```
 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=61629
 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 2019-04-26 09:03:38.282155: I tensorflow/core/platform/
   cpu_feature_guard.cc:141] Your CPU supports instructions
   that this TensorFlow binary was not compiled to use: AVX2
33 2019-04-26 09:03:38.496196: 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 2019-04-26 09:03:38.496363: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:1511] Adding visible gpu
   devices: 0
38 2019-04-26 09:03:40.517839: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:982] Device interconnect
   StreamExecutor with strength 1 edge matrix:
39 2019-04-26 09:03:40.517933: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:988]      0
40 2019-04-26 09:03:40.517981: I tensorflow/core/
   common_runtime/gpu/gpu_device.cc:1001] 0:   N
41 2019-04-26 09:03:40.518156: 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 2019-04-26 09:05:03.922481: 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 2019-04-26 09:05:04.005750: 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 2019-04-26 09:05:04.008726: 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  - 94s - loss: 0.6507 - acc: 0.7312 - val_loss: 2.4791 -
   val_acc: 0.6075
49 Epoch 2/40
50  - 64s - loss: 0.4819 - acc: 0.7927 - val_loss: 0.9135 -
   val_acc: 0.7253
```

```
Epoch 3/40
 - 62s - loss: 0.3928 - acc: 0.8281 - val_loss: 0.7431 -
   val_acc: 0.7560
Epoch 4/40
 - 61s - loss: 0.4061 - acc: 0.8365 - val_loss: 1.5734 -
   val_acc: 0.6929
Epoch 5/40
 - 60s - loss: 0.4124 - acc: 0.8156 - val_loss: 0.5099 -
   val_acc: 0.8058
Epoch 6/40
 - 63s - loss: 0.3556 - acc: 0.8417 - val_loss: 0.5565 -
   val_acc: 0.7270
Epoch 7/40
 - 62s - loss: 0.3211 - acc: 0.8677 - val_loss: 0.4606 -
   val_acc: 0.7917
Epoch 8/40
 - 57s - loss: 0.3180 - acc: 0.8750 - val_loss: 0.4431 -
   val_acc: 0.8058
Epoch 9/40
 - 61s - loss: 0.2947 - acc: 0.8813 - val_loss: 0.5244 -
   val_acc: 0.7909
Epoch 10/40
 - 58s - loss: 0.2904 - acc: 0.9031 - val_loss: 0.3470 -
   val_acc: 0.8456
Epoch 11/40
 - 56s - loss: 0.2275 - acc: 0.9146 - val_loss: 0.4645 -
   val_acc: 0.8091
Epoch 12/40
 - 58s - loss: 0.2832 - acc: 0.8927 - val_loss: 0.4122 -
   val_acc: 0.8498
Epoch 13/40
 - 58s - loss: 0.2214 - acc: 0.9115 - val_loss: 0.4654 -
   val_acc: 0.8266
Epoch 14/40
 - 63s - loss: 0.1835 - acc: 0.9323 - val_loss: 0.4379 -
   val_acc: 0.8465
Epoch 15/40
 - 57s - loss: 0.2010 - acc: 0.9271 - val_loss: 0.4696 -
   val_acc: 0.8456

Epoch 00015: ReduceLROnPlateau reducing learning rate to 0
   .00020000000949949026.
Epoch 16/40
 - 59s - loss: 0.1708 - acc: 0.9396 - val_loss: 0.4438 -
   val_acc: 0.8564
```

