```
!pip install pyyaml==5.1

import torch
TORCH_VERSION = ".".join(torch.__version__.split(".")[:2])
CUDA_VERSION = torch.__version__.split("+")[-1]
print("torch: ", TORCH_VERSION, "; cuda: ", CUDA_VERSION)
# Install detectron2 that matches the above pytorch version
# See https://detectron2.readthedocs.io/tutorials/install.html for instructions
!pip install detectron2 -f https://dl.fbaipublicfiles.com/detectron2/wheels/$CUDA_VERSION/tor
# If there is not yet a detectron2 release that matches the given torch + CUDA version, you n
```

```
Collecting pyyaml==5.1
  Downloading PyYAML-5.1.tar.gz (274 kB)
     |████████████████████████████████| 274 kB 5.4 MB/s
Building wheels for collected packages: pyyaml
  Building wheel for pyyaml (setup.py) ... done
  Created wheel for pyyaml: filename=PyYAML-5.1-cp37-cp37m-linux_x86_64.whl size=44092 s
  Stored in directory: /root/.cache/pip/wheels/77/f5/10/d00a2bd30928b972790053b5de0c703c
Successfully built pyyaml
Installing collected packages: pyyaml
  Attempting uninstall: pyyaml
    Found existing installation: PyYAML 3.13
    Uninstalling PyYAML-3.13:
      Successfully uninstalled PyYAML-3.13
Successfully installed pyyaml-5.1
torch:  1.10 ; cuda:  cu111
Looking in links: https://dl.fbaipublicfiles.com/detectron2/wheels/cu111/torch1.10/index
Collecting detectron2
  Downloading https://dl.fbaipublicfiles.com/detectron2/wheels/cu111/torch1.10/detectron
     |████████████████████████████████| 7.0 MB 808 kB/s
Requirement already satisfied: future in /usr/local/lib/python3.7/dist-packages (from de
Collecting yacs>=0.1.8
  Downloading yacs-0.1.8-py3-none-any.whl (14 kB)
Requirement already satisfied: matplotlib in /usr/local/lib/python3.7/dist-packages (fro
Requirement already satisfied: termcolor>=1.1 in /usr/local/lib/python3.7/dist-packages
Requirement already satisfied: pydot in /usr/local/lib/python3.7/dist-packages (from det
Requirement already satisfied: cloudpickle in /usr/local/lib/python3.7/dist-packages (fr
Requirement already satisfied: pycocotools>=2.0.2 in /usr/local/lib/python3.7/dist-packa
Requirement already satisfied: tqdm>4.29.0 in /usr/local/lib/python3.7/dist-packages (fr
Collecting iopath<0.1.10,>=0.1.7
  Downloading iopath-0.1.9-py3-none-any.whl (27 kB)
Requirement already satisfied: tabulate in /usr/local/lib/python3.7/dist-packages (from
Collecting fvcore<0.1.6,>=0.1.5
  Downloading fvcore-0.1.5.post20211023.tar.gz (49 kB)
     |████████████████████████████████| 49 kB 4.0 MB/s
Collecting omegaconf>=2.1
  Downloading omegaconf-2.1.1-py3-none-any.whl (74 kB)
     |████████████████████████████████| 74 kB 2.8 MB/s
Requirement already satisfied: tensorboard in /usr/local/lib/python3.7/dist-packages (fr
Requirement already satisfied: Pillow>=7.1 in /usr/local/lib/python3.7/dist-packages (fr
Collecting black==21.4b2
  Downloading black-21.4b2-py3-none-any.whl (130 kB)
     |████████████████████████████████| 130 kB 15.7 MB/s
Collecting hydra-core>=1.1
  Downloading hydra_core-1.1.1-py3-none-any.whl (145 kB)
     |████████████████████████████████| 145 kB 24.3 MB/s
Requirement already satisfied: appdirs in /usr/local/lib/python3.7/dist-packages (from b
Requirement already satisfied: typing-extensions>=3.7.4 in /usr/local/lib/python3.7/dist
Collecting mypy-extensions>=0.4.3
  Downloading mypy_extensions-0.4.3-py2.py3-none-any.whl (4.5 kB)
Requirement already satisfied: click>=7.1.2 in /usr/local/lib/python3.7/dist-packages (f
Collecting regex>=2020.1.8
  Downloading regex-2021.11.10-cp37-cp37m-manylinux_2_17_x86_64.manylinux2014_x86_64.whl
     |████████████████████████████████| 749 kB 39.8 MB/s
Collecting typed-ast>=1.4.2
  Downloading typed_ast-1.5.0-cp37-cp37m-manylinux_2_5_x86_64.manylinux1_x86_64.manylinu
     |████████████████████████████████| 843 kB 39.0 MB/s
Requirement already satisfied: toml>=0.10.1 in /usr/local/lib/python3.7/dist-packages (f
```

```
Collecting pathspec<1,>=0.8.1
  Downloading pathspec-0.9.0-py2.py3-none-any.whl (31 kB)
Requirement already satisfied: numpy in /usr/local/lib/python3.7/dist-packages (from fvc
Requirement already satisfied: pyyaml>=5.1 in /usr/local/lib/python3.7/dist-packages (fr
Collecting antlr4-python3-runtime==4.8
  Downloading antlr4-python3-runtime-4.8.tar.gz (112 kB)
     |████████████████████████████████| 112 kB 40.7 MB/s
Requirement already satisfied: importlib-resources in /usr/local/lib/python3.7/dist-pack
Collecting portalocker
  Downloading portalocker-2.3.2-py2.py3-none-any.whl (15 kB)
Requirement already satisfied: cython>=0.27.3 in /usr/local/lib/python3.7/dist-packages
Requirement already satisfied: setuptools>=18.0 in /usr/local/lib/python3.7/dist-package
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.7/dist-packages (f
Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.1 in /usr/local/li
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.7/dist-packag
Requirement already satisfied: python-dateutil>=2.1 in /usr/local/lib/python3.7/dist-pac
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/dist-packages (from
Requirement already satisfied: zipp>=3.1.0 in /usr/local/lib/python3.7/dist-packages (fr
Requirement already satisfied: wheel>=0.26 in /usr/local/lib/python3.7/dist-packages (fr
Requirement already satisfied: tensorboard-plugin-wit>=1.6.0 in /usr/local/lib/python3.7
Requirement already satisfied: grpcio>=1.24.3 in /usr/local/lib/python3.7/dist-packages
```

```
import detectron2
from detectron2.utils.logger import setup_logger
setup_logger()

# import some common libraries
import numpy as np
import os, json, cv2, random
from google.colab.patches import cv2_imshow

# import some common detectron2 utilities
from detectron2 import model_zoo
from detectron2.engine import DefaultPredictor
from detectron2.config import get_cfg
from detectron2.utils.visualizer import Visualizer
from detectron2.data import MetadataCatalog, DatasetCatalog
from detectron2.evaluation import PascalVOCDetectionEvaluator
```

```
Requirement already satisfied: ... in /usr/local/lib/python3.7/dist-packages
Building wheels for collected packages: fvcore, antlr4-python3-runtime
```

