



1. Subsampling

Points for the section: 6

! Answer the following six (yes/no) questions that are related to the same piece of code.



Look at the code below and answer the question, correct (yes) or no.

```
import numpy as np
def downsample_by_two(img_in):
    h_input, w_input, c_input = img_in.shape
    img_lr = np.zeros(shape=(h_input//2, w_input//2, c_input),
dtype=np.uint8)
    for j in range(0, h_input//2):
        for i in range(0, w_input//2):
            for c in range(0, c_input):
                pixel1 = img_in[i*2,j*2,c].astype(np.uint32)
                pixel2 = img_in[i*2+1,j*2,c].astype(np.uint32)
                pixel3 = img_in[i*2,j*2+1,c].astype(np.uint32)
                pixel4 = img_in[i*2+1,j*2+1,c].astype(np.uint32)
                sum = (pixel1 + pixel2 + pixel3 + pixel4) // 4
                img_lr[i,j,c] = sum.astype(np.uint8)
    return img_lr
```

Question: In this code, the variable 'sum' can also get negative (< 0) values.

- ☐ no
☐ yes

1 points



Look at the code below and answer the question, correct (yes) or no.

```
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def downsample_by_two(img_in):
    h_input, w_input, c_input = img_in.shape
    img_lr = np.zeros(shape=(h_input//2, w_input//2, c_input),
dtype=np.uint8)
    for j in range(0, h_input//2):
        for i in range(0, w_input//2):
            for c in range(0, c_input):
                pixel1 = img_in[i*2,j*2,c].astype(np.uint32)
                pixel2 = img_in[i*2+1,j*2,c].astype(np.uint32)
                pixel3 = img_in[i*2,j*2+1,c].astype(np.uint32)
                pixel4 = img_in[i*2+1,j*2+1,c].astype(np.uint32)
                sum = (pixel1 + pixel2 + pixel3 + pixel4) // 4
                img_lr[i,j,c] = sum.astype(np.uint8)
    return img_lr
```

Question: The code reads the input image pixels following the pattern of the attached image file.

- ☐ no
☐ yes

1 points

Machine Learning for Computer Vision

Instructions

Exam section 1: Subsampling



Answered
questions: 0 / 6

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to

Exam section 2: Question set 3



Answered
questions: 0 / 6

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The attachment of the question

PATTERN.PNG



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2. Question set 3 (Randomized questions)

Points for the section: 6

Which one of the following filter kernels can be used for nearest-neighbor 2x2 image upsampling with a transposed convolution layer?



- a) [-1, 0], [0, 1]
- b) [1, 0], [0, 0]
- c) [1 1], [1, 1]
- d) [0, 1], [-1, 0]

- ☐ a)
- ☐ b)
- ☐ c)
- ☐ d)

1 points

You have a Yolo v2 tiny object detector that uses 5 bounding boxes per grid cell and has been trained with the VOC dataset that has 20 different classes. What is the output size (shape) of the model's last layer?



- ☐ (B, 13, 13, 425)
- ☐ (B, 13, 13, 125)
- ☐ (B, 13, 13, 100)
- ☐ (B, 13, 13, 20)

1 points

Your object detector neural network has detected 5 objects with scores

Box 1: 0.99,

Box 2: 0.95,

Box 3: 0.90,

Box 4: 0.4, and

Box 5: 0.1.



The threshold for a positive match with ground truth is $\text{IoU} > 0.5$, and boxes 1, 2 and 5 reach this $\text{IoU} > 0.5$ with ground truth boxes. What is the *precision* of this object detector in this example?

- ☐ 1
- ☐ 0.8
- ☐ 0.6
- ☐ 0.4

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1 points

If your neural network training ends with a training log like this

Epoch 96/100

training accuracy: 0.7095 - loss: 1.1807 - val_accuracy: 0.4565 -
val_loss: 1.7404

Epoch 97/100

training accuracy: 0.7099 - loss: 1.1735 - val_accuracy: 0.4590 -
val_loss: 1.7413

Epoch 98/100

training accuracy: 0.7093 - loss: 1.1732 - val_accuracy: 0.4570 -
val_loss: 1.7408

Epoch 99/100

training accuracy: 0.7090 - loss: 1.1723 - val_accuracy: 0.4585 -
val_loss: 1.7443

Epoch 100/100

training accuracy: 0.7162 - loss: 1.1621 - val_accuracy: 0.4565 -
val_loss: 1.7434

Which of the following adjustments to your neural network would likely lead to improving test-time accuracy?

- ☐ Increase strength of regularization
- ☐ Decrease strength of regularization
- ☐ Increase dense layer parameter count
- ☐ Increase number of training epochs

1 points

If the input image size is 32x32 with 3 color channels, and the image classification model consists of a single dense layer that classifies the input images to 10 classes, the linear layer trainable parameter count is

- ☐ 10240
- ☐ 30720
- ☐ 30730
- ☐ none of the above

1 points

Which one of the following code lines normalizes RGB pixel values that are originally in the range of [0, 255], into the range [-1, 1[?

- ☐ `normalized = (original.astype("float32")-1) / 128`
- ☐ `normalized = (original.astype("float32")-1) / 256`
- ☐ `normalized = (original.astype("float32")-128) / 128`
- ☐ `normalized = (original.astype("float32")-128) / 256`

1 points

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