Práctica 6 - Segmentation

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Mejor modelo

```
i = Input(FACES_train.shape[1:])
h = BatchNormalization()(i)

h = Conv2D(8, (3, 3), padding='same', activation='elu')(h)
h = MaxPooling2D((2, 2))(h)

h = Conv2D(8, (3, 3), padding='same', activation='elu')(h)
h = MaxPooling2D((2, 2))(h)
h = Dropout(0.2)(h)

h = Conv2D(8, (3, 3), padding='same', activation='elu')(h)
h = MaxPooling2D((2, 2))(h)

h = Flatten()(h)
latent = Dense(128, activation='relu')(h)
h = Dense(512, activation='relu')(latent)
h = Reshape((8, 8, 8))(h)

h = UpSampling2D((2, 2))(h)
h = Conv2D(8, (3, 3), padding='same', activation='elu')(h)

h = Dropout(0.2)(h)
h = UpSampling2D((2, 2))(h)
h = Conv2D(8, (3, 3), padding='same', activation='elu')(h)

h = UpSampling2D((2, 2))(h)
h = Conv2D(8, (3, 3), padding='same', activation='elu')(h)

h = BatchNormalization()(h)
o = Conv2D(3, (3, 3), padding='same', activation='sigmoid')(h)

model = Model(inputs=i, outputs=o)
model.summary()
```

Layer (type)	Output Shape	Param #
input_38 (InputLayer)	(None, 64, 64, 3)	0
batch_normalization_53 (Batc	(None, 64, 64, 3)	12
conv2d_175 (Conv2D)	(None, 64, 64, 8)	224
max_pooling2d_65 (MaxPooling	(None, 32, 32, 8)	0
conv2d_176 (Conv2D)	(None, 32, 32, 8)	584
max_pooling2d_66 (MaxPooling	(None, 16, 16, 8)	0
dropout_17 (Dropout)	(None, 16, 16, 8)	0
conv2d_177 (Conv2D)	(None, 16, 16, 8)	584
max_pooling2d_67 (MaxPooling	(None, 8, 8, 8)	0
flatten_38 (Flatten)	(None, 512)	0
dense_55 (Dense)	(None, 128)	65664
dense_56 (Dense)	(None, 512)	66048
reshape_29 (Reshape)	(None, 8, 8, 8)	0
up_sampling2d_33 (UpSampling	(None, 16, 16, 8)	0
conv2d_178 (Conv2D)	(None, 16, 16, 8)	584
dropout_18 (Dropout)	(None, 16, 16, 8)	0
up_sampling2d_34 (UpSampling	(None, 32, 32, 8)	0
conv2d_179 (Conv2D)	(None, 32, 32, 8)	584
up_sampling2d_35 (UpSampling	(None, 64, 64, 8)	0
conv2d_180 (Conv2D)	(None, 64, 64, 8)	584
batch_normalization_54 (Batc	(None, 64, 64, 8)	32
conv2d_181 (Conv2D)	(None, 64, 64, 3)	219

Total params: 135,119
Trainable params: 135,097
Non-trainable params: 22

Batch size = 320

Épocas = 15

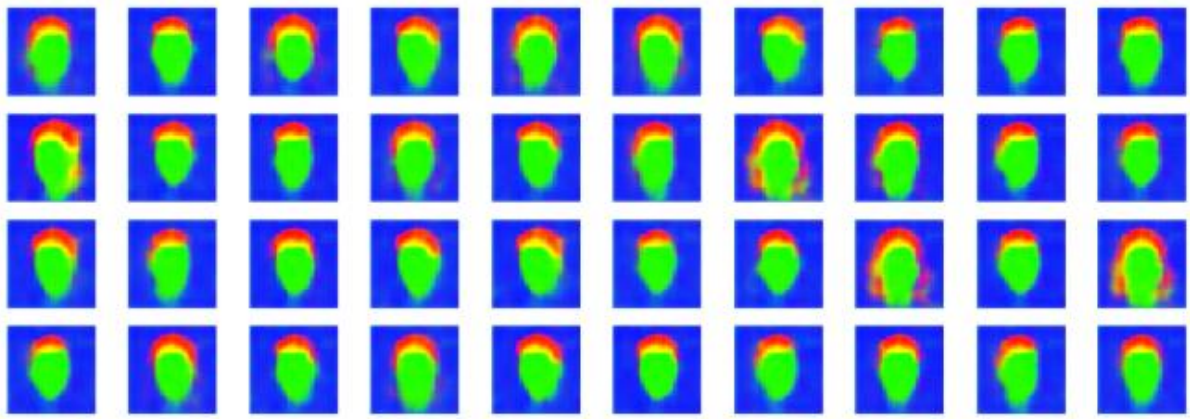
Pérdida y ganancia de cada época:

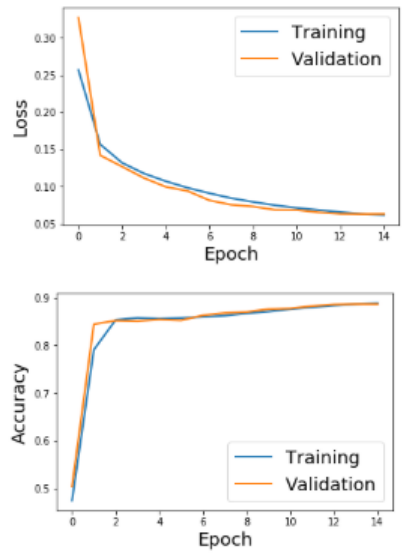
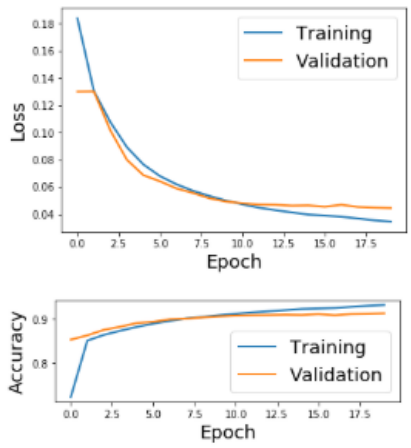
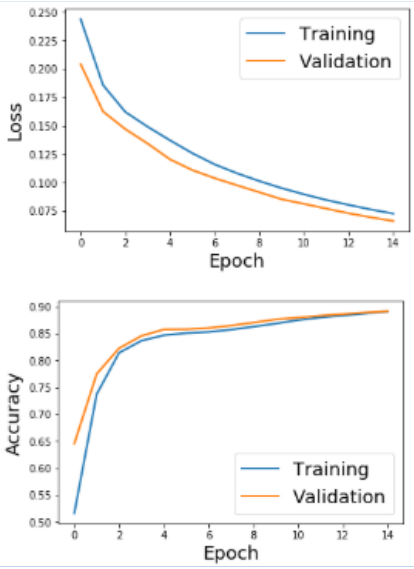
```
Train on 1485 samples, validate on 372 samples
Epoch 1/15
1485/1485 [==============================] - 55s 37ms/step - loss: 0.2625 - acc: 0.5725 - val_loss: 0.1939 - val_acc: 0.7670
Epoch 2/15
1485/1485 [==============================] - 46s 31ms/step - loss: 0.2029 - acc: 0.7339 - val_loss: 0.1599 - val_acc: 0.8140
Epoch 3/15
1485/1485 [==============================] - 41s 28ms/step - loss: 0.1760 - acc: 0.7816 - val_loss: 0.1375 - val_acc: 0.8436
Epoch 4/15
1485/1485 [==============================] - 40s 27ms/step - loss: 0.1594 - acc: 0.8130 - val_loss: 0.1269 - val_acc: 0.8539
Epoch 5/15
1485/1485 [==============================] - 41s 27ms/step - loss: 0.1477 - acc: 0.8303 - val_loss: 0.1216 - val_acc: 0.8591
Epoch 6/15
1485/1485 [==============================] - 46s 31ms/step - loss: 0.1388 - acc: 0.8383 - val_loss: 0.1158 - val_acc: 0.8617
Epoch 7/15
1485/1485 [==============================] - 47s 32ms/step - loss: 0.1309 - acc: 0.8429 - val_loss: 0.1101 - val_acc: 0.8650
Epoch 8/15
1485/1485 [==============================] - 46s 31ms/step - loss: 0.1237 - acc: 0.8485 - val_loss: 0.1042 - val_acc: 0.8693
Epoch 9/15
1485/1485 [==============================] - 46s 31ms/step - loss: 0.1169 - acc: 0.8532 - val_loss: 0.0982 - val_acc: 0.8723
Epoch 10/15
1485/1485 [==============================] - 41s 28ms/step - loss: 0.1104 - acc: 0.8589 - val_loss: 0.0923 - val_acc: 0.8761
Epoch 11/15
1485/1485 [==============================] - 40s 27ms/step - loss: 0.1043 - acc: 0.8642 - val_loss: 0.0875 - val_acc: 0.8792
Epoch 12/15
1485/1485 [==============================] - 40s 27ms/step - loss: 0.0985 - acc: 0.8692 - val_loss: 0.0837 - val_acc: 0.8817
Epoch 13/15
1485/1485 [==============================] - 41s 27ms/step - loss: 0.0931 - acc: 0.8728 - val_loss: 0.0804 - val_acc: 0.8841
Epoch 14/15
1485/1485 [==============================] - 41s 27ms/step - loss: 0.0882 - acc: 0.8773 - val_loss: 0.0771 - val_acc: 0.8858
Epoch 15/15
1485/1485 [==============================] - 42s 28ms/step - loss: 0.0841 - acc: 0.8800 - val_loss: 0.0745 - val_acc: 0.8874
```

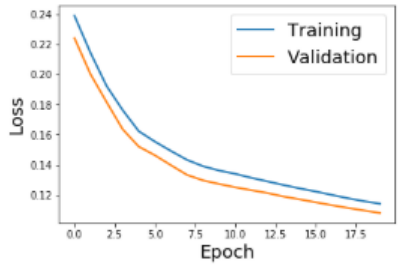
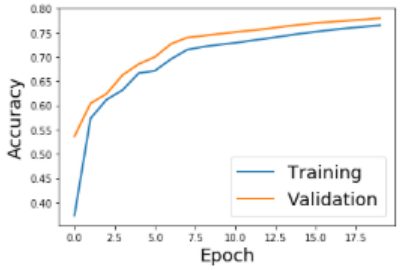
Tiempo total = 653 s

Imágenes originales:

Resultados de la predicción de imágenes:



Modelos	*Tiempo de entrenamiento*	*Pérdida final*	*Error de clasificación*	*Pérdida y precisión*
Modificando el número de filtros	2527 s (con 320 batches y 15 épocas)	0.06443681574316434	0.116275	
Con diferente tamaño de batch	1123 s (con 70 batches y 20 épocas)	0.046516235893772497	0.09155	
Con diferente número, tipo y orden de layers	868 s (con 320 batches y 15 épocas)	0.06735187911538668	0.11177	

Usando sólo layers convolucionales	448 s (con 320 batches y 20 épocas)	0.11183462589979172	0.228892	 
Mejor resultado	653 s	0.07637510544830753	0.116395