Additional Learning

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Instructor's Name	:	Prof. Anisha M Lal
Course	:	CSE4019 (Image Processing)
Slot	:	G2+TG2
Date of Submission	:	14 November 2018

Additional Learning

Coursera - Convolutional Neural Networks by deeplearning.ai (Andrew NG)

Certificate Link: https://www.coursera.org/account/accomplishments/verify/SMEDKK2G4BET

Course Completed on: 19th October 2018

Grade/Marks Obtained: 100%

Note: All of the code in the programming assignments is available in my GitHub repo: https://github.com/hhk998402/Convolutional-Neural-Networks-deeplearning.ai

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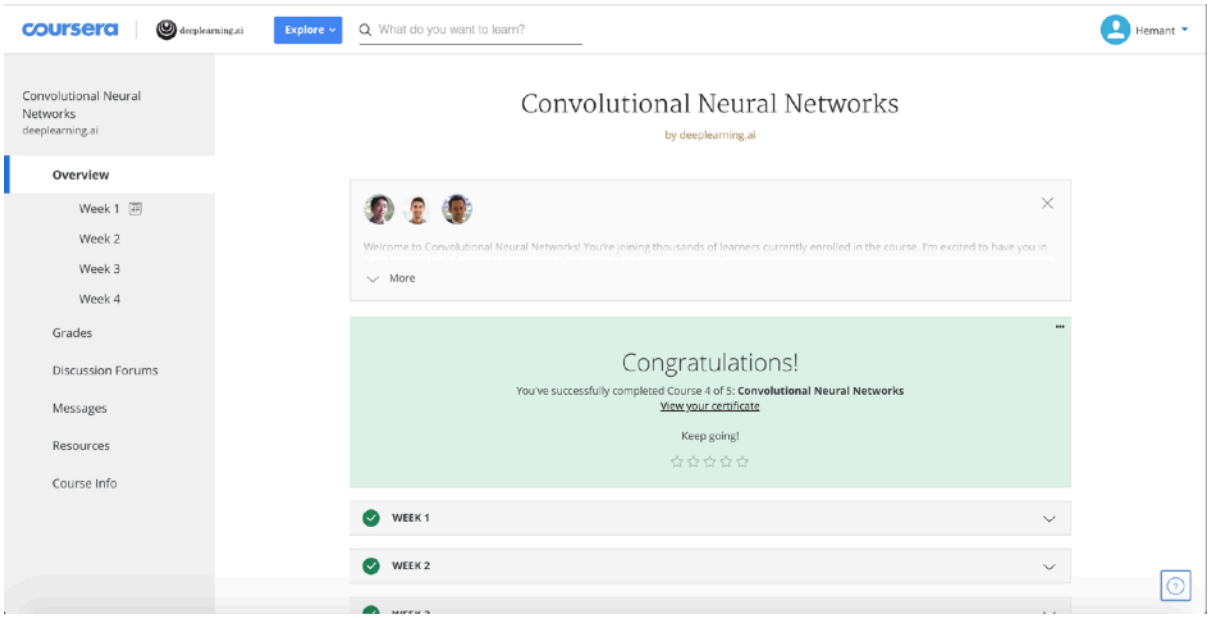
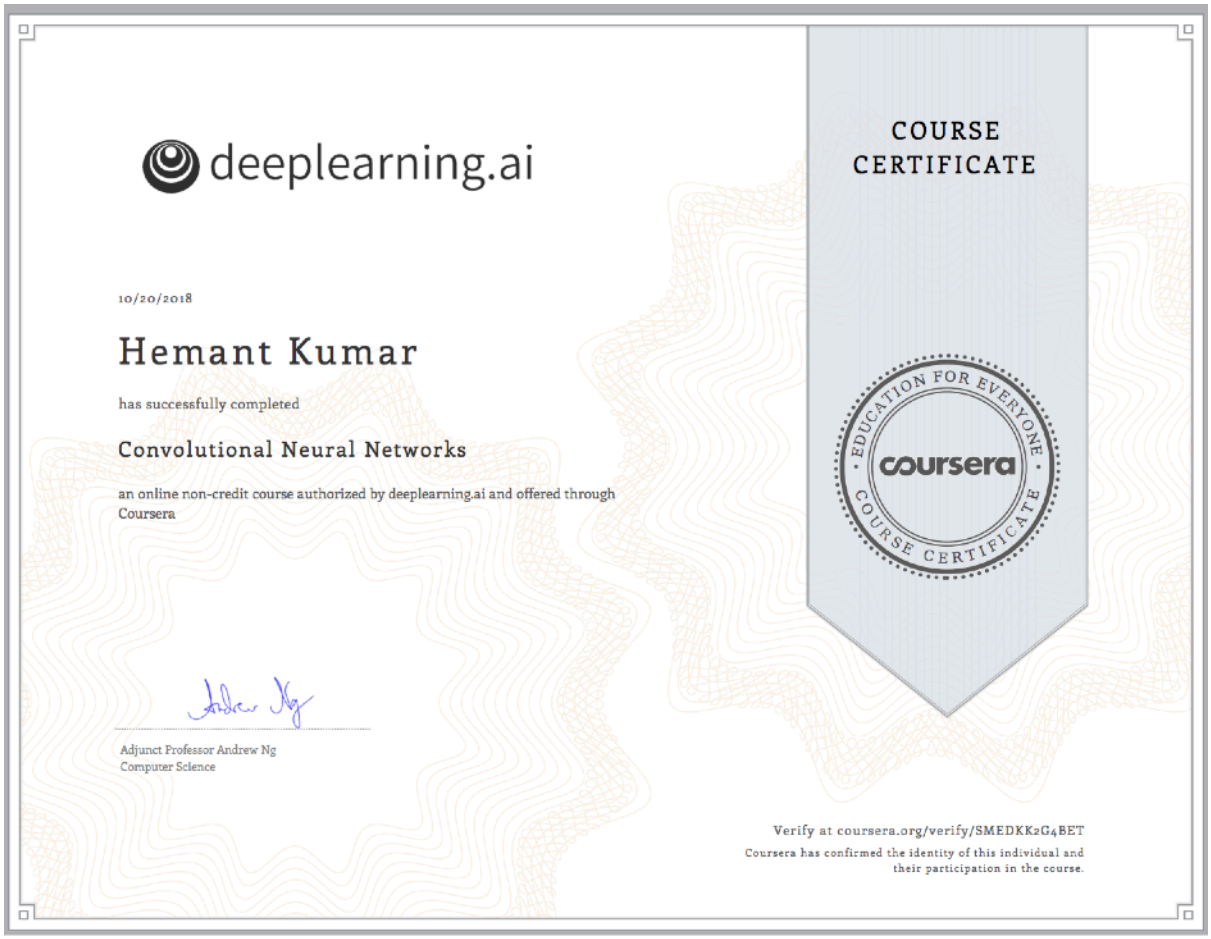
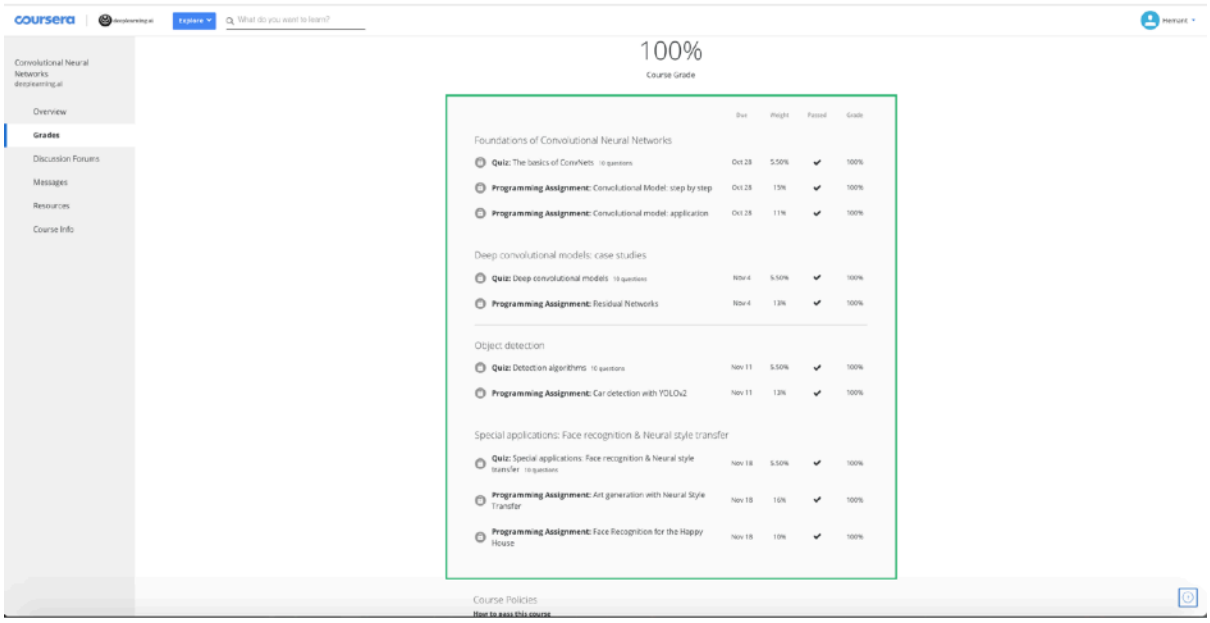
1. Course Home Page