Download Dataset PASCAL VOC

```
  Building wheel for antlr4-python3-runtime (setup.py) ... done
```

```
!wget http://host.robots.ox.ac.uk/pascal/VOC/voc2007/VOCtrainval_06-Nov-2007.tar
!tar -xvf VOCtrainval_06-Nov-2007.tar
```

```
VOCdevkit/VOC2007/SegmentationObject/008722.png
VOCdevkit/VOC2007/SegmentationObject/008747.png
VOCdevkit/VOC2007/SegmentationObject/008764.png
VOCdevkit/VOC2007/SegmentationObject/008801.png
VOCdevkit/VOC2007/SegmentationObject/008815.png
VOCdevkit/VOC2007/SegmentationObject/008927.png
VOCdevkit/VOC2007/SegmentationObject/008932.png
VOCdevkit/VOC2007/SegmentationObject/008944.png
VOCdevkit/VOC2007/SegmentationObject/008948.png
VOCdevkit/VOC2007/SegmentationObject/008973.png
```

```
VOCdevkit/VOC2007/SegmentationObject/008973.png
VOCdevkit/VOC2007/SegmentationObject/008980.png
VOCdevkit/VOC2007/SegmentationObject/009015.png
VOCdevkit/VOC2007/SegmentationObject/009068.png
VOCdevkit/VOC2007/SegmentationObject/009209.png
VOCdevkit/VOC2007/SegmentationObject/009221.png
VOCdevkit/VOC2007/SegmentationObject/009245.png
VOCdevkit/VOC2007/SegmentationObject/009251.png
VOCdevkit/VOC2007/SegmentationObject/009252.png
VOCdevkit/VOC2007/SegmentationObject/009295.png
VOCdevkit/VOC2007/SegmentationObject/009323.png
VOCdevkit/VOC2007/SegmentationObject/009327.png
VOCdevkit/VOC2007/SegmentationObject/009331.png
VOCdevkit/VOC2007/SegmentationObject/009348.png
VOCdevkit/VOC2007/SegmentationObject/009392.png
VOCdevkit/VOC2007/SegmentationObject/009413.png
VOCdevkit/VOC2007/SegmentationObject/009419.png
VOCdevkit/VOC2007/SegmentationObject/009422.png
VOCdevkit/VOC2007/SegmentationObject/009446.png
VOCdevkit/VOC2007/SegmentationObject/009458.png
VOCdevkit/VOC2007/SegmentationObject/009464.png
VOCdevkit/VOC2007/SegmentationObject/009527.png
VOCdevkit/VOC2007/SegmentationObject/009533.png
VOCdevkit/VOC2007/SegmentationObject/009550.png
VOCdevkit/VOC2007/SegmentationObject/009562.png
VOCdevkit/VOC2007/SegmentationObject/009580.png
VOCdevkit/VOC2007/SegmentationObject/009597.png
VOCdevkit/VOC2007/SegmentationObject/009605.png
VOCdevkit/VOC2007/SegmentationObject/009618.png
VOCdevkit/VOC2007/SegmentationObject/009649.png
VOCdevkit/VOC2007/SegmentationObject/009654.png
VOCdevkit/VOC2007/SegmentationObject/009655.png
VOCdevkit/VOC2007/SegmentationObject/009684.png
VOCdevkit/VOC2007/SegmentationObject/009687.png
VOCdevkit/VOC2007/SegmentationObject/009691.png
VOCdevkit/VOC2007/SegmentationObject/009706.png
VOCdevkit/VOC2007/SegmentationObject/009709.png
VOCdevkit/VOC2007/SegmentationObject/009724.png
VOCdevkit/VOC2007/SegmentationObject/009756.png
VOCdevkit/VOC2007/SegmentationObject/009764.png
VOCdevkit/VOC2007/SegmentationObject/009794.png
VOCdevkit/VOC2007/SegmentationObject/009807.png
VOCdevkit/VOC2007/SegmentationObject/009832.png
VOCdevkit/VOC2007/SegmentationObject/009841.png
VOCdevkit/VOC2007/SegmentationObject/009897.png
VOCdevkit/VOC2007/SegmentationObject/009911.png
VOCdevkit/VOC2007/SegmentationObject/009923.png
VOCdevkit/VOC2007/SegmentationObject/009938.png
VOCdevkit/VOC2007/SegmentationObject/009947.png
VOCdevkit/VOC2007/SegmentationObject/009950.png
```

```
!mv VOCdevkit datasets
```

