

## Special applications: Face recognition & Neural style transfer

Quiz, 10 questions

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point

1.

Face verification requires comparing a new picture against one person's face, whereas face recognition requires comparing a new picture against K person's faces.

☐ True

☐ False

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2.

Why do we learn a function  $d(img1, img2)$  for face verification? (Select all that apply.)

☐ This allows us to learn to recognize a new person given just a single image of that person.

☐ This allows us to learn to predict a person's identity using a softmax output unit, where the number of classes equals the number of persons in the database plus 1 (for the final "not in database" class).

☐ We need to solve a one-shot learning problem.

☐ Given how few images we have per person, we need to apply transfer learning.

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3.

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☐ True

☐ False

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4.

Which of the following is a correct definition of the triplet loss? Consider that  $\alpha > 0$ . (We encourage you to figure out the answer from first principles, rather than just refer to the lecture.)

☐  $\max(\|f(A) - f(P)\|^2 - \|f(A) - f(N)\|^2 - \alpha, 0)$

☐  $\max(\|f(A) - f(N)\|^2 - \|f(A) - f(P)\|^2 - \alpha, 0)$

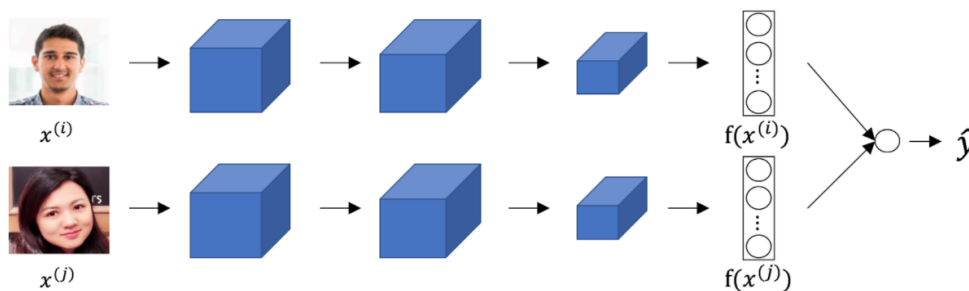
☐  $\max(\|f(A) - f(N)\|^2 - \|f(A) - f(P)\|^2 + \alpha, 0)$

☐  $\max(\|f(A) - f(P)\|^2 - \|f(A) - f(N)\|^2 + \alpha, 0)$

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5.

Consider the following Siamese network architecture:



The upper and lower neural networks have different input images, but have exactly the same parameters.

☐ True

☐ False

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6.

You train a ConvNet on a dataset with 100 different classes. You wonder if you can find a hidden unit which responds strongly to pictures of cats. (I.e., a neuron so that, of all the input/training images that strongly activate that neuron, the majority are cat pictures.) You are more likely to find this unit in layer 4 of the network than in layer 1.

☐ True

☐ False

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7.

Neural style transfer is trained as a supervised learning task in which the goal is to input two images ( $x$ ), and train a network to output a new, synthesized image ( $y$ ).

☐ True

☐ False

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8.

In the deeper layers of a ConvNet, each channel corresponds to a different feature detector. The style matrix  $G^{[l]}$  measures the degree to which the activations of different feature detectors in layer  $l$  vary (or correlate) together with each other.

☐ True

☐ False

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9.

In neural style transfer, what is updated in each iteration of the optimization algorithm?

- ☐ The pixel values of the content image  $C$
- ☐ The neural network parameters
- ☐ The regularization parameters
- ☐ The pixel values of the generated image  $G$

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10.

You are working with 3D data. You are building a network layer whose input volume has size  $32 \times 32 \times 32 \times 16$  (this volume has 16 channels), and applies convolutions with 32 filters of dimension  $3 \times 3 \times 3$  (no padding, stride 1). What is the resulting output volume?

- ☐  $30 \times 30 \times 30 \times 16$
- ☐  $30 \times 30 \times 30 \times 32$
- ☐ Undefined: This convolution step is impossible and cannot be performed because the dimensions specified don't match up.

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