```
 1 D:\OneDrive\TFG\TFG_Python\venv\Scripts\python.exe C:\
   Users\elias\AppData\Local\JetBrains\Toolbox\apps\PyCharm-P
   \ch-0\183.4284.139\helpers\pydev\pydevconsole.py --mode=
   client --port=55330
 2
 3 import sys; print('Python %s on %s' % (sys.version, sys.
   platform))
 4 sys.path.extend(['D:\\OneDrive\\TFG\\TFG_Python', 'D:/
   OneDrive/TFG/TFG_Python'])
 5
 6 PyDev console: starting.
 7
 8 Python 3.6.7 (v3.6.7:6ec5cf24b7, Oct 20 2018, 13:35:33) [
   MSC v.1900 64 bit (AMD64)] on win32
 9 >>> runfile('D:/OneDrive/TFG/TFG_Python/core/model.py',
   wdir='D:/OneDrive/TFG/TFG_Python/core')
10 Using TensorFlow backend.
11 >>> model_training()
12 ISBINARY: True
13 tipo
14 benign          2510
15 malignant       2510
16 premalignant    2510
17 dtype: int64
18 Valid gen: Img leidas= 0
19 Valid gen: Img leidas= 100
20 Valid gen: Img leidas= 200
21 Valid gen: Img leidas= 300
22 Valid gen: Img leidas= 400
23 Valid gen: Img leidas= 500
24 Valid gen: Img leidas= 600
25 Valid gen: Img leidas= 700
26 Valid gen: Img leidas= 800
27 Valid gen: Img leidas= 900
28 Valid gen: Img leidas= 1000
29 Valid gen: Img leidas= 1100
30 Valid gen: Img leidas= 1200
31 Creando modelo y compilandolo
32 2019-04-16 11:10:18.531231: I tensorflow/core/platform/
   cpu_feature_guard.cc:141] Your CPU supports instructions
   that this TensorFlow binary was not compiled to use: AVX2
33 2019-04-16 11:10:18.808409: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:1432] Found device 0 with
    properties:
34 name: GeForce GTX 1070 major: 6 minor: 1 memoryClockRate(
```

```
34 GHz): 1.835
35 pciBusID: 0000:26:00.0
36 totalMemory: 8.00GiB freeMemory: 6.64GiB
37 2019-04-16 11:10:18.852151: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:1511] Adding visible gpu
   devices: 0
38 2019-04-16 11:10:22.420631: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:982] Device interconnect
   StreamExecutor with strength 1 edge matrix:
39 2019-04-16 11:10:22.420731: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:988]      0
40 2019-04-16 11:10:22.420780: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:1001] 0:   N
41 2019-04-16 11:10:22.462874: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:1115] Created TensorFlow
   device (/job:localhost/replica:0/task:0/device:GPU:0 with
   6397 MB memory) -> physical GPU (device: 0, name: GeForce
   GTX 1070, pci bus id: 0000:26:00.0, compute capability: 6.
   1)
42 Se comienza el entrenamiento del modelo
43 ['loss', 'acc']
44 Epoch 1/40
45 2019-04-16 11:11:50.822483: W tensorflow/core/
   common_runtime/bfc_allocator.cc:211] Allocator (GPU_0_bfc
   ) ran out of memory trying to allocate 2.03GiB. The caller
    indicates that this is not a failure, but may mean that
   there could be performance gains if more memory were
   available.
46 2019-04-16 11:11:51.042743: W tensorflow/core/
   common_runtime/bfc_allocator.cc:211] Allocator (GPU_0_bfc
   ) ran out of memory trying to allocate 2.00GiB. The caller
    indicates that this is not a failure, but may mean that
   there could be performance gains if more memory were
   available.
47 2019-04-16 11:11:51.045685: W tensorflow/core/
   common_runtime/bfc_allocator.cc:211] Allocator (GPU_0_bfc
   ) ran out of memory trying to allocate 2.15GiB. The caller
    indicates that this is not a failure, but may mean that
   there could be performance gains if more memory were
   available.
48  - 111s - loss: 0.6563 - acc: 0.7260 - val_loss: 1.0322 -
   val_acc: 0.7510
49
50 Epoch 00001: val_loss improved from inf to 1.03218, saving
    model to equilibrado.h5
```

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Epoch 2/40
 - 129s - loss: 0.4678 - acc: 0.8010 - val_loss: 0.5604 -
val_acc: 0.7900

Epoch 00002: val_loss improved from 1.03218 to 0.56041,
saving model to equilibrado.h5
Epoch 3/40
 - 71s - loss: 0.4140 - acc: 0.8365 - val_loss: 0.5051 -
val_acc: 0.7917

