

Exercise set 6: Convolutional neural networks
Ossi Koski

```
Layer (type)                 Output Shape              Param #
=====
conv2d (Conv2D)              (None, 31, 31, 10)       280
max_pooling2d (MaxPooling2D) (None, 15, 15, 10)       0
conv2d_1 (Conv2D)            (None, 7, 7, 10)         910
max_pooling2d_1 (MaxPooling2D) (None, 3, 3, 10)         0
flatten (Flatten)            (None, 90)                0
dense (Dense)                (None, 1)                 91
=====
Total params: 1,281
Trainable params: 1,281
Non-trainable params: 0
=====

X_train.shape
(527, 64, 64, 3)
Epoch 1/20
17/17 [=====] - 2s 18ms/step - loss: 0.6741 - accuracy: 0.6603
Epoch 2/20
17/17 [=====] - 0s 15ms/step - loss: 0.6623 - accuracy: 0.7021
Epoch 3/20
17/17 [=====] - 0s 16ms/step - loss: 0.6510 - accuracy: 0.6945
Epoch 4/20
17/17 [=====] - 0s 19ms/step - loss: 0.6414 - accuracy: 0.6793
Epoch 5/20
17/17 [=====] - 0s 23ms/step - loss: 0.6325 - accuracy: 0.6831
Epoch 6/20
17/17 [=====] - 0s 16ms/step - loss: 0.6238 - accuracy: 0.6831
Epoch 7/20
17/17 [=====] - 0s 15ms/step - loss: 0.6147 - accuracy: 0.6888
Epoch 8/20
17/17 [=====] - 0s 17ms/step - loss: 0.6058 - accuracy: 0.6869
Epoch 9/20
17/17 [=====] - 0s 15ms/step - loss: 0.5965 - accuracy: 0.6907
Epoch 10/20
17/17 [=====] - 0s 18ms/step - loss: 0.5866 - accuracy: 0.7040
Epoch 11/20
17/17 [=====] - 0s 15ms/step - loss: 0.5766 - accuracy: 0.7419
Epoch 12/20
17/17 [=====] - 0s 15ms/step - loss: 0.5654 - accuracy: 0.7875
Epoch 13/20
17/17 [=====] - 0s 15ms/step - loss: 0.5536 - accuracy: 0.8425
Epoch 14/20
17/17 [=====] - 0s 18ms/step - loss: 0.5407 - accuracy: 0.8387
Epoch 15/20
17/17 [=====] - 0s 17ms/step - loss: 0.5284 - accuracy: 0.8444
Epoch 16/20
17/17 [=====] - 0s 20ms/step - loss: 0.5139 - accuracy: 0.8596
Epoch 17/20
17/17 [=====] - 0s 19ms/step - loss: 0.4983 - accuracy: 0.8994
Epoch 18/20
17/17 [=====] - 0s 16ms/step - loss: 0.4826 - accuracy: 0.8937
Epoch 19/20
17/17 [=====] - 0s 15ms/step - loss: 0.4667 - accuracy: 0.8956
Epoch 20/20
17/17 [=====] - 0s 15ms/step - loss: 0.4490 - accuracy: 0.9032
Accuracy: 0.9166666666666666
```