```
 1 C:\Users\katxi\.conda\envs\CI4O_project\python.exe "C
   :\Users\katxi\OneDrive\Mestrado\2nd Semester\
   Optimization\project\github\CI4O_project\mnist.py"
 2 Running GA iteration: 1
 3 Generating initial population...
 4 100%|████████| 15/15 [01:34<00:00,  6.33s/it]
 5   0%|         | 0/15 [00:00<?, ?it/s][
 6 Individual: 784, 512, 10; Loss:76.51119995117188,
   Fitness: 0.2051166594028473,
 7 Individual: 784, 512, 10; Loss:76.9083480834961,
   Fitness: 0.0,
 8 Individual: 784, 512, 10; Loss:75.67109680175781,
   Fitness: 0.0020999999925121665,
 9 Individual: 784, 512, 10; Loss:72.2718276977539,
   Fitness: 0.0070333331823349,
10 Individual: 784, 512, 10; Loss:73.01114654541016,
   Fitness: 0.0023666666820645332,
11 Individual: 784, 512, 10; Loss:74.70369720458984,
   Fitness: 0.0002500000118743628,
12 Individual: 784, 512, 10; Loss:69.02776336669922,
   Fitness: 0.12281666696071625,
13 Individual: 784, 512, 10; Loss:77.06998443603516,
   Fitness: 0.29135000705718994,
14 Individual: 784, 512, 10; Loss:60.2698974609375,
   Fitness: 0.18868333101272583,
15 Individual: 784, 512, 10; Loss:75.44705963134766,
   Fitness: 3.333333370392211e-05,
16 Individual: 784, 512, 10; Loss:89.94862365722656,
   Fitness: 0.009999999776482582,
17 Individual: 784, 512, 10; Loss:102.308837890625,
   Fitness: 0.45916667580604553,
18 Individual: 784, 512, 10; Loss:75.22425079345703,
   Fitness: 0.11753333359956741,
19 Individual: 784, 512, 10; Loss:89.1552963256836,
   Fitness: 0.01861666701734066,
20 Individual: 784, 512, 10; Loss:59.71580505371094,
   Fitness: 0.009383332915604115]
21 Evolving...
22 Starting Generation  1 ...
23   7%|█        | 1/15 [01:52<26:18, 112.76s/it]
   Results for Generation >>>  1
```

```
24 Best Individual:
25 Individual: 784, 512, 10; Loss:75.19703674316406,
   Fitness: 0.5625166893005371
26 Starting Generation  2 ...
27 Results for Generation >>>  2
28 Best Individual:
29 Individual: 784, 512, 10; Loss:73.85897827148438,
   Fitness: 0.6042333245277405
30 Starting Generation  3 ...
31  20%|██        | 3/15 [05:10<20:27, 102.27s/it]
   Results for Generation >>>  3
32 Best Individual:
33 Individual: 784, 512, 10; Loss:75.57445526123047,
   Fitness: 0.6116499900817871
34 Starting Generation  4 ...
35  27%|██        | 4/15 [06:48<18:25, 100.49s/it]
   Results for Generation >>>  4
36 Best Individual:
37 Individual: 784, 512, 10; Loss:82.166748046875,
   Fitness: 0.6661333441734314
38 Starting Generation  5 ...
39  33%|███       | 5/15 [08:29<16:47, 100.74s/it]
   Results for Generation >>>  5
40 Best Individual:
41 Individual: 784, 512, 10; Loss:84.09455871582031,
   Fitness: 0.6809499859809875
42 Starting Generation  6 ...
43 Results for Generation >>>  6
44 Best Individual:
45 Individual: 784, 512, 10; Loss:87.92547607421875,
   Fitness: 0.741599977016449
46 Starting Generation  7 ...
47  47%|████      | 7/15 [11:52<13:27, 100.91s/it]