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 81 Epoch 17/40
 82  - 59s - loss: 0.1727 - acc: 0.9375 - val_loss: 0.3784 -
    val_acc: 0.8556
 83 Epoch 18/40
 84  - 59s - loss: 0.1488 - acc: 0.9531 - val_loss: 0.3418 -
    val_acc: 0.8739
 85 Epoch 19/40
 86  - 53s - loss: 0.1116 - acc: 0.9542 - val_loss: 0.3357 -
    val_acc: 0.8730
 87 Epoch 20/40
 88  - 59s - loss: 0.1142 - acc: 0.9604 - val_loss: 0.3326 -
    val_acc: 0.8705
 89 Epoch 21/40
 90  - 56s - loss: 0.1261 - acc: 0.9531 - val_loss: 0.3241 -
    val_acc: 0.8664
 91 Epoch 22/40
 92  - 53s - loss: 0.0992 - acc: 0.9573 - val_loss: 0.3360 -
    val_acc: 0.8689
 93 Epoch 23/40
 94  - 60s - loss: 0.0843 - acc: 0.9760 - val_loss: 0.3260 -
    val_acc: 0.8730
 95 Epoch 24/40
 96  - 68s - loss: 0.0865 - acc: 0.9729 - val_loss: 0.3313 -
    val_acc: 0.8730
 97 Epoch 25/40
 98  - 63s - loss: 0.0849 - acc: 0.9698 - val_loss: 0.3419 -
    val_acc: 0.8747
 99 Epoch 26/40
100  - 62s - loss: 0.0831 - acc: 0.9698 - val_loss: 0.3582 -
    val_acc: 0.8755
101
102 Epoch 00026: ReduceLROnPlateau reducing learning rate to
    2.0000000949949027e-05.
103 Epoch 27/40
104  - 57s - loss: 0.0871 - acc: 0.9750 - val_loss: 0.3503 -
    val_acc: 0.8755
105 Epoch 28/40
106  - 58s - loss: 0.0576 - acc: 0.9833 - val_loss: 0.3418 -
    val_acc: 0.8763
107 Epoch 29/40
108  - 58s - loss: 0.0549 - acc: 0.9844 - val_loss: 0.3382 -
    val_acc: 0.8763
109 Epoch 30/40
110  - 60s - loss: 0.0644 - acc: 0.9823 - val_loss: 0.3381 -
    val_acc: 0.8755
```

```
Epoch 31/40
 - 63s - loss: 0.0737 - acc: 0.9781 - val_loss: 0.3361 - val_acc: 0.8755

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: 7s
 320/1506 [=====>........................] - ETA: 7s
 352/1506 [======>.......................] - ETA: 7s
 384/1506 [======>.......................] - ETA: 7s
 416/1506 [=======>......................] - ETA: 7s
 448/1506 [=======>......................] - ETA: 6s
 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
 896/1506 [================>.............] - ETA: 3s
 928/1506 [=================>............] - ETA: 3s
 960/1506 [==================>...........] - ETA: 3s
 992/1506 [==================>...........] - ETA: 3s
1024/1506 [===================>..........] - ETA: 3s
1056/1506 [====================>.........] - ETA: 2s
1088/1506 [====================>.........] - ETA: 2s
1120/1506 [=====================>........] - ETA: 2s
1152/1506 [=====================>........] - ETA: 2s
1184/1506 [======================>.......] - ETA: 2s
```

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154 1216/1506 [=======================>......] - ETA: 1s
155 1248/1506 [=======================>......] - ETA: 1s
156 1280/1506 [========================>.....] - ETA: 1s
157 1312/1506 [========================>.....] - ETA: 1s
158 1344/1506 [=========================>....] - ETA: 1s
159 1376/1506 [=========================>....] - ETA: 0s
160 1408/1506 [==========================>...] - ETA: 0s
161 1440/1506 [==========================>...] - ETA: 0s
162 1472/1506 [==========================>...] - ETA: 0s
163 1504/1506 [==========================>...] - ETA: 0s
164 1506/1506 [==============================] - 10s 7ms/step
165 ['loss', 'acc']
166 [0.29970760324878365, 0.8764940239043825]
167 Ahora vamos a dibujar la matriz de confusion
168 ['benign', 'premalignant', 'malignant']
169 Normalized confusion matrix
170 [[0.79587629 0.17731959 0.02680412]
171  [0.15594542 0.83430799 0.00974659]
172  [0.0019685  0.0019685  0.99606299]]
173 El entrenamiento ha llevado : 2149.436592102051
174
```