```
 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=54695
 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 11:06:27.015626: 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 11:06:27.241821: 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 11:06:27.241994: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:1511] Adding visible gpu
   devices: 0
38 2019-04-15 11:06:28.190151: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:982] Device interconnect
   StreamExecutor with strength 1 edge matrix:
39 2019-04-15 11:06:28.190253: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:988]      0
40 2019-04-15 11:06:28.190305: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:1001] 0:   N
41 2019-04-15 11:06:28.190499: 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 11:07:54.171532: 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 11:07:54.378688: 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 11:07:54.381946: 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  - 100s - loss: 0.6887 - acc: 0.7063 - val_loss: 2.9912 -
   val_acc: 0.5552
49
50 Epoch 00001: val_loss improved from inf to 2.99119, saving
    model to equilibrado.h5
```

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Epoch 2/40
 - 60s - loss: 0.4899 - acc: 0.7906 - val_loss: 0.9616 -
val_acc: 0.7718

Epoch 00002: val_loss improved from 2.99119 to 0.96162,
saving model to equilibrado.h5
Epoch 3/40
 - 69s - loss: 0.3880 - acc: 0.8365 - val_loss: 0.6441 -
val_acc: 0.7544

Epoch 00003: val_loss improved from 0.96162 to 0.64412,
saving model to equilibrado.h5
Epoch 4/40
 - 71s - loss: 0.3730 - acc: 0.8271 - val_loss: 0.8266 -
val_acc: 0.7386

Epoch 00004: val_loss did not improve from 0.64412
Epoch 5/40
 - 74s - loss: 0.4031 - acc: 0.8177 - val_loss: 0.5059 -
val_acc: 0.8058

Epoch 00005: val_loss improved from 0.64412 to 0.50588,
saving model to equilibrado.h5
Epoch 6/40
 - 69s - loss: 0.3002 - acc: 0.8656 - val_loss: 0.5955 -
val_acc: 0.8241

Epoch 00006: val_loss did not improve from 0.50588
Epoch 7/40
 - 64s - loss: 0.2948 - acc: 0.8677 - val_loss: 0.4926 -
val_acc: 0.8091

Epoch 00007: val_loss improved from 0.50588 to 0.49264,
saving model to equilibrado.h5
Epoch 8/40
 - 75s - loss: 0.2948 - acc: 0.8813 - val_loss: 0.5230 -
val_acc: 0.7950

Epoch 00008: val_loss did not improve from 0.49264
Epoch 9/40
 - 77s - loss: 0.3162 - acc: 0.8750 - val_loss: 0.4334 -
val_acc: 0.8232