   Results for Generation >>>  7
48 Best Individual:
49 Individual: 784, 512, 10; Loss:87.92547607421875,
   Fitness: 0.741599977016449
50 Starting Generation  8 ...
51  53%|████      | 8/15 [13:34<11:48, 101.26s/it]
   Results for Generation >>>  8
52 Best Individual:
```

```
53 Individual: 784, 512, 10; Loss:90.09363555908203,
   Fitness: 0.8029000163078308
54 Starting Generation  9 ...
55  60%|██████      | 9/15 [15:14<10:06, 101.02s/it]
   Results for Generation >>>  9
56 Best Individual:
57 Individual: 784, 512, 10; Loss:90.09363555908203,
   Fitness: 0.8029000163078308
58 Starting Generation  10 ...
59 Results for Generation >>>  10
60 Best Individual:
61 Individual: 784, 512, 10; Loss:92.49776458740234,
   Fitness: 0.8731333613395691
62 Starting Generation  11 ...
63  73%|███████     | 11/15 [18:42<06:50, 102.68s/it]
   Results for Generation >>>  11
64 Best Individual:
65 Individual: 784, 512, 10; Loss:92.88790893554688,
   Fitness: 0.8734333515167236
66 Starting Generation  12 ...
67  80%|████████    | 12/15 [20:26<05:09, 103.13s/it]
   Results for Generation >>>  12
68 Best Individual:
69 Individual: 784, 512, 10; Loss:96.21841430664062,
   Fitness: 0.8825666904449463
70 Starting Generation  13 ...
71 Results for Generation >>>  13
72 Best Individual:
73 Individual: 784, 512, 10; Loss:95.13423919677734,
   Fitness: 0.9016000032424927
74 Starting Generation  14 ...
75  93%|█████████   | 14/15 [23:51<01:42, 102.89s/it]
   Results for Generation >>>  14
76 Best Individual:
77 Individual: 784, 512, 10; Loss:94.9808349609375,
   Fitness: 0.9117833375930786
78 Starting Generation  15 ...
79 100%|██████████| 15/15 [25:33<00:00, 102.23s/it]
80 Results for Generation >>>  15
81 Best Individual:
82 Individual: 784, 512, 10; Loss:94.9808349609375,
```

```
 82 Fitness: 0.9117833375930786
 83 Running GA iteration: 2
 84 Generating initial population...
 85 100%|████████| 15/15 [01:40<00:00,  6.69s/it]
 86   0%|        | 0/15 [00:00<?, ?it/s][
 87 Individual: 784, 512, 10; Loss:68.50543212890625,
    Fitness: 0.06121666729450226,
 88 Individual: 784, 512, 10; Loss:100.28205871582031,
    Fitness: 0.00423333328217268,
 89 Individual: 784, 512, 10; Loss:72.018310546875,
    Fitness: 0.17194999754428864,
 90 Individual: 784, 512, 10; Loss:53.07014846801758,
    Fitness: 0.06539999693632126,
 91 Individual: 784, 512, 10; Loss:60.95119094848633,
    Fitness: 0.058916665613651276,
 92 Individual: 784, 512, 10; Loss:71.34974670410156,
    Fitness: 0.04373333230614662,
 93 Individual: 784, 512, 10; Loss:77.87137603759766,
    Fitness: 0.08044999837875366,
 94 Individual: 784, 512, 10; Loss:77.29852294921875,
    Fitness: 0.06560000032186508,
 95 Individual: 784, 512, 10; Loss:60.54265594482422,
    Fitness: 0.16598333418369293,
 96 Individual: 784, 512, 10; Loss:67.3147964477539,
    Fitness: 0.001483333297073841,
 97 Individual: 784, 512, 10; Loss:73.0536880493164,
    Fitness: 0.014883332885801792,
 98 Individual: 784, 512, 10; Loss:76.79171752929688,
    Fitness: 0.02384999953210354,
 99 Individual: 784, 512, 10; Loss:74.846923828125,
    Fitness: 0.0011500000255182385,
100 Individual: 784, 512, 10; Loss:82.40751647949219,
    Fitness: 0.08616666495800018,
101 Individual: 784, 512, 10; Loss:63.95709991455078,
    Fitness: 0.30329999327659607]