Epoch 00003: val_loss improved from 0.56041 to 0.50505,
saving model to equilibrado.h5
Epoch 4/40
 - 69s - loss: 0.4357 - acc: 0.8167 - val_loss: 0.5677 -
val_acc: 0.7651

Epoch 00004: val_loss did not improve from 0.50505
Epoch 5/40
 - 71s - loss: 0.3687 - acc: 0.8490 - val_loss: 0.4126 -
val_acc: 0.8207

Epoch 00005: val_loss improved from 0.50505 to 0.41258,
saving model to equilibrado.h5
Epoch 6/40
 - 71s - loss: 0.3839 - acc: 0.8385 - val_loss: 0.6072 -
val_acc: 0.7162

Epoch 00006: val_loss did not improve from 0.41258
Epoch 7/40
 - 63s - loss: 0.3273 - acc: 0.8604 - val_loss: 0.4737 -
val_acc: 0.7934

Epoch 00007: val_loss did not improve from 0.41258
Epoch 8/40
 - 79s - loss: 0.3084 - acc: 0.8594 - val_loss: 0.5602 -
val_acc: 0.7303

Epoch 00008: val_loss did not improve from 0.41258
Epoch 9/40
 - 67s - loss: 0.2588 - acc: 0.8854 - val_loss: 0.4163 -
val_acc: 0.8116

Epoch 00009: val_loss did not improve from 0.41258
Epoch 10/40
 - 69s - loss: 0.3169 - acc: 0.8542 - val_loss: 0.5008 -
```

```
 84 val_acc: 0.8017
 85
 86 Epoch 00010: val_loss did not improve from 0.41258
 87
 88 Epoch 00010: ReduceLROnPlateau reducing learning rate to
    0.00020000000949949026.
 89 Epoch 11/40
 90  - 64s - loss: 0.2882 - acc: 0.8823 - val_loss: 0.3771 -
    val_acc: 0.8456
 91
 92 Epoch 00011: val_loss improved from 0.41258 to 0.37711,
    saving model to equilibrado.h5
 93 Epoch 12/40
 94  - 67s - loss: 0.2395 - acc: 0.9156 - val_loss: 0.3399 -
    val_acc: 0.8581
 95
 96 Epoch 00012: val_loss improved from 0.37711 to 0.33989,
    saving model to equilibrado.h5
 97 Epoch 13/40
 98  - 56s - loss: 0.1954 - acc: 0.9229 - val_loss: 0.3155 -
    val_acc: 0.8606
 99
100 Epoch 00013: val_loss improved from 0.33989 to 0.31549,
    saving model to equilibrado.h5
101 Epoch 14/40
102  - 63s - loss: 0.2107 - acc: 0.9125 - val_loss: 0.3442 -
    val_acc: 0.8515
103
104 Epoch 00014: val_loss did not improve from 0.31549
105 Epoch 15/40
106  - 71s - loss: 0.2115 - acc: 0.9302 - val_loss: 0.3193 -
    val_acc: 0.8581
107
108 Epoch 00015: val_loss did not improve from 0.31549
109 Epoch 16/40
110  - 57s - loss: 0.1591 - acc: 0.9365 - val_loss: 0.3138 -
    val_acc: 0.8639
111
112 Epoch 00016: val_loss improved from 0.31549 to 0.31380,
    saving model to equilibrado.h5
113 Epoch 17/40
114  - 129s - loss: 0.1690 - acc: 0.9271 - val_loss: 0.2973
     - val_acc: 0.8755
115
116 Epoch 00017: val_loss improved from 0.31380 to 0.29735,
```

