
Detection

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1 Report the mAP

Some relevant parameters:

- Model = Faster RCNN
- Optimizer = SGD
- Learning Rate = 0.01
- Momentum = 0.01
- Weight Decay = 0.01
- Epoch = 15 (with pretrained model)
- Batch Size = 16
- Number of images training = 210
- Number of images for validation = 30
- Baseline: MMDetection

Table 1: **mAP with different IoU**

IoU	0.25	0.50	0.75
mAP	0.713	0.898	0.909

2 Methods

Model I tried two different models, YOLO(v3) and Faster RCNN. YOLOv3 performs not so satisficing, sometimes it may only find one apply while there are actually more than one. So I give up and turn to Faster RCNN. It turned out that Faster RCNN works well.

Optimizer I tried two advanced optimizers, SGD and Adam. The models with these two optimizers have similar mAP scores, but SGD is better(just a little and no more than $0.1 AP_{50}$). However, when I train a YOLOv3 model, SGD worked well while Adam went totally wrong way, the loss continues to rise and mAP went to zero. Maybe I made somemistakes but I didn't find it out.

Optimize Hyperparameters I used the mothod learned from lecture 13 part 2, and find the Hyperparameters that works well. Some hyperparameters are listed in section 1.

Use pretrained model At first, I did't use pretrained model, and failed to train great model within 30 epoches. But after I tried to use different pretrained models, I can train a model within 15 epoches and the model performs well. I tried about five different pretrained model of faste_rcnn and finally chose the one with the best performance.

DataSet Because of there are only train and test images, at first, I trained model without validation set and the model can't performs well in test set. But its loss was low enough, so I realized maybe it overfitted. So I randomly chose 30 images out of 240 in training set and use these to build validation set. After that, my model can extend to test set. What's more, I trid to get more data by turn RGB images to gray-scale images. But this resulted in lower mAP and worse results(visualization). I realized that apple and orange have similar shape, if I drop out color, it is harder to classify these two categories. So I just removed these gray-scale images and retrained my model.

3 Result Visualization

Note: For some pictures, you need to enlarge them to see bound boxes clearly, because the background color may cover the boxes and it is hard for you to find them.