102 Evolving...
103 Starting Generation  1 ...
104   7%|█      | 1/15 [01:44<24:21, 104.41s/it]
    Results for Generation >>>  1
105 Best Individual:
106 Individual: 784, 512, 10; Loss:33.7732048034668,
```

```
106 Fitness: 0.3960833251476288
107 Starting Generation  2 ...
108  13%|█          | 2/15 [03:27<22:30, 103.87s/it]
    Results for Generation >>>  2
109 Best Individual:
110 Individual: 784, 512, 10; Loss:23.811491012573242,
    Fitness: 0.4713333249092102
111 Starting Generation  3 ...
112  20%|██         | 3/15 [05:12<20:51, 104.28s/it]
    Results for Generation >>>  3
113 Best Individual:
114 Individual: 784, 512, 10; Loss:26.411226272583008,
    Fitness: 0.5551000237464905
115 Starting Generation  4 ...
116  27%|███        | 4/15 [06:57<19:11, 104.69s/it]
    Results for Generation >>>  4
117 Best Individual:
118 Individual: 784, 512, 10; Loss:31.699329376220703,
    Fitness: 0.6852499842643738
119 Starting Generation  5 ...
120 Results for Generation >>>  5
121 Best Individual:
122 Individual: 784, 512, 10; Loss:31.699329376220703,
    Fitness: 0.6852499842643738
123 Starting Generation  6 ...
124  40%|████       | 6/15 [10:28<15:45, 105.06s/it]
    Results for Generation >>>  6
125 Best Individual:
126 Individual: 784, 512, 10; Loss:32.4560432434082,
    Fitness: 0.6948833465576172
127 Starting Generation  7 ...
128 Results for Generation >>>  7
129 Best Individual:
130 Individual: 784, 512, 10; Loss:32.304134368896484,
    Fitness: 0.6962166428565979
131 Starting Generation  8 ...
132  53%|█████      | 8/15 [13:59<12:15, 105.10s/it]
    Results for Generation >>>  8
133 Best Individual:
134 Individual: 784, 512, 10; Loss:31.48699188232422,
    Fitness: 0.7007166743278503
```

```
135 Starting Generation  9 ...
136 Results for Generation >>>  9
137 Best Individual:
138 Individual: 784, 512, 10; Loss:36.80215072631836,
    Fitness: 0.7728999853134155
139  60%|██████     | 9/15 [15:43<10:29, 104.83s/it]
    Starting Generation  10 ...
140  67%|███████    | 10/15 [17:25<08:39, 103.99s/it]
    Results for Generation >>>  10
141 Best Individual:
142 Individual: 784, 512, 10; Loss:37.44069290161133,
    Fitness: 0.807616651058197
143 Starting Generation  11 ...
144 Results for Generation >>>  11
145 Best Individual:
146 Individual: 784, 512, 10; Loss:38.33283233642578,
    Fitness: 0.8225833177566528
147 Starting Generation  12 ...
148  80%|████████   | 12/15 [20:53<05:11, 104.00s/it]
    Results for Generation >>>  12
149 Best Individual:
150 Individual: 784, 512, 10; Loss:38.33283233642578,
    Fitness: 0.8225833177566528
151 Starting Generation  13 ...
152  87%|█████████  | 13/15 [22:40<03:29, 104.90s/it]
    Results for Generation >>>  13
153 Best Individual:
154 Individual: 784, 512, 10; Loss:41.10173034667969,
    Fitness: 0.8410666584968567
155 Starting Generation  14 ...
156  93%|██████████ | 14/15 [24:22<01:44, 104.17s/it]
    Results for Generation >>>  14
157 Best Individual:
158 Individual: 784, 512, 10; Loss:41.067420959472656,
    Fitness: 0.8576333522796631
159 Starting Generation  15 ...
160 100%|███████████| 15/15 [26:05<00:00, 104.38s/it]
161   0%|           | 0/15 [00:00<?, ?it/s]Results for
    Generation >>>  15
162 Best Individual:
163 Individual: 784, 512, 10; Loss:42.549354553222656,
```