```
116 saving model to equilibrado.h5
117 Epoch 18/40
118  - 68s - loss: 0.1763 - acc: 0.9406 - val_loss: 0.3104 -
    val_acc: 0.8672
119
120 Epoch 00018: val_loss did not improve from 0.29735
121 Epoch 19/40
122  - 72s - loss: 0.1618 - acc: 0.9375 - val_loss: 0.3105 -
    val_acc: 0.8672
123
124 Epoch 00019: val_loss did not improve from 0.29735
125 Epoch 20/40
126  - 66s - loss: 0.1493 - acc: 0.9448 - val_loss: 0.3359 -
    val_acc: 0.8606
127
128 Epoch 00020: val_loss did not improve from 0.29735
129 Epoch 21/40
130  - 65s - loss: 0.1292 - acc: 0.9458 - val_loss: 0.3143 -
    val_acc: 0.8614
131
132 Epoch 00021: val_loss did not improve from 0.29735
133 Epoch 22/40
134  - 65s - loss: 0.1164 - acc: 0.9594 - val_loss: 0.3158 -
    val_acc: 0.8664
135
136 Epoch 00022: val_loss did not improve from 0.29735
137
138 Epoch 00022: ReduceLROnPlateau reducing learning rate to
    2.0000000949949027e-05.
139 Epoch 23/40
140  - 55s - loss: 0.1287 - acc: 0.9427 - val_loss: 0.3209 -
    val_acc: 0.8672
141
142 Epoch 00023: val_loss did not improve from 0.29735
143 Epoch 24/40
144  - 63s - loss: 0.1035 - acc: 0.9656 - val_loss: 0.3223 -
    val_acc: 0.8647
145
146 Epoch 00024: val_loss did not improve from 0.29735
147 Epoch 25/40
148  - 69s - loss: 0.1197 - acc: 0.9510 - val_loss: 0.3275 -
    val_acc: 0.8664
149
150 Epoch 00025: val_loss did not improve from 0.29735
151 Epoch 26/40
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152  - 74s - loss: 0.1211 - acc: 0.9594 - val_loss: 0.3349 -
    val_acc: 0.8664
153
154 Epoch 00026: val_loss did not improve from 0.29735
155 Epoch 27/40
156  - 77s - loss: 0.1240 - acc: 0.9563 - val_loss: 0.3350 -
    val_acc: 0.8664
157
158 Epoch 00027: val_loss did not improve from 0.29735
159
160 Epoch 00027: ReduceLROnPlateau reducing learning rate to
    2.0000001313746906e-06.
161 Entrenamiento completado, se procede al test final
162
163   32/1506 [..............................] - ETA: 10s
164   64/1506 [>.............................] - ETA: 9s
165   96/1506 [>.............................] - ETA: 9s
166  128/1506 [=>............................] - ETA: 9s
167  160/1506 [==>...........................] - ETA: 8s
168  192/1506 [==>...........................] - ETA: 8s
169  224/1506 [===>..........................] - ETA: 8s
170  256/1506 [====>.........................] - ETA: 8s
171  288/1506 [====>.........................] - ETA: 7s
172  320/1506 [=====>........................] - ETA: 7s
173  352/1506 [======>.......................] - ETA: 7s
174  384/1506 [======>.......................] - ETA: 7s
175  416/1506 [=======>......................] - ETA: 7s
176  448/1506 [=======>......................] - ETA: 6s
177  480/1506 [========>.....................] - ETA: 6s
178  512/1506 [=========>....................] - ETA: 6s
179  544/1506 [=========>....................] - ETA: 6s
180  576/1506 [==========>...................] - ETA: 6s
181  608/1506 [===========>..................] - ETA: 5s
182  640/1506 [===========>..................] - ETA: 5s
183  672/1506 [============>.................] - ETA: 5s
184  704/1506 [=============>................] - ETA: 5s
185  736/1506 [=============>................] - ETA: 5s
186  768/1506 [==============>...............] - ETA: 4s
187  800/1506 [==============>...............] - ETA: 4s
188  832/1506 [===============>..............] - ETA: 4s
189  864/1506 [================>.............] - ETA: 4s
190  896/1506 [================>.............] - ETA: 3s
191  928/1506 [=================>............] - ETA: 3s
192  960/1506 [==================>...........] - ETA: 3s
193  992/1506 [==================>...........] - ETA: 3s
```

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194 1024/1506 [===================>.........] - ETA: 3s
195 1056/1506 [====================>........] - ETA: 2s
196 1088/1506 [====================>........] - ETA: 2s
197 1120/1506 [=====================>.......] - ETA: 2s
198 1152/1506 [=====================>.......] - ETA: 2s
199 1184/1506 [======================>......] - ETA: 2s
200 1216/1506 [======================>......] - ETA: 1s
201 1248/1506 [======================>......] - ETA: 1s
202 1280/1506 [=======================>.....] - ETA: 1s
203 1312/1506 [=======================>.....] - ETA: 1s
204 1344/1506 [========================>....] - ETA: 1s
205 1376/1506 [========================>....] - ETA: 0s
206 1408/1506 [=========================>...] - ETA: 0s
207 1440/1506 [=========================>...] - ETA: 0s
208 1472/1506 [==========================>..] - ETA: 0s
209 1504/1506 [==========================>..] - ETA: 0s
210 1506/1506 [==============================] - 10s 7ms/step
211 ['loss', 'acc']
212 [0.27104003143906197, 0.8851261620185923]
213 Ahora vamos a dibujar la matriz de confusion
214 ['benign', 'premalignant', 'malignant']
215 Normalized confusion matrix
216 [[0.81761006 0.16981132 0.01257862]
217  [0.14807692 0.84615385 0.00576923]
218  [0.00982318 0.00196464 0.98821218]]
219 El entrenamiento ha llevado : 2627.316427230835
220
```