2. Certificate



3. Grades/Marks List



4. Each Quiz and Programming Assignment Attempts

Week 1:

Quiz 1: The Basics of ConvNets

The basics of ConvNets
Quiz, 10 questions

Congratulations! You passed! Next Item

1. What do you think applying this filter to a grayscale image will do?
$\begin{bmatrix} 0 & 1 & -1 & 0 \\ 1 & 3 & -3 & -1 \\ 1 & 3 & -3 & -1 \\ 0 & 1 & -1 & 0 \end{bmatrix}$
1 / 1 point

2. Suppose your input is a 300 by 300 color (RGB) image, and you are not using a convolutional network. If the first hidden layer has 100 neurons, each one fully connected to the input, how many parameters does this hidden layer have (including the bias parameters)?
1 / 1 point

3. Suppose your input is a 300 by 300 color (RGB) image, and you use a convolutional layer with 100 filters that are each 5x5. How many parameters does this hidden layer have (including the bias parameters)?
1 / 1 point

4. You have an input volume that is 63x63x16, and convolve it with 32 filters that are each 7x7, using a stride of 2 and no padding. What is the output volume?
1 / 1 point

5. You have an input volume that is 15x15x8, and pad it using "pad=2." What is the dimension of the resulting volume (after padding)?
1 / 1 point

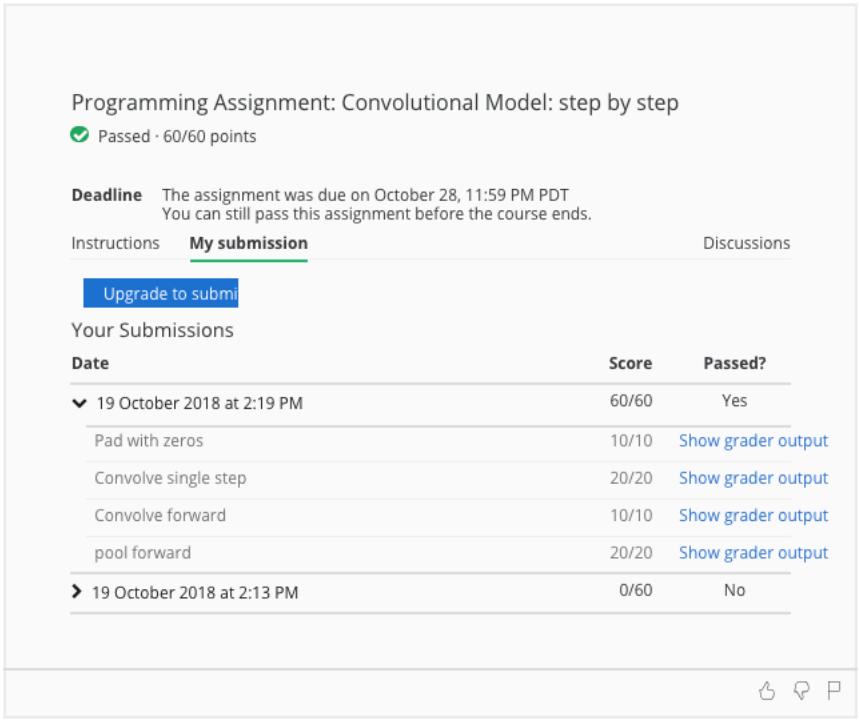
6. You have an input volume that is 63x63x16, and convolve it with 32 filters that are each 7x7, and stride of 1. You want to use a "same" convolution. What is the padding?
1 / 1 point