```
163 Fitness: 0.8654333353042603
164 Running GA iteration: 3
165 Generating initial population...
166 100%|████████| 15/15 [01:40<00:00,  6.68s/it]
167   0%|        | 0/15 [00:00<?, ?it/s][
168 Individual: 784, 512, 10; Loss:64.5670394897461,
    Fitness: 0.030366666615009308,
169 Individual: 784, 512, 10; Loss:68.43619537353516,
    Fitness: 0.014100000262260437,
170 Individual: 784, 512, 10; Loss:84.19892120361328,
    Fitness: 0.2079000025987625,
171 Individual: 784, 512, 10; Loss:65.96324157714844,
    Fitness: 0.08316666632890701,
172 Individual: 784, 512, 10; Loss:86.2676010131836,
    Fitness: 0.0069333333522081375,
173 Individual: 784, 512, 10; Loss:70.3172607421875,
    Fitness: 0.0003000000142492354,
174 Individual: 784, 512, 10; Loss:87.129638671875,
    Fitness: 0.0011833333410322666,
175 Individual: 784, 512, 10; Loss:84.60324096679688,
    Fitness: 0.00016666666488163173,
176 Individual: 784, 512, 10; Loss:66.27377319335938,
    Fitness: 0.19763332605361938,
177 Individual: 784, 512, 10; Loss:60.2272644042968758,
    Fitness: 0.08791666477918625,
178 Individual: 784, 512, 10; Loss:77.37074279785156,
    Fitness: 0.004600000102072954,
179 Individual: 784, 512, 10; Loss:78.8222885131836,
    Fitness: 9.999999747378752e-05,
180 Individual: 784, 512, 10; Loss:81.85245513916016,
    Fitness: 0.02215000055730343,
181 Individual: 784, 512, 10; Loss:65.6694564819336,
    Fitness: 0.11573333293199539,
182 Individual: 784, 512, 10; Loss:71.69110870361328,
    Fitness: 0.019583333283662796]
183 Evolving...
184 Starting Generation  1 ...
185 Results for Generation >>>  1
186 Best Individual:
187 Individual: 784, 512, 10; Loss:39.76955795288086,
    Fitness: 0.4023333191871643
```

```
188 Starting Generation  2 ...
189  13%|█             | 2/15 [03:27<22:27, 103.66s/it]
    Results for Generation >>>  2
190 Best Individual:
191 Individual: 784, 512, 10; Loss:39.754825592041016,
    Fitness: 0.4517666697502136
192 Starting Generation  3 ...
193 Results for Generation >>>  3
194 Best Individual:
195 Individual: 784, 512, 10; Loss:39.754825592041016,
    Fitness: 0.4517666697502136
196 Starting Generation  4 ...
197  27%|██            | 4/15 [06:56<19:08, 104.42s/it]
    Results for Generation >>>  4
198 Best Individual:
199 Individual: 784, 512, 10; Loss:41.42985916137695,
    Fitness: 0.5508166551589966
200 Starting Generation  5 ...
201  33%|███           | 5/15 [08:42<17:31, 105.11s/it]
    Results for Generation >>>  5
202 Best Individual:
203 Individual: 784, 512, 10; Loss:41.42985916137695,
    Fitness: 0.5508166551589966
204 Starting Generation  6 ...
205 Results for Generation >>>  6
206 Best Individual:
207 Individual: 784, 512, 10; Loss:44.43191909790039,
    Fitness: 0.6041499972343445
208 Starting Generation  7 ...
209  47%|████          | 7/15 [12:14<14:05, 105.72s/it]
    Results for Generation >>>  7
210 Best Individual:
211 Individual: 784, 512, 10; Loss:41.1821174621582,
    Fitness: 0.6222166419029236
212 Starting Generation  8 ...
213 Results for Generation >>>  8
214 Best Individual:
215 Individual: 784, 512, 10; Loss:45.274959564208984,
    Fitness: 0.6371999979019165
216  53%|█████         | 8/15 [14:02<12:22, 106.14s/it]
    Starting Generation  9 ...