Train model

merge_from_file --> Choose model architecture (Retinanet)

Datasets.TRAIN ---> Training dataset (Pascal VOC)

model_zoo.get_checkpoint_url---> Weights initialization from pre-trained network

SOLVER.BASE_LR ---> learning rate

SOLVER.MAX_ITER ---> number of iterations

MODEL.ROI_HEADS.BATCH_SIZE_PER_IMAGE ---> Batch_size

trainer.train() ---> start the training (Fine tuning the network)

```
from detectron2.engine import DefaultTrainer

cfg = get_cfg()
cfg.merge_from_file(model_zoo.get_config_file("COCO-Detection/retinanet_R_50_FPN_3x.yaml"))
cfg.OUTPUT_DIR = 'MyVOCTraining'
cfg.DATASETS.TRAIN = ("voc_2007_train",)
cfg.DATASETS.TEST = ()
cfg.DATALOADER.NUM_WORKERS = 1
cfg.MODEL.WEIGHTS = model_zoo.get_checkpoint_url("COCO-Detection/retinanet_R_50_FPN_3x.yaml")
cfg.SOLVER.IMS_PER_BATCH = 1
cfg.SOLVER.BASE_LR = 0.00025 # pick a good LR
cfg.SOLVER.MAX_ITER = 3000
cfg.MODEL.ROI_HEADS.BATCH_SIZE_PER_IMAGE = 128
cfg.MODEL.ROI_HEADS.NUM_CLASSES = 20

os.makedirs(cfg.OUTPUT_DIR, exist_ok=True)
trainer = DefaultTrainer(cfg)
trainer.resume_or_load(resume=False)
trainer.train()
```

