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Semantic Segmentation For Self-Driving Cars

LATEST SUBMISSION GRADE
100%

1. Achieving smooth category boundaries is a major difficulty to take into account while designing semantic segmentation models. Which of the following statements describe the origins of this problem? (Check all that apply.) **1 / 1 point**

- [ ] Objects within the same category having variable appearances. An example being multiple color and models for cars on the road.
- [x] Thin objects such as poles, tree trunks, and lane separators.

Correct
Correct!

- [x] The similarity in appearance between some categories such as road, curb, and sidewalk.

Correct
Correct!

2. When comparing the results of a semantic segmentation model to the ground truth, you found out that for the car category, its **class IOU** is **0.75**. Knowing that the number of false positives **(FP)** is **17**, and the number of false negatives **(FN)** is **3**, what is the number of true positives achieved by this model? **2 / 2 points**

60

Correct

Correct!

3. To measure the performance of a semantic segmentation model over all classes, a good idea would be to average the class IOU. **1 / 1 point**

- ○ True
- ◉ False

Correct

Correct!

4. Which of the following do you typically see in a Semantic Segmentation Model? (Check all that apply.) **1 / 1 point**

- ☑ Multiple Convolutional layers followed by an up-sampling layer.

Correct

Correct!

- ☐ Up-sampling layers in the encoder stage of the architecture.
- ☑ Multiple Convolutional layers followed by a Pool layer.

Correct

Correct!

- ☑ Up-sampling layers in the decoder stage of the architecture.

Correct

Correct!

5. Anchor boxes are an essential component of any semantic segmentation neural network architecture. **1 / 1 point**

- ○ True
- ◉ False

✓ **Correct**

Correct!

6. In your semantic segmentation model an input feature map is passed through a nearest neighbor up-sampling layer. The output feature map's depth is equal to that of the input feature map. **1 / 1 point**

- ◉ True
- ○ False

✓ **Correct**

7. A standard semantic segmentation architecture that uses a softmax output layer is allowed to associate multiple categories to a single pixel in the input image. **1 / 1 point**

- ○ True
- ◉ False

✓ **Correct**

Correct!

8. Which of the bellow loss functions is usually used to train semantic segmentation models? **1 / 1 point**

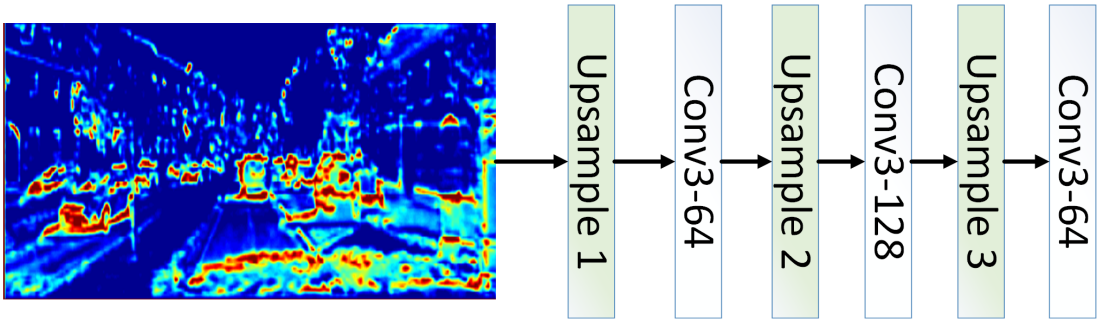
- ○ Mean Square Error (L2-Loss)
- ◉ Cross-Entropy Loss

- 0-1 Loss
- Mean Absolute Error (L1-Loss)

✓ **Correct**

Correct!

9. A semantic segmentation model uses the following decoder architecture. The convolutions are all 3x3, have a padding size of 1, and have a number of filters shown in the figure. The up-sampling multiplier S is 2 for all upsampling layers. **2 / 2 points**



If you pass an input of dimensions MxNxD through this decoder, what are the expected output dimensions?

Note: M is the width, N is the height, and D is the depth of the input.

- (●) 8*M, 8*N, 64*D
- ( ) M/8, N/8, 64*D
- ( ) 8*M, 8*N, 128*D
- ( ) 6*M, 6*N, 64*D

✓ **Correct**

Correct!

10. In context of self-driving cars, semantic segmentation can be used to perform: (Check all that apply.) **1 / 1 point**

- [ ] Localization in a predefined 3D map.

- [ ] Velocity estimation of dynamic obstacles in the scene.
- [x] Drivable space estimation.

Correct
Correct!

- [x] Constrain the image space used to perform 2D object detection.

Correct
Correct!

- [x] Lane boundary estimation.

Correct
Correct!

11. Which of the following categories in a semantic segmentation output map would be useful to determine lane boundaries? **1 / 1 point**

- [x] Lane Separator

Correct
Correct!

- [ ] Road
- [x] Sidewalk

Correct
Correct!

- [ ] Pedestrian

- [x] Curb

Correct

Correct!

12. To estimate a plane model, an algorithm would require a minimum of: **1 / 1 point**

- ( ) Five points, chosen at random.
- (•) Three points, chosen to be non-collinear.
- ( ) Three points, chosen to be collinear.
- ( ) Five points, chosen to be non-collinear.

Correct

13. To estimate lines that could belong to lanes in a post-processed output image from semantic segmentation, containing only relevant categories, one would: **1 / 1 point**

- ( ) First apply Canny edge detection followed by a Kalman Filter to estimate lines.
- (•) First apply Canny edge detection followed by Hough transform line estimation.
- ( ) Use RANSAC to estimate the road plane, then fit lines to its boundary.
- ( ) First apply Hough transform line estimation followed by Canny edge detection.

Correct

Correct!