Epoch 00009: val_loss improved from 0.49264 to 0.43339,
saving model to equilibrado.h5
```

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Epoch 10/40
 - 72s - loss: 0.2606 - acc: 0.8917 - val_loss: 1.2469 - val_acc: 0.6598

Epoch 00010: val_loss did not improve from 0.43339
Epoch 11/40
 - 68s - loss: 0.2130 - acc: 0.9073 - val_loss: 0.3828 - val_acc: 0.8523

Epoch 00011: val_loss improved from 0.43339 to 0.38283, saving model to equilibrado.h5
Epoch 12/40
 - 67s - loss: 0.2639 - acc: 0.8927 - val_loss: 0.3797 - val_acc: 0.8656

Epoch 00012: val_loss improved from 0.38283 to 0.37973, saving model to equilibrado.h5
Epoch 13/40
 - 72s - loss: 0.1878 - acc: 0.9219 - val_loss: 0.3636 - val_acc: 0.8456

Epoch 00013: val_loss improved from 0.37973 to 0.36360, saving model to equilibrado.h5
Epoch 14/40
 - 76s - loss: 0.1885 - acc: 0.9312 - val_loss: 0.3511 - val_acc: 0.8564

Epoch 00014: val_loss improved from 0.36360 to 0.35109, saving model to equilibrado.h5
Epoch 15/40
 - 69s - loss: 0.2174 - acc: 0.9177 - val_loss: 0.5952 - val_acc: 0.7726

Epoch 00015: val_loss did not improve from 0.35109
Epoch 16/40
 - 70s - loss: 0.1574 - acc: 0.9469 - val_loss: 0.3638 - val_acc: 0.8606

Epoch 00016: val_loss did not improve from 0.35109
Epoch 17/40
 - 67s - loss: 0.1314 - acc: 0.9500 - val_loss: 0.3828 - val_acc: 0.8647

Epoch 00017: val_loss did not improve from 0.35109
Epoch 18/40
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116  - 56s - loss: 0.1172 - acc: 0.9542 - val_loss: 0.3434 -
    val_acc: 0.8722
117
118 Epoch 00018: val_loss improved from 0.35109 to 0.34343,
    saving model to equilibrado.h5
119 Epoch 19/40
120  - 66s - loss: 0.1616 - acc: 0.9406 - val_loss: 0.3787 -
    val_acc: 0.8556
121
122 Epoch 00019: val_loss did not improve from 0.34343
123 Epoch 20/40
124  - 68s - loss: 0.1270 - acc: 0.9521 - val_loss: 0.4181 -
    val_acc: 0.8465
125
126 Epoch 00020: val_loss did not improve from 0.34343
127 Epoch 21/40
128  - 65s - loss: 0.1406 - acc: 0.9469 - val_loss: 0.3789 -
    val_acc: 0.8573
129
130 Epoch 00021: val_loss did not improve from 0.34343
131 Epoch 22/40
132  - 63s - loss: 0.0976 - acc: 0.9719 - val_loss: 0.3493 -
    val_acc: 0.8797
133
134 Epoch 00022: val_loss did not improve from 0.34343
135 Epoch 23/40
136  - 70s - loss: 0.0865 - acc: 0.9708 - val_loss: 0.4184 -
    val_acc: 0.8755
137
138 Epoch 00023: val_loss did not improve from 0.34343
139
140 Epoch 00023: ReduceLROnPlateau reducing learning rate to
    0.00020000000949949026.
141 Epoch 24/40
142  - 64s - loss: 0.0644 - acc: 0.9760 - val_loss: 0.3892 -
    val_acc: 0.8763
143
144 Epoch 00024: val_loss did not improve from 0.34343
145 Epoch 25/40
146  - 64s - loss: 0.0607 - acc: 0.9760 - val_loss: 0.3748 -
    val_acc: 0.8880
147
148 Epoch 00025: val_loss did not improve from 0.34343
149 Epoch 26/40
150  - 65s - loss: 0.0393 - acc: 0.9833 - val_loss: 0.3618 -
```

```
val_acc: 0.8888

Epoch 00026: val_loss did not improve from 0.34343
Epoch 27/40
 - 127s - loss: 0.0322 - acc: 0.9917 - val_loss: 0.3612
  - val_acc: 0.8946

Epoch 00027: val_loss did not improve from 0.34343
Epoch 28/40
 - 80s - loss: 0.0328 - acc: 0.9917 - val_loss: 0.3690 -
val_acc: 0.8921

Epoch 00028: val_loss did not improve from 0.34343

Epoch 00028: ReduceLROnPlateau reducing learning rate to
2.0000000949949027e-05.
Entrenamiento completado, se procede al test final

  32/1506 [..............................] - ETA: 10s
  64/1506 [>.............................] - ETA: 10s
  96/1506 [>.............................] - ETA: 10s
 128/1506 [=>............................] - ETA: 9s
 160/1506 [==>...........................] - ETA: 9s
 192/1506 [==>...........................] - ETA: 9s
 224/1506 [===>..........................] - ETA: 8s
 256/1506 [====>.........................] - ETA: 8s
 288/1506 [====>.........................] - ETA: 8s
 320/1506 [=====>........................] - ETA: 7s
 352/1506 [======>.......................] - ETA: 7s
 384/1506 [======>.......................] - ETA: 7s
 416/1506 [=======>......................] - ETA: 7s
 448/1506 [=======>......................] - ETA: 7s
 480/1506 [========>.....................] - ETA: 6s
 512/1506 [=========>....................] - ETA: 6s
 544/1506 [=========>....................] - ETA: 6s
 576/1506 [==========>...................] - ETA: 6s
 608/1506 [===========>..................] - ETA: 5s
 640/1506 [===========>..................] - ETA: 5s
 672/1506 [============>.................] - ETA: 5s
 704/1506 [=============>................] - ETA: 5s
 736/1506 [=============>................] - ETA: 5s
 768/1506 [==============>...............] - ETA: 4s
 800/1506 [==============>...............] - ETA: 4s
 832/1506 [===============>..............] - ETA: 4s
 864/1506 [================>.............] - ETA: 4s
```

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192  896/1506 [===============>.............] - ETA: 4s
193  928/1506 [================>.............] - ETA: 3s
194  960/1506 [=================>............] - ETA: 3s
195  992/1506 [=================>............] - ETA: 3s
196 1024/1506 [==================>...........] - ETA: 3s
197 1056/1506 [===================>..........] - ETA: 2s
198 1088/1506 [===================>..........] - ETA: 2s
199 1120/1506 [====================>.........] - ETA: 2s
200 1152/1506 [====================>.........] - ETA: 2s
201 1184/1506 [=====================>........] - ETA: 2s
202 1216/1506 [======================>.......] - ETA: 1s
203 1248/1506 [======================>.......] - ETA: 1s
204 1280/1506 [=======================>......] - ETA: 1s
205 1312/1506 [========================>.....] - ETA: 1s
206 1344/1506 [========================>.....] - ETA: 1s
207 1376/1506 [=========================>....] - ETA: 0s
208 1408/1506 [==========================>...] - ETA: 0s
209 1440/1506 [==========================>...] - ETA: 0s
210 1472/1506 [===========================>..] - ETA: 0s
211 1504/1506 [===========================>..] - ETA: 0s
212 1506/1506 [==============================] - 10s 7ms/step
213 ['loss', 'acc']
214 [0.37792193800567153, 0.8612217795484728]
215 Ahora vamos a dibujar la matriz de confusion
216 ['benign', 'premalignant', 'malignant']
217 Normalized confusion matrix
218 [[0.79681275 0.19123506 0.01195219]
219  [0.184      0.798      0.018     ]
220  [0.00595238 0.00595238 0.98809524]]
221 El entrenamiento ha llevado : 2647.6378631591797
222
```