7. You have an input volume that is 32x32x16, and apply max pooling with a stride of 2 and a filter size of 2. What is the output volume?
1 / 1 point

8. Because pooling layers do not have parameters, they do not affect the backpropagation (derivatives) calculation.
1 / 1 point

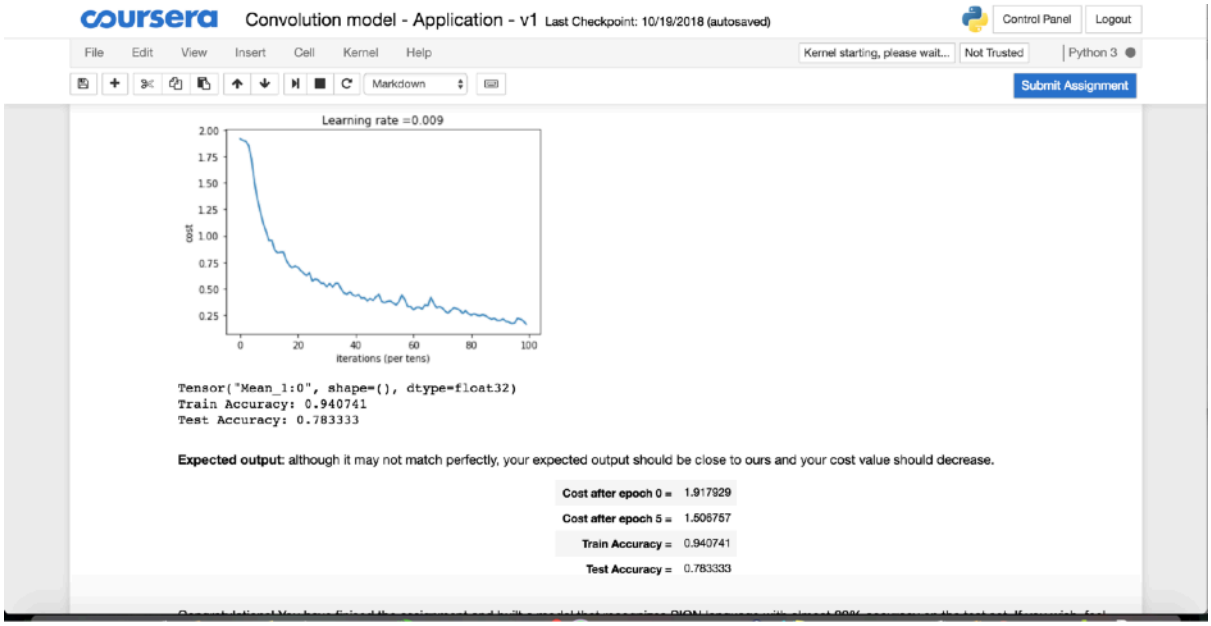
9. In lecture we talked about "parameter sharing" as a benefit of using convolutional networks. Which of the following statements about parameter sharing in ConvNets are true? (Check all that apply.)
1 / 1 point

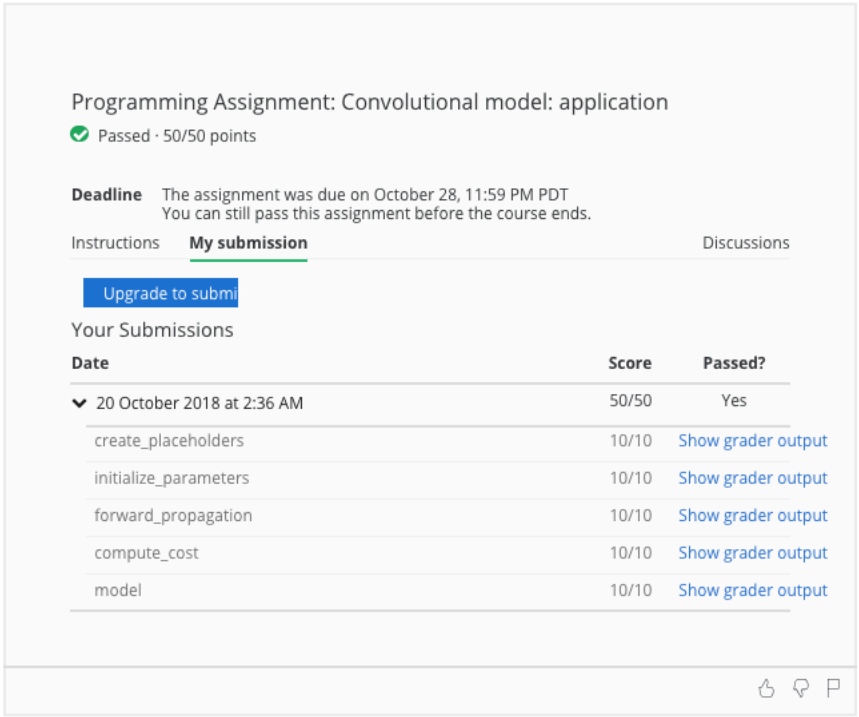
10. In lecture we talked about "sparsity of connections" as a benefit of using convolutional layers. What does this mean?
1 / 1 point



Week 1:

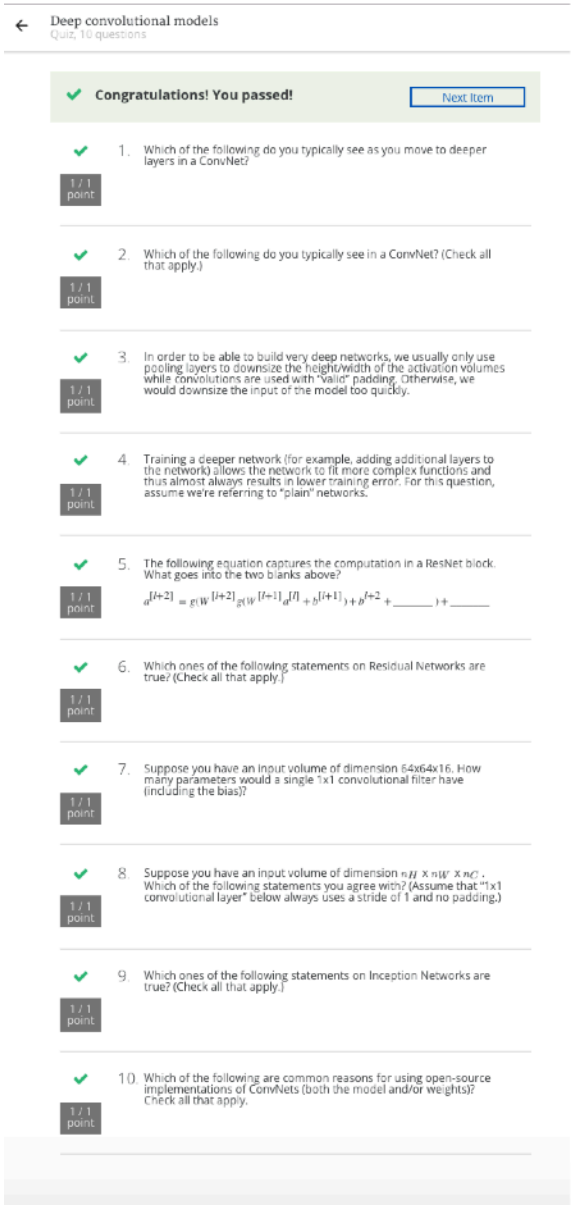
Programming Assignment 1: Convolution model - Step by Step - v2





Week 1:

Programming Assignment 2: Convolution model: Application



Deep convolutional models
Quiz, 10 questions

Congratulations! You passed! Next Item

1. Which of the following do you typically see as you move to deeper layers in a ConvNet? — 1 / 1 point

2. Which of the following do you typically see in a ConvNet? (Check all that apply.) — 1 / 1 point

3. In order to be able to build very deep networks, we usually only use pooling layers to downsize the height/width of the activation volumes while convolutions are used with "valid" padding. Otherwise, we would downsize the input of the model too quickly. — 1 / 1 point

4. Training a deeper network (for example, adding additional layers to the network) allows the network to fit more complex functions and thus almost always results in lower training error. For this question, assume we're referring to "plain" networks. — 1 / 1 point

5. The following equation captures the computation in a ResNet block. What goes into the two blanks above? $a^{[l+2]} = g(W^{[l+2]}g(W^{[l+1]}a^{[l]} + b^{[l+1]}) + b^{l+2} + \_\_\_\_\_) + \_\_\_\_\_$ — 1 / 1 point

6. Which ones of the following statements on Residual Networks are true? (Check all that apply.) — 1 / 1 point

7. Suppose you have an input volume of dimension 64x64x16. How many parameters would a single 1x1 convolutional filter have (including the bias)? — 1 / 1 point

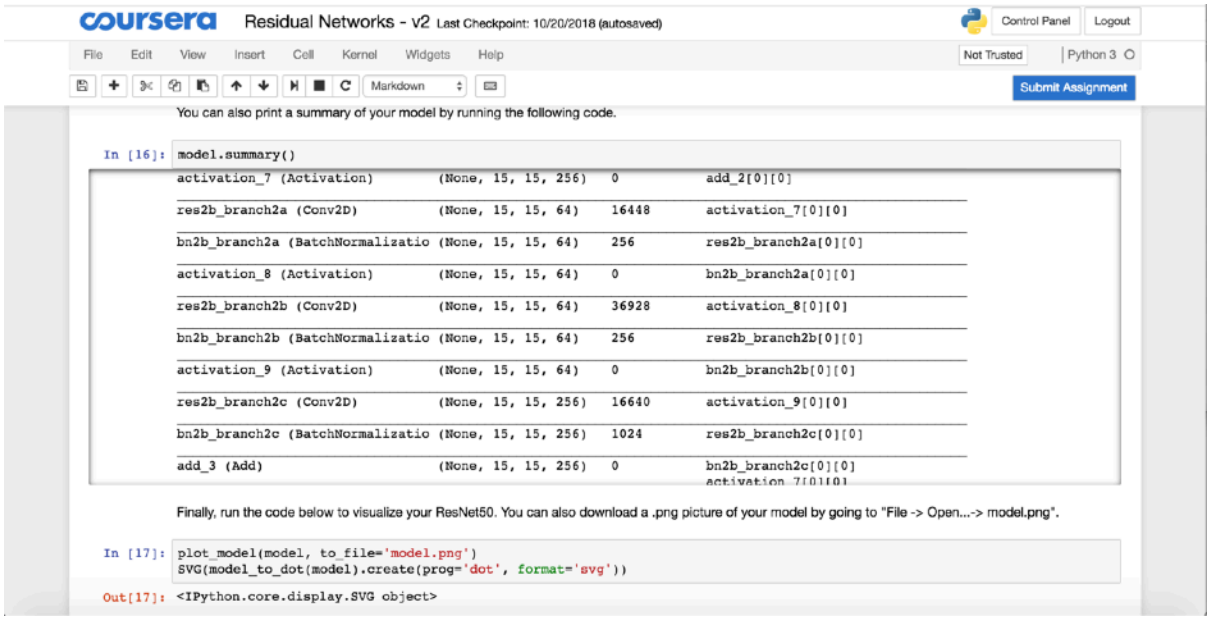
8. Suppose you have an input volume of dimension $n_H \times n_W \times n_C$. Which of the following statements you agree with? (Assume that "1x1 convolutional layer" below always uses a stride of 1 and no padding.) — 1 / 1 point