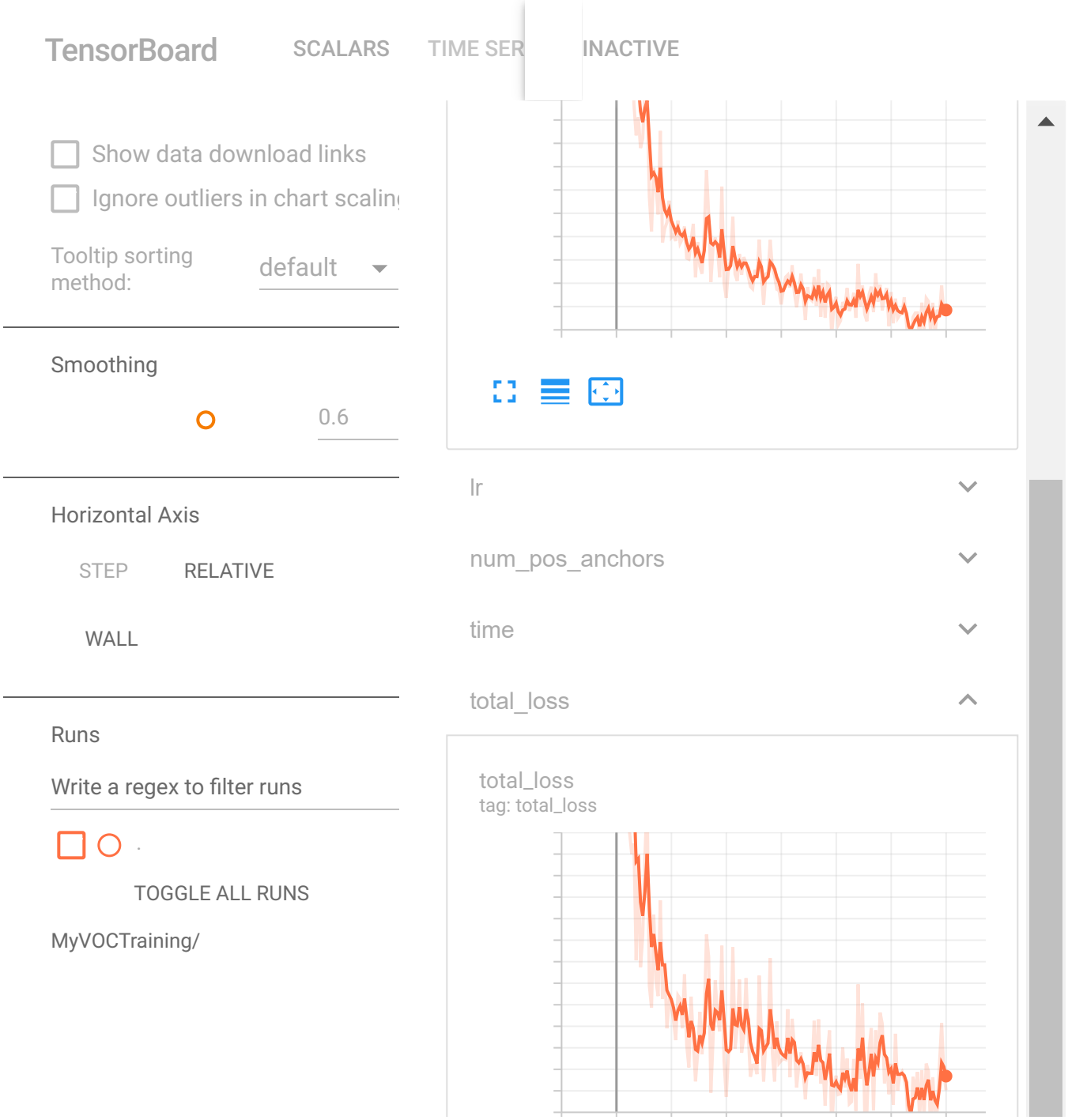
```
[11/19 04:42:03 d2.utils.events]:  eta: 0:14:29  iter: 1919  total_loss: 0.3385  los
[11/19 04:42:20 d2.utils.events]:  eta: 0:14:15  iter: 1939  total_loss: 0.3904  los
[11/19 04:42:36 d2.utils.events]:  eta: 0:13:58  iter: 1959  total_loss: 0.1535  los
[11/19 04:42:52 d2.utils.events]:  eta: 0:13:44  iter: 1979  total_loss: 0.2587  los
[11/19 04:43:09 d2.utils.events]:  eta: 0:13:28  iter: 1999  total_loss: 0.2852  los
[11/19 04:43:25 d2.utils.events]:  eta: 0:13:14  iter: 2019  total_loss: 0.2416  los
[11/19 04:43:42 d2.utils.events]:  eta: 0:12:58  iter: 2039  total_loss: 0.2433  los
[11/19 04:43:58 d2.utils.events]:  eta: 0:12:42  iter: 2059  total_loss: 0.3506  los
[11/19 04:44:15 d2.utils.events]:  eta: 0:12:26  iter: 2079  total_loss: 0.2581  los
[11/19 04:44:30 d2.utils.events]:  eta: 0:12:08  iter: 2099  total_loss: 0.325  loss
[11/19 04:44:46 d2.utils.events]:  eta: 0:11:53  iter: 2119  total_loss: 0.2197  los
[11/19 04:45:01 d2.utils.events]:  eta: 0:11:33  iter: 2139  total_loss: 0.2247  los
[11/19 04:45:17 d2.utils.events]:  eta: 0:11:18  iter: 2159  total_loss: 0.3239  los
[11/19 04:45:33 d2.utils.events]:  eta: 0:11:00  iter: 2179  total_loss: 0.2034  los
[11/19 04:45:48 d2.utils.events]:  eta: 0:10:42  iter: 2199  total_loss: 0.4974  los
[11/19 04:46:04 d2.utils.events]:  eta: 0:10:23  iter: 2219  total_loss: 0.2779  los
[11/19 04:46:20 d2.utils.events]:  eta: 0:10:08  iter: 2239  total_loss: 0.4536  los
[11/19 04:46:36 d2.utils.events]:  eta: 0:09:51  iter: 2259  total_loss: 0.2008  los
[11/19 04:46:52 d2.utils.events]:  eta: 0:09:36  iter: 2279  total_loss: 0.1996  los
```

```
[11/19 04:47:08 d2.utils.events]:  eta: 0:09:21  iter: 2299  total_loss: 0.3454  los
[11/19 04:47:23 d2.utils.events]:  eta: 0:09:05  iter: 2319  total_loss: 0.3958  los
[11/19 04:47:39 d2.utils.events]:  eta: 0:08:48  iter: 2339  total_loss: 0.2051  los
