Embedded Systems and Applications 4190.303C
Seoul National University

Homework #(**2**)

Oh Hyun Seok
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1 Analyze Pascal VOC 2012(only segmentation)

Segmentation: Generating pixel-wise segmentations giving the class of the object visible at each pixel, or ”background” otherwise.

1.1 Class names

The twenty object classes that have been selected are:
Person: person
Animal: bird, cat, cow, dog, horse, sheep
Vehicle: aeroplane, bicycle, boat, bus, car, motorbike, train
Indoor: bottle, chair, dining table, potted plant, sofa, tv/monitor

1.2 Image size

images in dataset can have diverse sizes. They all have 3 channels (RGB) in common, but their width and height varies according to image. Their class segmentation and object segmentation images also have corresponding diverse image sizes. For instance, for segmentation train dataset there are 244 different image sizes. Their width varies from 112 pixels to 500 pixels, and height varies from 246 to 500 pixels.

1.3 Number of images of each dataset

train : 1464 images on VOC2012/ImageSets/Segmentation/train.txt
val : 1449 images on VOC2012/ImageSets/Segmentation/val.txt
trainval : 2913 images on VOC2012/ImageSets/Segmentation/trainval.txt
trainaug : dataset from VOC2012 are augmented with SegmentationClassAug dataset made by someone from Semantic Boundaries Dataset (SBD) leads to 10582 images for training.

1.4 Meaning of outline

On images at VOC2012/SegmentationObjects or VOC2012/SegmentationClass, you can see that images have white outlines in common. These outlines are indicating acceptable error of segmentation. When we compare ground truth image and our segmented image, our image should segment similar to ground truth image, with range of segmentation error on outline allowed. Segmented pixel covered by outline is masked and excluded on evaluation. I got this idea from PASCAL VOC 2012 devkit VOCevalseg.m file.

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2 Evaluation Metric: mIoU

2.1 How to calculate mIoU with outline

2.2 state-of-the-art on Pascal VOC 2012 Segmentation

3 Analyze DeepLab v3+

3.1 Explain the architecture below in your own words

3.1.1 Refer to PDF(Xception 65) for more detail

3.1.2 Refer to PDF(MobileNet V2) for more detail

3.2 Discuss why DeepLab v3+ gets better accuracy than other segmentation networks

3.3 Run on a few images on two networks

3.3.1 Network: MobileNet V2, Xception

3.3.2 6 Classes

3.4 e.g.