```

```
217  60%|███████      | 9/15 [15:49<10:39, 106.55s/it]
    Results for Generation >>>  9
218 Best Individual:
219 Individual: 784, 512, 10; Loss:44.39643096923828,
    Fitness: 0.7282833456993103
220 Starting Generation  10 ...
221 Results for Generation >>>  10
222 Best Individual:
223 Individual: 784, 512, 10; Loss:46.46989440917969,
    Fitness: 0.762499988079071
224 Starting Generation  11 ...
225  73%|████████     | 11/15 [19:22<07:06, 106.64s/it]
    Results for Generation >>>  11
226 Best Individual:
227 Individual: 784, 512, 10; Loss:48.74259567260742,
    Fitness: 0.8039500117301941
228 Starting Generation  12 ...
229  80%|████████     | 12/15 [21:19<05:28, 109.52s/it]
    Results for Generation >>>  12
230 Best Individual:
231 Individual: 784, 512, 10; Loss:48.74259567260742,
    Fitness: 0.8039500117301941
232 Starting Generation  13 ...
233 Results for Generation >>>  13
234 Best Individual:
235 Individual: 784, 512, 10; Loss:48.69599533081055,
    Fitness: 0.8039833307266235
236 Starting Generation  14 ...
237  93%|█████████    | 14/15 [25:05<01:51, 111.40s/it]
    Results for Generation >>>  14
238 Best Individual:
239 Individual: 784, 512, 10; Loss:49.1566162109375,
    Fitness: 0.8241999745368958
240 Starting Generation  15 ...
241 100%|██████████| 15/15 [26:56<00:00, 107.75s/it]
242 Results for Generation >>>  15
243 Best Individual:
244 Individual: 784, 512, 10; Loss:54.12372970581055,
    Fitness: 0.862583339214325
245 Running GA iteration: 4
246 Generating initial population...
```

```
247 100%|████████| 15/15 [01:48<00:00,  7.25s/it]
248 [
249 Individual: 784, 512, 10; Loss:101.64452362060547,
    Fitness: 0.0008666666690260172,
250 Individual: 784, 512, 10; Loss:70.56529235839844,
    Fitness: 0.000183333337190561,
251 Individual: 784, 512, 10; Loss:72.7651138305664,
    Fitness: 0.013450000435113907,
252 Individual: 784, 512, 10; Loss:68.06189727783203,
    Fitness: 0.1253499984741211,
253 Individual: 784, 512, 10; Loss:87.41448974609375,
    Fitness: 0.0,
254 Individual: 784, 512, 10; Loss:84.40930938720703,
    Fitness: 0.02538333274424076,
255 Individual: 784, 512, 10; Loss:92.74441528320312,
    Fitness: 0.001416666666045785,
256 Individual: 784, 512, 10; Loss:77.1103515625,
    Fitness: 0.3888166546821594,
257 Individual: 784, 512, 10; Loss:89.93225860595703,
    Fitness: 1.6666666851961054e-05,
258 Individual: 784, 512, 10; Loss:92.03434753417969,
    Fitness: 0.002033333294093609,
259 Individual: 784, 512, 10; Loss:66.95846557617188,
    Fitness: 0.14785000681877136,
260 Individual: 784, 512, 10; Loss:65.59867858886719,
    Fitness: 0.36853334307670593,
261 Individual: 784, 512, 10; Loss:66.05139923095703,
    Fitness: 0.08285000175237656,
262 Individual: 784, 512, 10; Loss:56.70461654663086,
    Fitness: 0.14740000665187836,
263 Individual: 784, 512, 10; Loss:77.62168884277344,
    Fitness: 0.0018166666850447655]
264 Evolving...
265 Starting Generation  1 ...
266   7%|█        | 1/15 [01:49<25:39, 110.00s/it]
    Results for Generation >>>  1
267 Best Individual:
268 Individual: 784, 512, 10; Loss:49.79880142211914,
    Fitness: 0.5520166754722595
269 Starting Generation  2 ...
270 Results for Generation >>>  2
```

```
271 Best Individual:
272 Individual: 784, 512, 10; Loss:55.033321380615234,
    Fitness: 0.6377333402633667
273 Starting Generation  3 ...
274  20%|██        | 3/15 [05:38<22:43, 113.67s/it]