[11/19 04:47:55 d2.utils.events]:  eta: 0:08:33  iter: 2359  total_loss: 0.3905  los
[11/19 04:48:12 d2.utils.events]:  eta: 0:08:17  iter: 2379  total_loss: 0.2983  los
[11/19 04:48:28 d2.utils.events]:  eta: 0:08:00  iter: 2399  total_loss: 0.4319  los
[11/19 04:48:44 d2.utils.events]:  eta: 0:07:44  iter: 2419  total_loss: 0.4053  los
[11/19 04:49:00 d2.utils.events]:  eta: 0:07:29  iter: 2439  total_loss: 0.2677  los
[11/19 04:49:15 d2.utils.events]:  eta: 0:07:11  iter: 2459  total_loss: 0.315  loss
[11/19 04:49:32 d2.utils.events]:  eta: 0:06:56  iter: 2479  total_loss: 0.2421  los
[11/19 04:49:48 d2.utils.events]:  eta: 0:06:40  iter: 2499  total_loss: 0.3128  los
[11/19 04:50:04 d2.utils.events]:  eta: 0:06:24  iter: 2519  total_loss: 0.2177  los
[11/19 04:50:20 d2.utils.events]:  eta: 0:06:07  iter: 2539  total_loss: 0.3826  los
[11/19 04:50:36 d2.utils.events]:  eta: 0:05:51  iter: 2559  total_loss: 0.2506  los
[11/19 04:50:53 d2.utils.events]:  eta: 0:05:35  iter: 2579  total_loss: 0.2879  los
[11/19 04:51:09 d2.utils.events]:  eta: 0:05:19  iter: 2599  total_loss: 0.2949  los
[11/19 04:51:25 d2.utils.events]:  eta: 0:05:03  iter: 2619  total_loss: 0.2775  los
[11/19 04:51:41 d2.utils.events]:  eta: 0:04:47  iter: 2639  total_loss: 0.2461  los
[11/19 04:51:57 d2.utils.events]:  eta: 0:04:32  iter: 2659  total_loss: 0.1363  los
[11/19 04:52:13 d2.utils.events]:  eta: 0:04:18  iter: 2679  total_loss: 0.1661  los
[11/19 04:52:29 d2.utils.events]:  eta: 0:04:02  iter: 2699  total_loss: 0.2831  los
[11/19 04:52:45 d2.utils.events]:  eta: 0:03:45  iter: 2719  total_loss: 0.2375  los
[11/19 04:53:02 d2.utils.events]:  eta: 0:03:29  iter: 2739  total_loss: 0.2938  los
[11/19 04:53:19 d2.utils.events]:  eta: 0:03:13  iter: 2759  total_loss: 0.1868  los
[11/19 04:53:35 d2.utils.events]:  eta: 0:02:57  iter: 2779  total_loss: 0.2976  los
