Homework-7 Solutions

Question 1

Consider the following deep learning model, with layers stacked in a sequential order:

layer 0: RGB image of size 200×200

layer 1: MaxPooling2D layer with pool size $(2, 2)$

layer 2: Conv2D layer with 64 filters and kernel size $(3, 3)$. The padding method is "same".

layer 3: MaxPooling2D layer with pool size $(2, 2)$

layer 4: Flatten layer

layer 5: Dense layer of 10 nodes

layer 6: Dense layer of 4 nodes

layer 7: SoftMax

1

Nonlinear activation (ReLU) should be applied immediately after some of these layers. Mark below the layers that should be followed by ReLU.

Answer

0 / 1 / [2] / 3 / 4 / [5] / 6 / 7

2

Compute the number of trainable weights that are associated with each layer. (These are the weights with values that are determined during the training.) For simplicity assume no bias connections. Show your calculations.

Answer

layer 0: 0 weights.

layer 1: 0 weights.

layer 2: 576 weights. $(3 \cdot 3 \cdot 64)$

layer 3: 0 weights.

layer 4: 0 weights.

layer 5: 1,600,000 weights.

layer 6: 40 weights.

layer 7: 0 weights.

Data size after layer 0 is $200 \cdot 200 \cdot 3$.
Data size after layer 1 is $100 \cdot 100 \cdot 3$.
Data size after layer 2 is $100 \cdot 100 \cdot 64$.
Data size after layer 3 is $50 \cdot 50 \cdot 64$.
Data size after layer 4 is $50 \cdot 50 \cdot 64 = 160,000$.