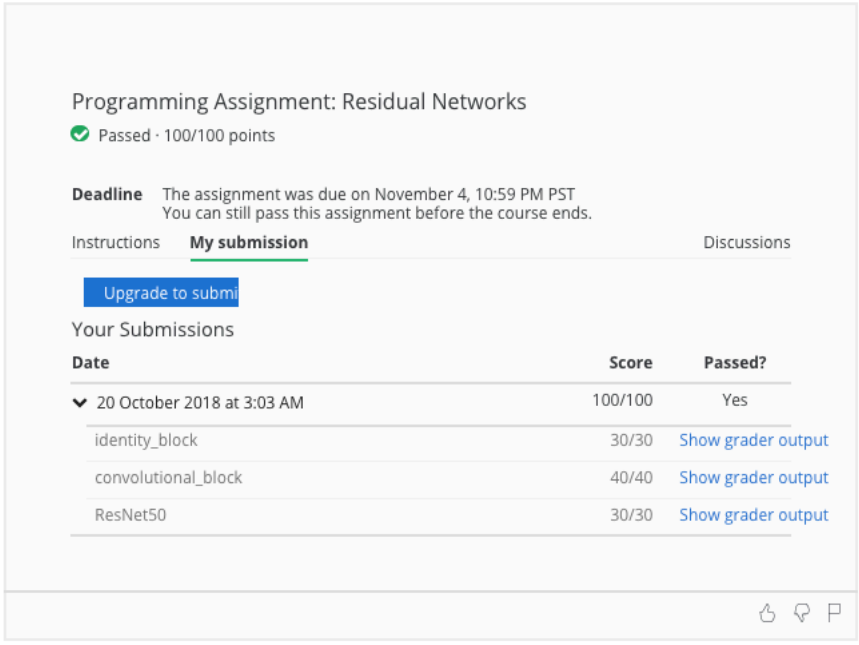
9. Which ones of the following statements on Inception Networks are true? (Check all that apply.) — 1 / 1 point

10. Which of the following are common reasons for using open-source implementations of ConvNets (both the model and/or weights)? Check all that apply. — 1 / 1 point

Week 2:

Quiz 1: Deep Convolutional Models





Week 2:

Programming Assignment 1: Residual Networks

Detection algorithms
Quiz, 10 questions

Congratulations! You passed! Next Item

1. You are building a 3-class object classification and localization algorithm. The classes are: pedestrian (c=1), car (c=2), motorcycle (c=3). What would be the label for the following image? Recall $y = [p_c, b_x, b_y, b_h, b_w, c1, c2, c3]$

1 / 1 point

2. Continuing from the previous problem, what should y be for the image below? Remember that "?" means "don't care", which means that the neural network loss function won't care what the neural network gives for that component of the output. As before, $y = [p_c, b_x, b_y, b_h, b_w, c1, c2, c3]$.

1 / 1 point

3. You are working on a factory automation task. Your system will see a can of soft-drink coming down a conveyor belt, and you want it to take a picture and decide whether (i) there is a soft-drink can in the image, and if so (ii) its bounding box. Since the soft-drink can is round, the bounding box is always square, and the soft drink can always appears as the same size in the image. There is at most one soft drink can in each image. Here're some typical images in your training set:

What is the most appropriate set of output units for your neural network?

1 / 1 point

4. If you build a neural network that inputs a picture of a person's face and outputs N landmarks on the face (assume the input image always contains exactly one face), how many output units will the network have?

1 / 1 point

5. When training one of the object detection systems described in lecture, you need a training set that contains many pictures of the object(s) you wish to detect. However, bounding boxes do not need to be provided in the training set, since the algorithm can learn to detect the objects by itself.

1 / 1 point

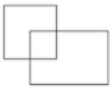
6. Suppose you are applying a sliding windows classifier (non-convolutional implementation). Increasing the stride would tend to increase accuracy, but decrease computational cost.

1 / 1 point

7. In the YOLO algorithm, at training time, only one cell ---the one containing the center/midpoint of an object--- is responsible for detecting this object.

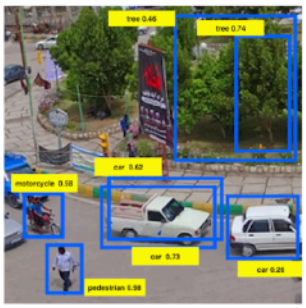
1 / 1 point

8. What is the IoU between these two boxes? The upper-left box is 2x2, and the lower-right box is 2x3. The overlapping region is 1x1.



1 / 1 point

9. Suppose you run non-max suppression on the predicted boxes above. The parameters you use for non-max suppression are that boxes with probability ≤ 0.4 are discarded, and the IoU threshold for deciding if two boxes overlap is 0.5. How many boxes will remain after non-max suppression?