[11/19 04:53:51 d2.utils.events]:  eta: 0:02:41  iter: 2799  total_loss: 0.1868  los
[11/19 04:54:07 d2.utils.events]:  eta: 0:02:25  iter: 2819  total_loss: 0.3133  los
[11/19 04:54:23 d2.utils.events]:  eta: 0:02:09  iter: 2839  total_loss: 0.2956  los
[11/19 04:54:40 d2.utils.events]:  eta: 0:01:53  iter: 2859  total_loss: 0.1566  los
[11/19 04:54:56 d2.utils.events]:  eta: 0:01:37  iter: 2879  total_loss: 0.2816  los
[11/19 04:55:12 d2.utils.events]:  eta: 0:01:20  iter: 2899  total_loss: 0.1954  los
[11/19 04:55:29 d2.utils.events]:  eta: 0:01:04  iter: 2919  total_loss: 0.204  loss
[11/19 04:55:44 d2.utils.events]:  eta: 0:00:48  iter: 2939  total_loss: 0.3092  los
[11/19 04:56:00 d2.utils.events]:  eta: 0:00:32  iter: 2959  total_loss: 0.4072  los
[11/19 04:56:15 d2.utils.events]:  eta: 0:00:16  iter: 2979  total_loss: 0.2914  los
[11/19 04:56:32 d2.utils.events]:  eta: 0:00:00  iter: 2999  total_loss: 0.2515  los
[11/19 04:56:32 d2.engine.hooks]: Overall training speed: 2998 iterations in 0:40:08
[11/19 04:56:32 d2.engine.hooks]: Total training time: 0:40:11 (0:00:02 on hooks)
```

```
import torch
torch.save(trainer.model.state_dict(), os.path.join("/content/drive/MyDrive/CSCI/", "mymodel_
#model = torch.load("MyCustom/path/mymodel.pth")


# Look at training curves in tensorboard:
%reload_ext tensorboard
%tensorboard --logdir MyVOCTraining/
```

```
Reusing TensorBoard on port 6006 (pid 716), started 2:12:44 ago. (Use '!kill 716' to ki
```




```
# Inference should use the config with parameters that are used in training
# cfg now already contains everything we've set previously. We changed it a little bit for in
cfg.MODEL.WEIGHTS = os.path.join(cfg.OUTPUT_DIR, "model_final.pth")  # path to the model we j
cfg.MODEL.RETINANET.SCORE_THRESH_TEST=0.5 # set a custom testing threshold
predictor = DefaultPredictor(cfg)
```