    Results for Generation >>>  3
275 Best Individual:
276 Individual: 784, 512, 10; Loss:32.3238525390625,
    Fitness: 0.7763166427612305
277 Starting Generation  4 ...
278 Results for Generation >>>  4
279 Best Individual:
280 Individual: 784, 512, 10; Loss:32.3238525390625,
    Fitness: 0.7763166427612305
281 Starting Generation  5 ...
282  33%|███       | 5/15 [09:22<18:45, 112.57s/it]
    Results for Generation >>>  5
283 Best Individual:
284 Individual: 784, 512, 10; Loss:32.3238525390625,
    Fitness: 0.7763166427612305
285 Starting Generation  6 ...
286  40%|████      | 6/15 [11:11<16:42, 111.41s/it]
    Results for Generation >>>  6
287 Best Individual:
288 Individual: 784, 512, 10; Loss:34.845069885253906,
    Fitness: 0.8390666842460632
289 Starting Generation  7 ...
290 Results for Generation >>>  7
291 Best Individual:
292 Individual: 784, 512, 10; Loss:34.95740509033203,
    Fitness: 0.8403000235557556
293 Starting Generation  8 ...
294  53%|█████     | 8/15 [14:46<12:44, 109.21s/it]
    Results for Generation >>>  8
295 Best Individual:
296 Individual: 784, 512, 10; Loss:35.26620864868164,
    Fitness: 0.8405500054359436
297 Starting Generation  9 ...
298  60%|██████    | 9/15 [16:34<10:52, 108.73s/it]
    Results for Generation >>>  9
299 Best Individual:
```

```
300 Individual: 784, 512, 10; Loss:35.2784423828125,
    Fitness: 0.8406166434288025
301 Starting Generation  10 ...
302 Results for Generation >>>  10
303 Best Individual:
304 Individual: 784, 512, 10; Loss:39.334388732910156,
    Fitness: 0.8941333293914795
305 Starting Generation  11 ...
306  73%|████████    | 11/15 [20:18<07:21, 110.29s/it]
    Results for Generation >>>  11
307 Best Individual:
308 Individual: 784, 512, 10; Loss:44.53191375732422,
    Fitness: 0.9312000274658203
309 Starting Generation  12 ...
310  80%|████████    | 12/15 [22:09<05:32, 110.69s/it]
    Results for Generation >>>  12
311 Best Individual:
312 Individual: 784, 512, 10; Loss:46.34975051879883,
    Fitness: 0.9329166412353516
313 Starting Generation  13 ...
314  87%|█████████   | 13/15 [24:04<03:43, 111.86s/it]
    Results for Generation >>>  13
315 Best Individual:
316 Individual: 784, 512, 10; Loss:48.46659851074219,
    Fitness: 0.967199981212616
317 Starting Generation  14 ...
318  93%|█████████   | 14/15 [25:57<01:52, 112.32s/it]
    Results for Generation >>>  14
319 Best Individual:
320 Individual: 784, 512, 10; Loss:50.801856994628906,
    Fitness: 0.9730666875839233
321 Starting Generation  15 ...
322 100%|██████████| 15/15 [27:52<00:00, 111.47s/it]
