```
 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=52271
 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 2019-04-15 09:17:52.059875: I tensorflow/core/platform/
   cpu_feature_guard.cc:141] Your CPU supports instructions
   that this TensorFlow binary was not compiled to use: AVX2
33 2019-04-15 09:17:52.323513: 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 2019-04-15 09:17:52.339125: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:1511] Adding visible gpu
   devices: 0
38 2019-04-15 09:22:33.369776: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:982] Device interconnect
   StreamExecutor with strength 1 edge matrix:
39 2019-04-15 09:22:33.369888: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:988]      0
40 2019-04-15 09:22:33.369939: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:1001] 0:   N
41 2019-04-15 09:22:33.421158: 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 2019-04-15 09:24:03.132887: 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 2019-04-15 09:24:03.334628: 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 2019-04-15 09:24:03.337820: 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  - 109s - loss: 0.6542 - acc: 0.7167 - val_loss: 3.8586 -
   val_acc: 0.5826
49
50 Epoch 00001: val_loss improved from inf to 3.85860, saving
    model to equilibrado.h5
```

```
Epoch 2/40
 - 72s - loss: 0.4859 - acc: 0.7844 - val_loss: 0.9456 -
val_acc: 0.7544

Epoch 00002: val_loss improved from 3.85860 to 0.94562,
saving model to equilibrado.h5
Epoch 3/40
 - 77s - loss: 0.4227 - acc: 0.8177 - val_loss: 0.6802 -
val_acc: 0.7983

Epoch 00003: val_loss improved from 0.94562 to 0.68018,
saving model to equilibrado.h5
Epoch 4/40
 - 93s - loss: 0.3900 - acc: 0.8354 - val_loss: 0.5157 -
val_acc: 0.8017

Epoch 00004: val_loss improved from 0.68018 to 0.51573,
saving model to equilibrado.h5
Epoch 5/40
 - 69s - loss: 0.3947 - acc: 0.8427 - val_loss: 0.6275 -
val_acc: 0.7751

Epoch 00005: val_loss did not improve from 0.51573
Epoch 6/40
 - 65s - loss: 0.3912 - acc: 0.8562 - val_loss: 0.4037 -
val_acc: 0.8066

Epoch 00006: val_loss improved from 0.51573 to 0.40369,
saving model to equilibrado.h5
Epoch 7/40
 - 68s - loss: 0.3494 - acc: 0.8646 - val_loss: 0.4775 -
val_acc: 0.8041

Epoch 00007: val_loss did not improve from 0.40369
Epoch 8/40
 - 104s - loss: 0.3468 - acc: 0.8583 - val_loss: 0.3990 -
val_acc: 0.8266

Epoch 00008: val_loss improved from 0.40369 to 0.39896,
saving model to equilibrado.h5
Epoch 9/40
 - 65s - loss: 0.2675 - acc: 0.8938 - val_loss: 0.3812 -
val_acc: 0.8232

Epoch 00009: val_loss improved from 0.39896 to 0.38123,
```

```
saving model to equilibrado.h5
Epoch 10/40
 - 69s - loss: 0.2952 - acc: 0.8938 - val_loss: 0.4606 - val_acc: 0.8025

Epoch 00010: val_loss did not improve from 0.38123
Epoch 11/40
 - 70s - loss: 0.2167 - acc: 0.9198 - val_loss: 0.3720 - val_acc: 0.8506

Epoch 00011: val_loss improved from 0.38123 to 0.37200, saving model to equilibrado.h5
Epoch 12/40
 - 67s - loss: 0.2672 - acc: 0.8917 - val_loss: 0.5000 - val_acc: 0.7743

Epoch 00012: val_loss did not improve from 0.37200
Epoch 13/40
 - 63s - loss: 0.2128 - acc: 0.9177 - val_loss: 0.5281 - val_acc: 0.7917

Epoch 00013: val_loss did not improve from 0.37200
Epoch 14/40
 - 69s - loss: 0.2397 - acc: 0.9115 - val_loss: 0.4145 - val_acc: 0.8149

Epoch 00014: val_loss did not improve from 0.37200
Epoch 15/40
 - 62s - loss: 0.1881 - acc: 0.9302 - val_loss: 0.6062 - val_acc: 0.7983

Epoch 00015: val_loss did not improve from 0.37200
Epoch 16/40
 - 61s - loss: 0.1798 - acc: 0.9469 - val_loss: 0.3988 - val_acc: 0.8506

Epoch 00016: val_loss did not improve from 0.37200

Epoch 00016: ReduceLROnPlateau reducing learning rate to 0.00020000000949949026.