Evaluation

Run the evaluation on validation (test) dataset and report the scoring metric. We are interested in AP50 score.

```
from detectron2.evaluation import PascalVOCDetectionEvaluator, inference_on_dataset
from detectron2.data import build_detection_test_loader
evaluator = PascalVOCDetectionEvaluator("voc_2007_val")
val_loader = build_detection_test_loader(cfg, "voc_2007_val")
print(inference_on_dataset(predictor.model, val_loader, evaluator))
```

```
ce done 121/2510. Dataloading: 0.0026 s/iter. Inference: 0.3745 s/iter. Eval: 0.0003
ce done 134/2510. Dataloading: 0.0026 s/iter. Inference: 0.3755 s/iter. Eval: 0.0003
ce done 147/2510. Dataloading: 0.0026 s/iter. Inference: 0.3767 s/iter. Eval: 0.0003
ce done 161/2510. Dataloading: 0.0025 s/iter. Inference: 0.3763 s/iter. Eval: 0.0003
ce done 175/2510. Dataloading: 0.0025 s/iter. Inference: 0.3762 s/iter. Eval: 0.0003
ce done 189/2510. Dataloading: 0.0025 s/iter. Inference: 0.3762 s/iter. Eval: 0.0003
ce done 202/2510. Dataloading: 0.0025 s/iter. Inference: 0.3772 s/iter. Eval: 0.0003
ce done 216/2510. Dataloading: 0.0025 s/iter. Inference: 0.3766 s/iter. Eval: 0.0003
ce done 229/2510. Dataloading: 0.0025 s/iter. Inference: 0.3771 s/iter. Eval: 0.0003
ce done 243/2510. Dataloading: 0.0025 s/iter. Inference: 0.3766 s/iter. Eval: 0.0003
ce done 257/2510. Dataloading: 0.0025 s/iter. Inference: 0.3763 s/iter. Eval: 0.0003
ce done 271/2510. Dataloading: 0.0025 s/iter. Inference: 0.3762 s/iter. Eval: 0.0003
ce done 284/2510. Dataloading: 0.0025 s/iter. Inference: 0.3766 s/iter. Eval: 0.0003
ce done 298/2510. Dataloading: 0.0025 s/iter. Inference: 0.3769 s/iter. Eval: 0.0003
ce done 312/2510. Dataloading: 0.0025 s/iter. Inference: 0.3761 s/iter. Eval: 0.0003
ce done 325/2510. Dataloading: 0.0025 s/iter. Inference: 0.3764 s/iter. Eval: 0.0003
ce done 338/2510. Dataloading: 0.0025 s/iter. Inference: 0.3770 s/iter. Eval: 0.0003
ce done 352/2510. Dataloading: 0.0025 s/iter. Inference: 0.3768 s/iter. Eval: 0.0003
ce done 366/2510. Dataloading: 0.0025 s/iter. Inference: 0.3770 s/iter. Eval: 0.0003
ce done 380/2510. Dataloading: 0.0025 s/iter. Inference: 0.3762 s/iter. Eval: 0.0003
ce done 394/2510. Dataloading: 0.0025 s/iter. Inference: 0.3760 s/iter. Eval: 0.0003
ce done 408/2510. Dataloading: 0.0025 s/iter. Inference: 0.3756 s/iter. Eval: 0.0003
ce done 422/2510. Dataloading: 0.0025 s/iter. Inference: 0.3755 s/iter. Eval: 0.0003
ce done 436/2510. Dataloading: 0.0025 s/iter. Inference: 0.3756 s/iter. Eval: 0.0003
ce done 450/2510. Dataloading: 0.0025 s/iter. Inference: 0.3756 s/iter. Eval: 0.0003
ce done 464/2510. Dataloading: 0.0025 s/iter. Inference: 0.3754 s/iter. Eval: 0.0003
ce done 478/2510. Dataloading: 0.0025 s/iter. Inference: 0.3753 s/iter. Eval: 0.0003
ce done 492/2510. Dataloading: 0.0025 s/iter. Inference: 0.3751 s/iter. Eval: 0.0003
ce done 506/2510. Dataloading: 0.0025 s/iter. Inference: 0.3751 s/iter. Eval: 0.0003
ce done 520/2510. Dataloading: 0.0025 s/iter. Inference: 0.3748 s/iter. Eval: 0.0003
ce done 533/2510. Dataloading: 0.0025 s/iter. Inference: 0.3752 s/iter. Eval: 0.0003
ce done 546/2510. Dataloading: 0.0025 s/iter. Inference: 0.3754 s/iter. Eval: 0.0003
ce done 560/2510. Dataloading: 0.0025 s/iter. Inference: 0.3753 s/iter. Eval: 0.0003
ce done 574/2510. Dataloading: 0.0025 s/iter. Inference: 0.3749 s/iter. Eval: 0.0003