323 Results for Generation >>>  15
324 Best Individual:
325 Individual: 784, 512, 10; Loss:52.93497848510742,
    Fitness: 0.9767333269119263
326 Running GA iteration: 5
327 Generating initial population...
328 100%|██████████| 15/15 [01:50<00:00,  7.38s/it]
329 [
```

330 Individual: 784, 512, 10; Loss:64.05072021484375,
    Fitness: 0.078083336353302,
331 Individual: 784, 512, 10; Loss:64.65531158447266,
    Fitness: 0.00033333332976326346,
332 Individual: 784, 512, 10; Loss:57.583377838134766,
    Fitness: 0.023083332926034927,
333 Individual: 784, 512, 10; Loss:80.99385070800781,
    Fitness: 0.07270000129938126,
334 Individual: 784, 512, 10; Loss:85.95301818847656,
    Fitness: 0.03550000116229057,
335 Individual: 784, 512, 10; Loss:53.53334045410156,
    Fitness: 0.01276666671037674,
336 Individual: 784, 512, 10; Loss:75.3215560913086,
    Fitness: 0.03245000168681145,
337 Individual: 784, 512, 10; Loss:69.3988265991211,
    Fitness: 0.2345166653394699,
338 Individual: 784, 512, 10; Loss:90.11798095703125,
    Fitness: 0.08501666784286499,
339 Individual: 784, 512, 10; Loss:96.08078002929688,
    Fitness: 0.0011666666250675917,
340 Individual: 784, 512, 10; Loss:72.26099395751953,
    Fitness: 0.04886666685342789,
341 Individual: 784, 512, 10; Loss:72.57250213623047,
    Fitness: 0.024150000885128975,
342 Individual: 784, 512, 10; Loss:66.37796020507812,
    Fitness: 0.004499998062849045,
343 Individual: 784, 512, 10; Loss:69.97693634033203,
    Fitness: 0.1717333346605301,
344 Individual: 784, 512, 10; Loss:79.1748046875,
    Fitness: 0.0036333333370089531]
345 Evolving...
346 Starting Generation  1 ...
347   7%|█          | 1/15 [01:52<26:17, 112.70s/it]
    Results for Generation >>>  1
348 Best Individual:
349 Individual: 784, 512, 10; Loss:61.06908416748047,
    Fitness: 0.2552500069141388
350 Starting Generation  2 ...
351  13%|█          | 2/15 [03:47<24:38, 113.72s/it]
    Results for Generation >>>  2
352 Best Individual:

```
353 Individual: 784, 512, 10; Loss:38.968074798583984,
    Fitness: 0.3182833194732666
354 Starting Generation  3 ...
355  20%|██        | 3/15 [05:47<23:22, 116.89s/it]
    Results for Generation >>>  3
356 Best Individual:
357 Individual: 784, 512, 10; Loss:38.968074798583984,
    Fitness: 0.3182833194732666
358 Starting Generation  4 ...
359  27%|██        | 4/15 [07:46<21:32, 117.54s/it]
    Results for Generation >>>  4
360 Best Individual:
361 Individual: 784, 512, 10; Loss:39.22908020019531,
    Fitness: 0.4116833209991455
362 Starting Generation  5 ...
363  33%|███       | 5/15 [09:42<19:31, 117.14s/it]
    Results for Generation >>>  5
364 Best Individual:
365 Individual: 784, 512, 10; Loss:39.79587936401367,
    Fitness: 0.4153166711330414
366 Starting Generation  6 ...
367 Results for Generation >>>  6
368 Best Individual:
369 Individual: 784, 512, 10; Loss:40.23440933227539,
    Fitness: 0.557616651058197
370 Starting Generation  7 ...
371  47%|████      | 7/15 [13:33<15:30, 116.36s/it]
    Results for Generation >>>  7
372 Best Individual:
373 Individual: 784, 512, 10; Loss:40.23440933227539,
    Fitness: 0.557616651058197
374 Starting Generation  8 ...
375 Results for Generation >>>  8
376 Best Individual:
377 Individual: 784, 512, 10; Loss:40.23440933227539,
    Fitness: 0.557616651058197
378 Starting Generation  9 ...
379  60%|█████     | 9/15 [17:29<11:43, 117.29s/it]
    Results for Generation >>>  9
380 Best Individual:
381 Individual: 784, 512, 10; Loss:40.23440933227539,
```

```
381 Fitness: 0.557616651058197
382 Starting Generation  10 ...
383 Results for Generation >>>  10
384 Best Individual:
385 Individual: 784, 512, 10; Loss:42.54671096801758,
    Fitness: 0.652649998664856
386 Starting Generation  11 ...
387  73%|███████   | 11/15 [21:24<07:48, 117.11s/it]