Epoch 17/40
 - 63s - loss: 0.2105 - acc: 0.9219 - val_loss: 0.3669 - val_acc: 0.8647

Epoch 00017: val_loss improved from 0.37200 to 0.36687,
```

```
116 saving model to equilibrado.h5
117 Epoch 18/40
118  - 76s - loss: 0.1192 - acc: 0.9521 - val_loss: 0.4228 -
    val_acc: 0.8473
119
120 Epoch 00018: val_loss did not improve from 0.36687
121 Epoch 19/40
122  - 145s - loss: 0.1271 - acc: 0.9552 - val_loss: 0.3396
     - val_acc: 0.8722
123
124 Epoch 00019: val_loss improved from 0.36687 to 0.33963,
    saving model to equilibrado.h5
125 Epoch 20/40
126  - 67s - loss: 0.1418 - acc: 0.9490 - val_loss: 0.3406 -
    val_acc: 0.8589
127
128 Epoch 00020: val_loss did not improve from 0.33963
129 Epoch 21/40
130  - 62s - loss: 0.1006 - acc: 0.9646 - val_loss: 0.3223 -
    val_acc: 0.8739
131
132 Epoch 00021: val_loss improved from 0.33963 to 0.32228,
    saving model to equilibrado.h5
133 Epoch 22/40
134  - 63s - loss: 0.0805 - acc: 0.9719 - val_loss: 0.3445 -
    val_acc: 0.8705
135
136 Epoch 00022: val_loss did not improve from 0.32228
137 Epoch 23/40
138  - 64s - loss: 0.1001 - acc: 0.9646 - val_loss: 0.3306 -
    val_acc: 0.8722
139
140 Epoch 00023: val_loss did not improve from 0.32228
141 Epoch 24/40
142  - 55s - loss: 0.0621 - acc: 0.9802 - val_loss: 0.3462 -
    val_acc: 0.8672
143
144 Epoch 00024: val_loss did not improve from 0.32228
145 Epoch 25/40
146  - 70s - loss: 0.0814 - acc: 0.9750 - val_loss: 0.3433 -
    val_acc: 0.8772
147
148 Epoch 00025: val_loss did not improve from 0.32228
149 Epoch 26/40
150  - 60s - loss: 0.0591 - acc: 0.9812 - val_loss: 0.3519 -
```

```
val_acc: 0.8730

Epoch 00026: val_loss did not improve from 0.32228

Epoch 00026: ReduceLROnPlateau reducing learning rate to 2.0000000949949027e-05.
Epoch 27/40
 - 67s - loss: 0.0683 - acc: 0.9750 - val_loss: 0.3586 - val_acc: 0.8705

Epoch 00027: val_loss did not improve from 0.32228
Epoch 28/40
 - 58s - loss: 0.0732 - acc: 0.9719 - val_loss: 0.3596 - val_acc: 0.8714

Epoch 00028: val_loss did not improve from 0.32228
Epoch 29/40
 - 68s - loss: 0.0897 - acc: 0.9688 - val_loss: 0.3600 - val_acc: 0.8730

Epoch 00029: val_loss did not improve from 0.32228
Epoch 30/40
 - 61s - loss: 0.0651 - acc: 0.9750 - val_loss: 0.3609 - val_acc: 0.8714

Epoch 00030: val_loss did not improve from 0.32228
Epoch 31/40
 - 72s - loss: 0.0567 - acc: 0.9823 - val_loss: 0.3645 - val_acc: 0.8705

Epoch 00031: val_loss did not improve from 0.32228

Epoch 00031: ReduceLROnPlateau reducing learning rate to 2.0000001313746906e-06.
Entrenamiento completado, se procede al test final

  32/1506 [..............................] - ETA: 10s
  64/1506 [>.............................] - ETA: 9s
  96/1506 [>.............................] - ETA: 9s
 128/1506 [=>............................] - ETA: 9s
 160/1506 [==>...........................] - ETA: 8s
 192/1506 [==>...........................] - ETA: 8s
 224/1506 [===>..........................] - ETA: 8s
 256/1506 [====>.........................] - ETA: 8s
 288/1506 [====>.........................] - ETA: 8s
```

```
188  320/1506 [=====>........................] - ETA: 7s
189  352/1506 [======>.......................] - ETA: 7s
190  384/1506 [======>.......................] - ETA: 7s
191  416/1506 [=======>......................] - ETA: 7s
192  448/1506 [=======>......................] - ETA: 6s
193  480/1506 [========>.....................] - ETA: 6s
194  512/1506 [=========>....................] - ETA: 6s
195  544/1506 [=========>....................] - ETA: 6s
196  576/1506 [==========>...................] - ETA: 6s
197  608/1506 [===========>..................] - ETA: 5s
198  640/1506 [===========>..................] - ETA: 5s
199  672/1506 [============>.................] - ETA: 5s
200  704/1506 [=============>................] - ETA: 5s
201  736/1506 [=============>................] - ETA: 5s
202  768/1506 [==============>...............] - ETA: 4s
203  800/1506 [==============>...............] - ETA: 4s
204  832/1506 [===============>..............] - ETA: 4s
205  864/1506 [================>.............] - ETA: 4s
206  896/1506 [================>.............] - ETA: 4s
207  928/1506 [=================>............] - ETA: 3s
208  960/1506 [==================>...........] - ETA: 3s
209  992/1506 [==================>...........] - ETA: 3s
210 1024/1506 [===================>..........] - ETA: 3s
211 1056/1506 [====================>.........] - ETA: 2s
212 1088/1506 [====================>.........] - ETA: 2s
213 1120/1506 [=====================>........] - ETA: 2s
214 1152/1506 [=====================>........] - ETA: 2s
215 1184/1506 [======================>.......] - ETA: 2s
216 1216/1506 [======================>......] - ETA: 1s
217 1248/1506 [=======================>......] - ETA: 1s
218 1280/1506 [========================>.....] - ETA: 1s
219 1312/1506 [========================>.....] - ETA: 1s
220 1344/1506 [=========================>....] - ETA: 1s
221 1376/1506 [=========================>....] - ETA: 0s
222 1408/1506 [==========================>...] - ETA: 0s
223 1440/1506 [==========================>...] - ETA: 0s
224 1472/1506 [===========================>..] - ETA: 0s
225 1504/1506 [===========================>..] - ETA: 0s
226 1506/1506 [==============================] - 10s 7ms/step
227 ['loss', 'acc']
228 [0.29998612275735476, 0.8871181938911022]
229 Ahora vamos a dibujar la matriz de confusion
230 ['benign', 'premalignant', 'malignant']
231 Normalized confusion matrix
232 [[0.83905579 0.15879828 0.00214592]
```

```
233  [0.16007905 0.82608696 0.01383399]
234  [0.01310861 0.         0.98689139]]
235 El entrenamiento ha llevado : 3211.629408597946
236
```