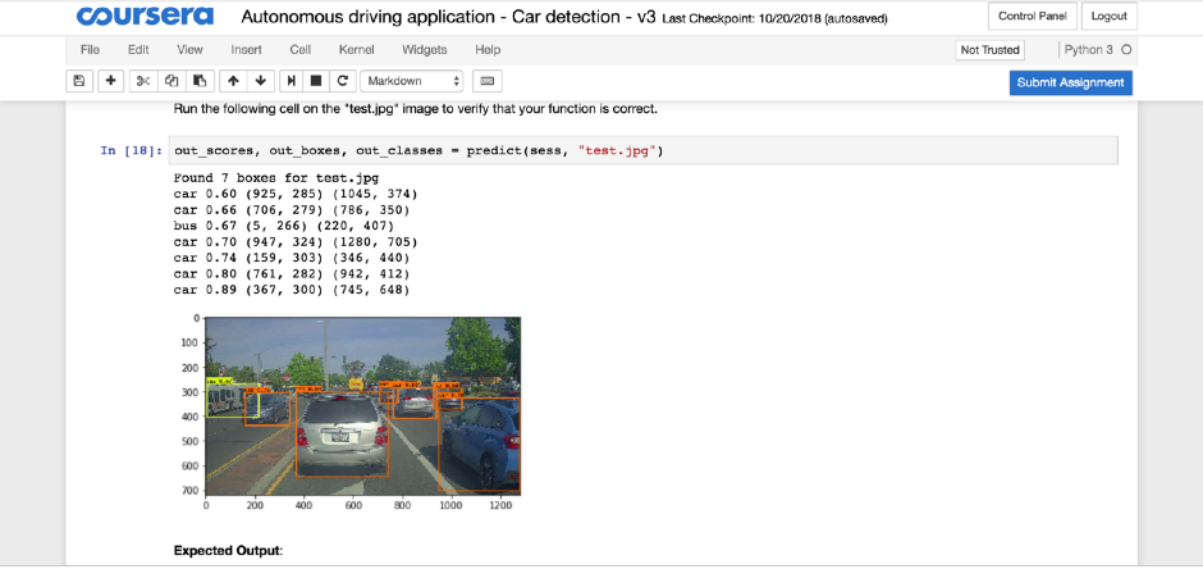
1 / 1 point

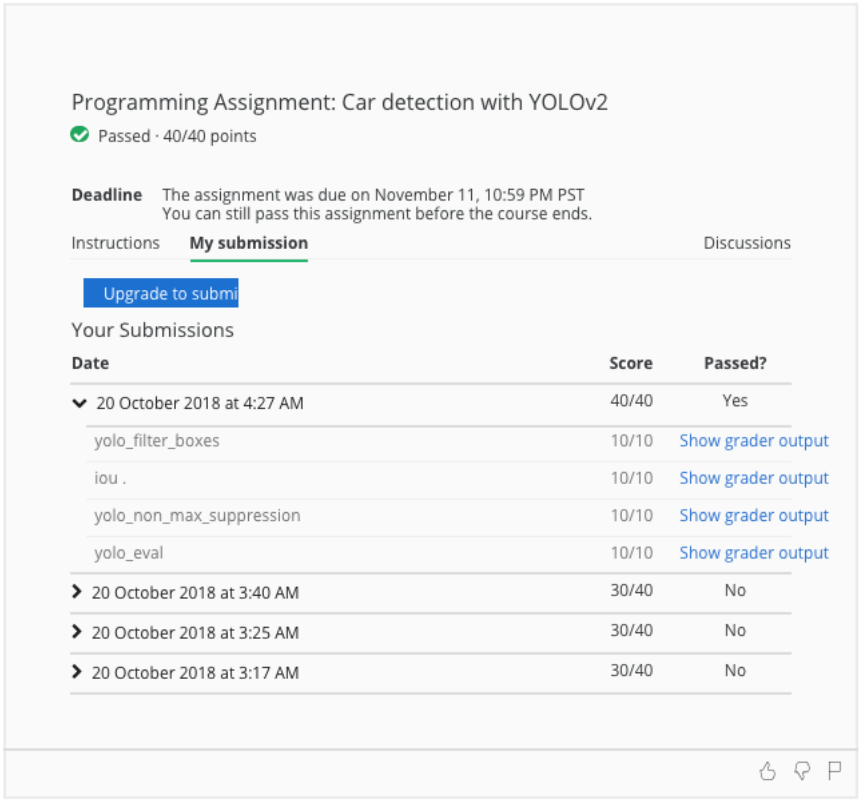
10. Suppose you are using YOLO on a 19x19 grid, on a detection problem with 20 classes, and with 5 anchor boxes. During training, for each image you will need to construct an output volume y as the target value for the neural network; this corresponds to the last layer of the neural network. (y may include some "?", or "don't cares"). What is the dimension of this output volume?

1 / 1 point

Week 3:

Quiz 1: Detection Algorithms





Week 3:

Programming Assignment 1: Autonomous driving application - Car detection - v3

Special applications: Face recognition & Neural style transfer
Quiz, 10 questions

Congratulations! You passed! Next Item

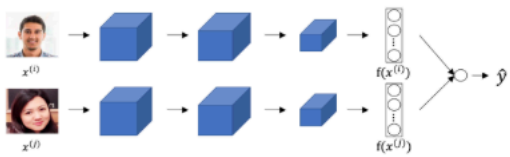
1. Face verification requires comparing a new picture against one person's face, whereas face recognition requires comparing a new picture against K person's faces.
1 / 1 point

2. Why do we learn a function $d(img1, img2)$ for face verification? (Select all that apply.)
1 / 1 point

3. In order to train the parameters of a face recognition system, it would be reasonable to use a training set comprising 100,000 pictures of 100,000 different persons.
1 / 1 point

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.)
1 / 1 point

5. Consider the following Siamese network architecture:
1 / 1 point



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

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.
1 / 1 point

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).
1 / 1 point

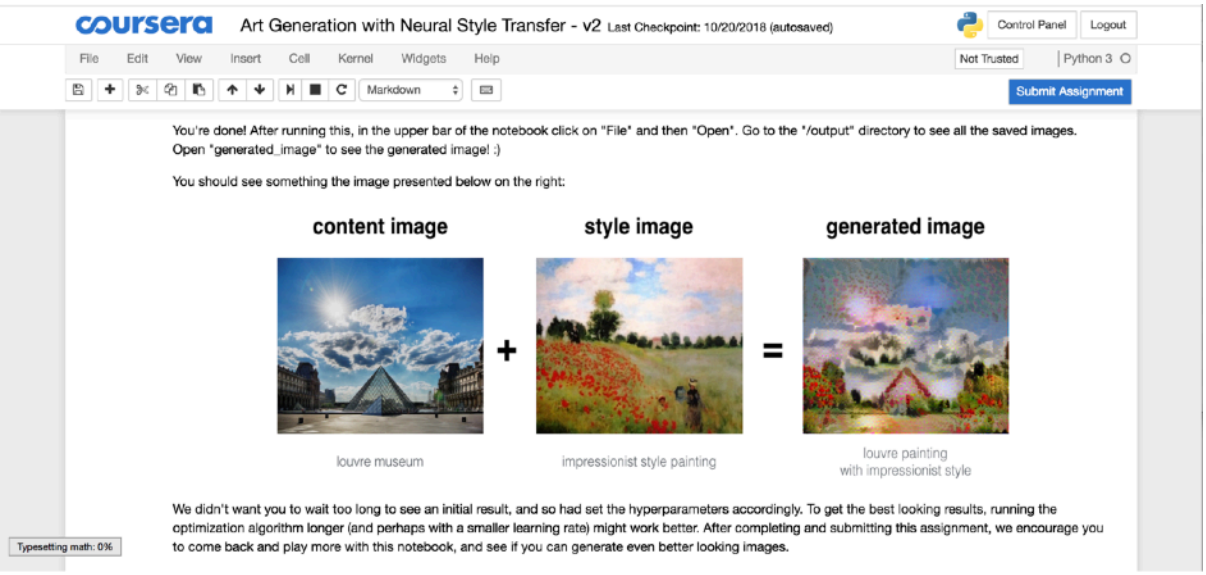
8. In the deeper layers of a ConvNet, each channel corresponds to a different feature detector. The style matrix $G^{[l]}$ measures the degree to which the activations of different feature detectors in layer l vary (or correlate) together with each other.
1 / 1 point