    Results for Generation >>>  11
388 Best Individual:
389 Individual: 784, 512, 10; Loss:42.54671096801758,
    Fitness: 0.652649998664856
390 Starting Generation  12 ...
391 Results for Generation >>>  12
392 Best Individual:
393 Individual: 784, 512, 10; Loss:43.930519104003906,
    Fitness: 0.711983323097229
394 Starting Generation  13 ...
395  87%|████████  | 13/15 [25:25<03:57, 118.86s/it]
    Results for Generation >>>  13
396 Best Individual:
397 Individual: 784, 512, 10; Loss:43.696895599365234,
    Fitness: 0.7121833562850952
398 Starting Generation  14 ...
399  93%|█████████ | 14/15 [27:42<02:04, 124.44s/it]
    Results for Generation >>>  14
400 Best Individual:
401 Individual: 784, 512, 10; Loss:47.3825798034668,
    Fitness: 0.8051000237464905
402 Starting Generation  15 ...
403 100%|██████████| 15/15 [30:02<00:00, 120.20s/it]
404 Results for Generation >>>  15
405 Best Individual:
406 Individual: 784, 512, 10; Loss:47.3825798034668,
    Fitness: 0.8051000237464905
407 All best fitness, from each generation, from each
    run have been saved to sparce_categorical_accuracy.
    csv
408 -----------------------------------------------------
    ----------------------------------------------
409 ----------List with the best fitness, from each
```

```
409 generation, from each run ------------------
410 [[0.5625166893005371, 0.6042333245277405, 0.
    6116499900817871, 0.6661333441734314, 0.
    6809499859809875, 0.741599977016449, 0.
    741599977016449, 0.8029000163078308, 0.
    8029000163078308, 0.8731333613395691, 0.
    8734333515167236, 0.8825666904449463, 0.
    9016000032424927, 0.9117833375930786, 0.
    9117833375930786], [0.3960833251476288, 0.
    4713333249092102, 0.5551000237464905, 0.
    6852499842643738, 0.6852499842643738, 0.
    6948833465576172, 0.6962166428565979, 0.
    7007166743278503, 0.7728999853134155, 0.
    807616651058197, 0.8225833177566528, 0.
    8225833177566528, 0.8410666584968567, 0.
    8576333522796631, 0.8654333353042603], [0.
    4023333191871643, 0.4517666697502136, 0.
    4517666697502136, 0.5508166551589966, 0.
    5508166551589966, 0.6041499972343445, 0.
    6222166419029236, 0.6371999979019165, 0.
    7282833456993103, 0.762499988079071, 0.
    8039500117301941, 0.8039500117301941, 0.
    8039833307266235, 0.8241999745368958, 0.
    862583339214325], [0.5520166754722595, 0.
    6377333402633667, 0.7763166427612305, 0.
    7763166427612305, 0.7763166427612305, 0.
    8390666842460632, 0.8403000235557556, 0.
    8405500054359436, 0.8406166434288025, 0.
    8941333293914795, 0.9312000274658203, 0.
    9329166412353516, 0.967199981212616, 0.
    9730666875839233, 0.9767333269119263], [0.
    2552500069141388, 0.3182833194732666, 0.
    3182833194732666, 0.4116833209991455, 0.
    4153166711330414, 0.557616651058197, 0.
    557616651058197, 0.557616651058197, 0.
    557616651058197, 0.652649998664856, 0.
    652649998664856, 0.711983323097229, 0.
    712183356285052, 0.8051000237464905, 0.
    8051000237464905]]
411 ------------------------------------------------
    -------------
```

```
412  ----------List with the Average Best Fitness
     ------------------
413  [0.4336400032043457, 0.4966699957847595, 0.
     5426233291625977, 0.6180399894714356, 0.
     621729987859726, 0.6874633312225342, 0.
     6915899872779846, 0.7077966690063476, 0.
     7404633283615112, 0.7980066657066345, 0.
     8167633414268494, 0.8307999968528748, 0.
     8452066659927369, 0.8743566751480103, 0.
     8843266725540161]
414  --------------------------------------------------
     ------------
415  ----------List with the Median Best Fitness
     ------------------
416  [0.4023333191871643, 0.4713333249092102, 0.
     5551000237464905, 0.6661333441734314, 0.
     6809499859809875, 0.6948833465576172, 0.
     6962166428565979, 0.7007166743278503, 0.
     7728999853134155, 0.807616651058197, 0.
     8225833177566528, 0.8225833177566528, 0.
     8410666584968567, 0.8576333522796631, 0.
     8654333353042603]
417
418  Process finished with exit code 0
419
```