/step
203 23/23 [==============================] - 0s
    273us/step
204 23/23 [==============================] - 0s
    273us/step
205 La couche 1 possède 15 unités
206 23/23 [==============================] - 0s
    273us/step
207 23/23 [==============================] - 0s
    318us/step
208 23/23 [==============================] - 0s
    273us/step
209 23/23 [==============================] - 0s
    318us/step
210 23/23 [==============================] - 0s
    318us/step
211 23/23 [==============================] - 0s
    318us/step
212 23/23 [==============================] - 0s
    318us/step
213 23/23 [==============================] - 0s
    318us/step
214 23/23 [==============================] - 0s
    318us/step
215 23/23 [==============================] - 0s
```

```
215 318us/step
216 La couche 1 possède 16 unités
217 23/23 [==============================] - 0s
    318us/step
218 23/23 [==============================] - 0s
    273us/step
219 23/23 [==============================] - 0s
    318us/step
220 23/23 [==============================] - 0s
    318us/step
221 23/23 [==============================] - 0s
    318us/step
222 23/23 [==============================] - 0s
    318us/step
223 23/23 [==============================] - 0s
    273us/step
224 23/23 [==============================] - 0s
    318us/step
225 23/23 [==============================] - 0s
    273us/step
226 23/23 [==============================] - 0s
    318us/step
227 La couche 1 possède 17 unités
228 23/23 [==============================] - 0s
    273us/step
229 23/23 [==============================] - 0s
    273us/step
230 23/23 [==============================] - 0s
    273us/step
231 23/23 [==============================] - 0s
    318us/step
232 23/23 [==============================] - 0s
    318us/step
233 23/23 [==============================] - 0s
    318us/step
234 23/23 [==============================] - 0s
    273us/step
235 23/23 [==============================] - 0s
```

```
235 273us/step
236 23/23 [==============================] - 0s
    318us/step
237 23/23 [==============================] - 0s
    318us/step
238 La couche 1 possède 18 unités
239 23/23 [==============================] - 0s
    273us/step
240 23/23 [==============================] - 0s
    318us/step
241 23/23 [==============================] - 0s
    273us/step
242 23/23 [==============================] - 0s
    273us/step
243 23/23 [==============================] - 0s
    318us/step
244 23/23 [==============================] - 0s
    318us/step
245 23/23 [==============================] - 0s
    273us/step
246 23/23 [==============================] - 0s
    318us/step
247 23/23 [==============================] - 0s
    318us/step
248 23/23 [==============================] - 0s
    6ms/step
249 La couche 1 possède 19 unités
250 23/23 [==============================] - 0s
    318us/step
251 23/23 [==============================] - 0s
    273us/step
252 23/23 [==============================] - 0s
    318us/step
253 23/23 [==============================] - 0s
    318us/step
254 23/23 [==============================] - 0s
    273us/step
255 23/23 [==============================] - 0s
```

```
255 318us/step
256 23/23 [==============================] - 0s
    319us/step
257 23/23 [==============================] - 0s
    273us/step
258 23/23 [==============================] - 0s
    318us/step
259 23/23 [==============================] - 0s
    273us/step
260 La couche 1 possède 20 unités
261 23/23 [==============================] - 0s
    318us/step
262 23/23 [==============================] - 0s
    318us/step
263 23/23 [==============================] - 0s
    273us/step
264 23/23 [==============================] - 0s
    318us/step
265 23/23 [==============================] - 0s
    318us/step
266 23/23 [==============================] - 0s
    273us/step
267 23/23 [==============================] - 0s
    273us/step
268 23/23 [==============================] - 0s
    318us/step
269 23/23 [==============================] - 0s
    318us/step
270 23/23 [==============================] - 0s
    318us/step
271 La couche 1 possède 21 unités
272 23/23 [==============================] - 0s
    273us/step
273 23/23 [==============================] - 0s
    273us/step
274 23/23 [==============================] - 0s
    364us/step
275 23/23 [==============================] - 0s
```

```
275 364us/step
276 23/23 [==============================] - 0s
    318us/step
277 23/23 [==============================] - 0s
    318us/step
278 23/23 [==============================] - 0s
    363us/step
279 23/23 [==============================] - 0s
    318us/step
280 23/23 [==============================] - 0s
    273us/step
281 23/23 [==============================] - 0s
    318us/step
282 La couche 1 possède 22 unités
283 23/23 [==============================] - 0s
    273us/step
284 23/23 [==============================] - 0s
    318us/step
285 23/23 [==============================] - 0s
    318us/step
286 23/23 [==============================] - 0s
    318us/step
287 23/23 [==============================] - 0s
    318us/step
288 23/23 [==============================] - 0s
    318us/step
289 23/23 [==============================] - 0s
    409us/step
290 23/23 [==============================] - 0s
    318us/step
291 23/23 [==============================] - 0s
    318us/step
292 23/23 [==============================] - 0s
    364us/step
293 La couche 1 possède 23 unités
294 23/23 [==============================] - 0s
    318us/step
295 23/23 [==============================] - 0s
```

```
295 318us/step
296 23/23 [==============================] - 0s
    318us/step
297 23/23 [==============================] - 0s
    318us/step
298 23/23 [==============================] - 0s
    364us/step
299 23/23 [==============================] - 0s
    273us/step
300 23/23 [==============================] - 0s
    318us/step
301 23/23 [==============================] - 0s
    318us/step
302 23/23 [==============================] - 0s
    318us/step
303 23/23 [==============================] - 0s
    318us/step
304 La couche 1 possède 24 unités
305 23/23 [==============================] - 0s
    318us/step
306 23/23 [==============================] - 0s
    318us/step
307 23/23 [==============================] - 0s
    6ms/step
308 23/23 [==============================] - 0s
    318us/step
309 23/23 [==============================] - 0s
    318us/step
310 23/23 [==============================] - 0s
    318us/step
311 23/23 [==============================] - 0s
    319us/step
312 23/23 [==============================] - 0s
    318us/step
313 23/23 [==============================] - 0s
    273us/step
314 23/23 [==============================] - 0s
    273us/step
```

```
Scores moyens(précision moyenne et écart-type) pour les auto-encodeurs linéaires trop complets à 2 couches:
{11: (0.1625092239508728, 0.2227), 12: (0.169271655264475, 0.2272), 13: (0.1447710920499871 2, 0.3369), 14: (0.1786531790978981, 0.2094), 15: (0.1875871292321166 5, 0.1812), 16: (0.1699968387402922, 0.1789), 17: (0.1718898881915899, 0.1452), 18: (0.1761902236024618 7, 0.1769), 19: (0.1585329375497140 6, 0.1191), 20: (0.1674552464742921, 0.1544), 21: (0.1678415392298438 2, 0.1431), 22: (0.1710655302268141, 0.1037), 23: (0.1516460133809320 6, 0.0918), 24: (0.1633949030681370 3, 0.1241)}

Process finished with exit code 0

```