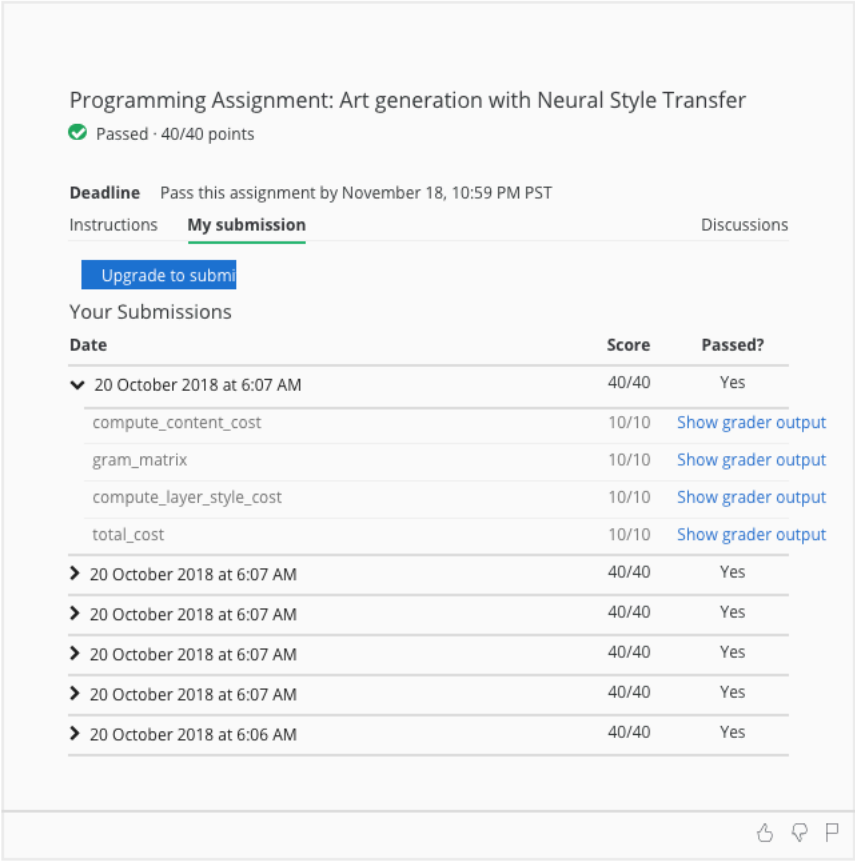
9. In neural style transfer, what is updated in each iteration of the optimization algorithm?
1 / 1 point

10. You are working with 3D data. You are building a network layer whose input volume has size 32x32x32x16 (this volume has 16 channels), and applies convolutions with 32 filters of dimension 3x3x3 (no padding, stride 1). What is the resulting output volume?
1 / 1 point

Week 4:

Quiz 1: Special applications: Face recognition & Neural style transfer





Week 4:

Programming Assignment 1: Art generation with Neural Style Transfer

coursera Face Recognition for the Happy House - v3 Last Checkpoint: 10/20/2018 (autosaved)

Control Panel Logout

File Edit View Insert Cell Kernel Widgets Help

Not Trusted Python 3

Markdown Submit Assignment

```
In [9]: verify("images/camera_0.jpg", "younes", database, FRmodel)
        It's younes, welcome home!
Out[9]: (0.65939283, True)
```

Expected Output:

It's younes, welcome home! (0.65939283, True)

Benoit, who broke the aquarium last weekend, has been banned from the house and removed from the database. He stole Kian's ID card and came back to the house to try to present himself as Kian. The front-door camera took a picture of Benoit ("images/camera_2.jpg). Let's run the verification algorithm to check if benoit can enter.

```
In [10]: verify("images/camera_2.jpg", "kian", database, FRmodel)
         It's not kian, please go away
Out[10]: (0.86224014, False)
```

Programming Assignment: Face Recognition for the Happy House

Passed · 30/30 points

Deadline Pass this assignment by November 18, 10:59 PM PST

Instructions **My submission** Discussions

Upgrade to submi

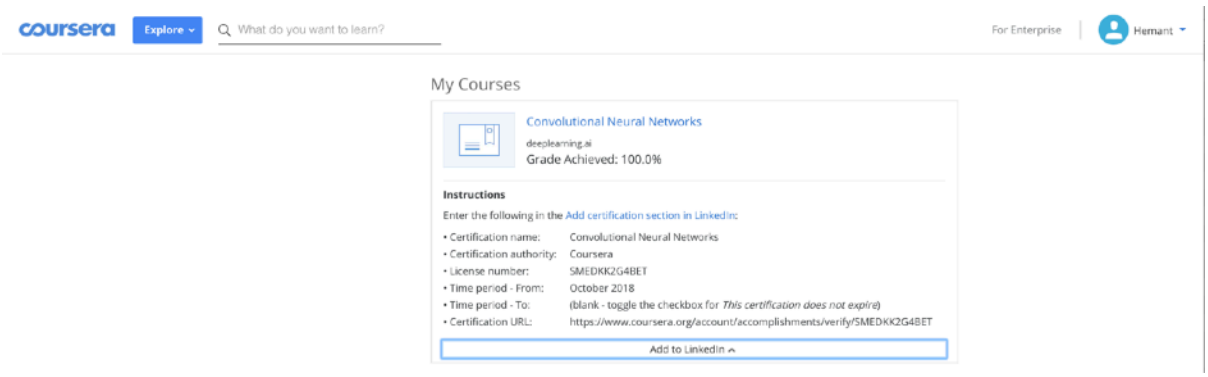
Your Submissions

Date	Score	Passed?
20 October 2018 at 6:28 AM	30/30	Yes
triplet_loss	10/10	Show grader output
verify	10/10	Show grader output
who_is_it	10/10	Show grader output

