

Homework 3: Object detection

Description

The goal of this assignment is to deepen your understanding of object detection models, specifically YOLOv6-n, by reproducing its implementation and fine-tuning it on a new dataset. You will be using the YOLOv6 official codebase for this task.

Instruction

1. Setup and Environment Preparation:
 - a) Clone the YOLOv6 repository. The Github link is [here](#).
 - b) Set up your environment according to the repository's instructions.
 - c) In case you need GPU resources. from Discovery cluster, please refer to these documents([1](#), [2](#)).



```
Quick Start

▼ Install
git clone https://github.com/meituan/YOLOv6
cd YOLOv6
pip install -r requirements.txt

▶ Reproduce our results on COCO

▼ Finetune on custom data
Single GPU

# P5 models
python tools/train.py --batch 32 --conf configs/yolov6s_finetune.py --data data/dataset.yaml --use_
# P6 models
python tools/train.py --batch 32 --conf configs/yolov6s6_finetune.py --data data/dataset.yaml --img
```

Figure 1 Environment setup and training instruction from official YOLOv6 repository.

2. Configure the dataset
 - a) Download the fine-tuning datasets. You can choose one from [Oxford-IIIT Pet Dataset](#) (7,000 images), [Caltech-UCSD Birds-200-2011](#) (10,000 images), [Stanford Dogs Dataset](#) (~20,000 images).
 - b) Setup the dataset path properly according to the instruction.
3. Reproduction:
 - a) Download the pretrained YOLOv6-n model [here](#) and conduct testing on your target test dataset. Display the **testing log** and final accuracy.
4. Fine-Tuning:
 - a) Fine-tune the YOLOv6-n model on the target dataset you choose. Display the **training log** and final **test accuracy**.

```

2023/01/18 12:35:41 - mmengine - INFO - Exp name: yolov8_n_syncbn_fast_8xb16-500e_coco_20230118_120012
2023/01/18 12:35:41 - mmengine - INFO - Saving checkpoint at 30 epochs
2023/01/18 12:35:42 - mmengine - WARNING - 'save_param_scheduler' is True but 'self.param_schedulers' is None, so skip saving parameter schedulers
2023/01/18 12:35:43 - mmengine - INFO - Epoch(val) [30][ 50/313] eta: 0:00:05 time: 0.0288 data_time: 0.0010 memory: 8053
2023/01/18 12:35:44 - mmengine - INFO - Epoch(val) [30][100/313] eta: 0:00:04 time: 0.0289 data_time: 0.0003 memory: 91
2023/01/18 12:35:46 - mmengine - INFO - Epoch(val) [30][150/313] eta: 0:00:03 time: 0.0216 data_time: 0.0003 memory: 91
2023/01/18 12:35:47 - mmengine - INFO - Epoch(val) [30][200/313] eta: 0:00:02 time: 0.0222 data_time: 0.0003 memory: 91
2023/01/18 12:35:48 - mmengine - INFO - Epoch(val) [30][250/313] eta: 0:00:01 time: 0.0183 data_time: 0.0002 memory: 91
2023/01/18 12:35:48 - mmengine - INFO - Epoch(val) [30][300/313] eta: 0:00:00 time: 0.0173 data_time: 0.0002 memory: 91
2023/01/18 12:36:06 - mmengine - INFO - Evaluating bbox...
2023/01/18 12:37:44 - mmengine - INFO - bbox_mAP_copypaste: 0.249 0.377 0.267 0.124 0.272 0.340

```

Figure 2 Example of training process.

```

Evaluate annotation type "bbox"
DONE (t=68.23s).
Accumulating evaluation results...
DONE (t=19.43s).
Average Precision (AP) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.313
Average Precision (AP) @[ IoU=0.50 | area= all | maxDets=100 ] = 0.460
Average Precision (AP) @[ IoU=0.75 | area= all | maxDets=100 ] = 0.332
Average Precision (AP) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.115
Average Precision (AP) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.344
Average Precision (AP) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.490
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 1 ] = 0.282
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 10 ] = 0.462
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.506
Average Recall (AR) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.235
Average Recall (AR) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.583
Average Recall (AR) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.749
Results saved to runs/val/exp4

```

Figure 3 Example of testing results.

Submission

1. You need to submit one zip file and one PDF report.
2. In the PDF report, you should include:
 - a) 1 screenshot of testing on the target dataset without pretraining.
 - b) 1 screenshot of finetune training process.
 - c) 1 screenshot of testing on the target dataset after pretraining.
3. In the zip file, you should include:
 - a) Testing log file
 - b) Training log file
 - c) Fine-tuned model checkpoint.
- The **zip** file should be named using the following convention:
 <Last-Name>_<First-Name>_HW3.zip
 Ex. Wayne_Bruce_HW3.zip

Note:

Don't put any print function other than showing the results.
 Do not include the dataset in your submission.