ce done 588/2510. Dataloading: 0.0025 s/iter. Inference: 0.3747 s/iter. Eval: 0.0003
ce done 602/2510. Dataloading: 0.0025 s/iter. Inference: 0.3745 s/iter. Eval: 0.0003
ce done 616/2510. Dataloading: 0.0025 s/iter. Inference: 0.3745 s/iter. Eval: 0.0003
ce done 630/2510. Dataloading: 0.0025 s/iter. Inference: 0.3743 s/iter. Eval: 0.0003
ce done 644/2510. Dataloading: 0.0025 s/iter. Inference: 0.3741 s/iter. Eval: 0.0003
ce done 658/2510. Dataloading: 0.0025 s/iter. Inference: 0.3740 s/iter. Eval: 0.0003
ce done 672/2510. Dataloading: 0.0025 s/iter. Inference: 0.3740 s/iter. Eval: 0.0003
ce done 686/2510. Dataloading: 0.0025 s/iter. Inference: 0.3742 s/iter. Eval: 0.0003
ce done 700/2510. Dataloading: 0.0025 s/iter. Inference: 0.3739 s/iter. Eval: 0.0003
ce done 714/2510. Dataloading: 0.0025 s/iter. Inference: 0.3739 s/iter. Eval: 0.0003
ce done 728/2510. Dataloading: 0.0025 s/iter. Inference: 0.3739 s/iter. Eval: 0.0003
ce done 742/2510. Dataloading: 0.0025 s/iter. Inference: 0.3740 s/iter. Eval: 0.0003
ce done 756/2510. Dataloading: 0.0025 s/iter. Inference: 0.3740 s/iter. Eval: 0.0003
ce done 770/2510. Dataloading: 0.0025 s/iter. Inference: 0.3739 s/iter. Eval: 0.0003
ce done 784/2510. Dataloading: 0.0025 s/iter. Inference: 0.3739 s/iter. Eval: 0.0003
```

```
ce done 798/2510. Dataloading: 0.0026 s/iter. Inference: 0.3739 s/iter. Eval: 0.0003
ce done 812/2510. Dataloading: 0.0025 s/iter. Inference: 0.3737 s/iter. Eval: 0.0003
ce done 825/2510. Dataloading: 0.0026 s/iter. Inference: 0.3739 s/iter. Eval: 0.0003
ce done 839/2510. Dataloading: 0.0026 s/iter. Inference: 0.3739 s/iter. Eval: 0.0003
ce done 853/2510. Dataloading: 0.0025 s/iter. Inference: 0.3741 s/iter. Eval: 0.0003
ce done 867/2510. Dataloading: 0.0026 s/iter. Inference: 0.3740 s/iter. Eval: 0.0003
ce done 881/2510. Dataloading: 0.0026 s/iter. Inference: 0.3739 s/iter. Eval: 0.0003
ce done 895/2510. Dataloading: 0.0026 s/iter. Inference: 0.3739 s/iter. Eval: 0.0003
ce done 909/2510. Dataloading: 0.0026 s/iter. Inference: 0.3739 s/iter. Eval: 0.0003
ce done 923/2510. Dataloading: 0.0026 s/iter. Inference: 0.3738 s/iter. Eval: 0.0003
```

Predictions

predictor(im)---> Forward pass test image through our trained network

Visualizer ---> View the predictions of objects in image

detectron2.data.MetadataCatalog.get ---> Dictionary containing class of objects reference

v.draw_instance_predictions ---> Draw the output predictions on the image.

cv2_imshow ---> display the output image

```
dataset_dicts = detectron2.data.get_detection_dataset_dicts('voc_2007_val')
for d in random.sample(dataset_dicts, 3):
    im = cv2.imread(d["file_name"])
    outputs = predictor(im)  # format is documented at https://detectron2.readthedocs.io/tuto
    v = Visualizer(im[:, :, ::-1],
                   detectron2.data.MetadataCatalog.get('voc_2007_val'),
                   scale=0.5,
                   )
    out = v.draw_instance_predictions(outputs["instances"].to("cpu"))
····cv2_imshow(out.get_image()[:,·:,·::-1])
```

```
[11/19 05:27:52 d2.data.build]: Removed 0 images with no usable annotations. 2510 images
/usr/local/lib/python3.7/dist-packages/detectron2/structures/image_list.py:88: UserWarni
  max_size = (max_size + (stride - 1)) // stride * stride
```

✓ 2s completed at 9:27 PM