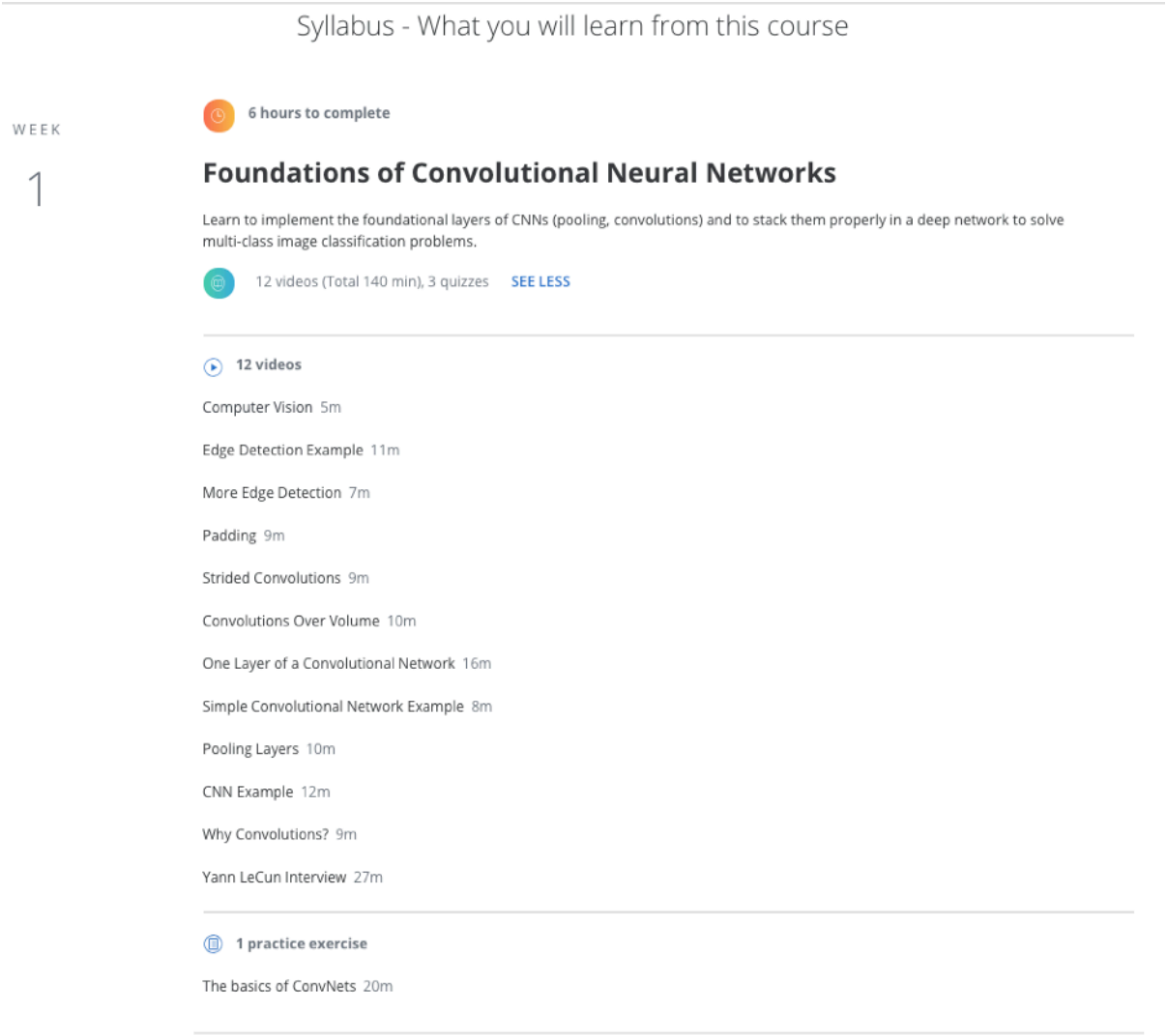
Week 4:

Programming Assignment 2: Face Recognition for the Happy House

5. Course Completion (Grade)



6. Syllabus



WEEK 2

5 hours to complete

Deep convolutional models: case studies

Learn about the practical tricks and methods used in deep CNNs straight from the research papers.

11 videos (Total 99 min), 2 quizzes SEE LESS

11 videos

Why look at case studies? 3m

Classic Networks 18m

ResNets 7m

Why ResNets Work 9m

Networks in Networks and 1x1 Convolutions 6m

Inception Network Motivation 10m

Inception Network 8m

Using Open-Source Implementation 4m

Transfer Learning 8m

Data Augmentation 9m

State of Computer Vision 12m

1 practice exercise

Deep convolutional models 20m

WEEK 3

4 hours to complete

Object detection

Learn how to apply your knowledge of CNNs to one of the toughest but hottest field of computer vision: Object detection.

10 videos (Total 85 min), 2 quizzes SEE LESS

10 videos

Object Localization 11m

Landmark Detection 5m

Object Detection 5m

Convolutional Implementation of Sliding Windows 11m

Bounding Box Predictions 14m

Intersection Over Union 4m

Non-max Suppression 8m

Anchor Boxes 9m

YOLO Algorithm 7m

(Optional) Region Proposals 6m

1 practice exercise

Detection algorithms 20m

WEEK

4

5 hours to complete

Special applications: Face recognition & Neural style transfer

Discover how CNNs can be applied to multiple fields, including art generation and face recognition. Implement your own algorithm to generate art and recognize faces!

11 videos (Total 76 min), 3 quizzes SEE LESS

11 videos

What is face recognition? 4m

One Shot Learning 4m

Siamese Network 4m

Triplet Loss 15m

Face Verification and Binary Classification 6m

What is neural style transfer? 2m

What are deep ConvNets learning? 7m

Cost Function 3m

Content Cost Function 3m

Style Cost Function 13m

1D and 3D Generalizations 9m

1 practice exercise

Special applications: Face recognition & Neural style transfer 20m