FasterR-CNN

March 2, 2020

[20]:
```
import torchvision
from PIL import Image
from torchvision import transforms as T
import cv2
import matplotlib
from matplotlib import pyplot as plt
```

[2]:
```
model = torchvision.models.detection.fasterrcnn_resnet50_fpn(pretrained=True)
model.eval()
```

```
Downloading:
"https://download.pytorch.org/models/fasterrcnn_resnet50_fpn_coco-258fb6c6.pth"
to
/home/chanho/.cache/torch/checkpoints/fasterrcnn_resnet50_fpn_coco-258fb6c6.pth
14.7%IOPub message rate exceeded.
The notebook server will temporarily stop sending output
to the client in order to avoid crashing it.
To change this limit, set the config variable
`--NotebookApp.iopub_msg_rate_limit`.

Current values:
NotebookApp.iopub_msg_rate_limit=1000.0 (msgs/sec)
NotebookApp.rate_limit_window=3.0 (secs)

40.8%IOPub message rate exceeded.
The notebook server will temporarily stop sending output
to the client in order to avoid crashing it.
To change this limit, set the config variable
`--NotebookApp.iopub_msg_rate_limit`.

Current values:
NotebookApp.iopub_msg_rate_limit=1000.0 (msgs/sec)
NotebookApp.rate_limit_window=3.0 (secs)

65.6%IOPub message rate exceeded.
The notebook server will temporarily stop sending output
to the client in order to avoid crashing it.
To change this limit, set the config variable
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`--NotebookApp.iopub_msg_rate_limit`.

Current values:
NotebookApp.iopub_msg_rate_limit=1000.0 (msgs/sec)
NotebookApp.rate_limit_window=3.0 (secs)

91.5%IOPub message rate exceeded.
The notebook server will temporarily stop sending output
to the client in order to avoid crashing it.
To change this limit, set the config variable
`--NotebookApp.iopub_msg_rate_limit`.

Current values:
NotebookApp.iopub_msg_rate_limit=1000.0 (msgs/sec)
NotebookApp.rate_limit_window=3.0 (secs)
```

[3]:
```
COCO_INSTANCE_CATEGORY_NAMES = [
    '__background__', 'person', 'bicycle', 'car', 'motorcycle', 'airplane',␣
↪'bus',
    'train', 'truck', 'boat', 'traffic light', 'fire hydrant', 'N/A', 'stop␣
↪sign',
    'parking meter', 'bench', 'bird', 'cat', 'dog', 'horse', 'sheep', 'cow',
    'elephant', 'bear', 'zebra', 'giraffe', 'N/A', 'backpack', 'umbrella', 'N/
↪A', 'N/A',
    'handbag', 'tie', 'suitcase', 'frisbee', 'skis', 'snowboard', 'sports ball',
    'kite', 'baseball bat', 'baseball glove', 'skateboard', 'surfboard',␣
↪'tennis racket',
    'bottle', 'N/A', 'wine glass', 'cup', 'fork', 'knife', 'spoon', 'bowl',
    'banana', 'apple', 'sandwich', 'orange', 'broccoli', 'carrot', 'hot dog',␣
↪'pizza',
    'donut', 'cake', 'chair', 'couch', 'potted plant', 'bed', 'N/A', 'dining␣
↪table',
    'N/A', 'N/A', 'toilet', 'N/A', 'tv', 'laptop', 'mouse', 'remote',␣
↪'keyboard', 'cell phone',
    'microwave', 'oven', 'toaster', 'sink', 'refrigerator', 'N/A', 'book',
    'clock', 'vase', 'scissors', 'teddy bear', 'hair drier', 'toothbrush'
]
```

[13]:
```
def get_prediction(img_path, threshold):
  img = Image.open(img_path) # Load the image
  transform = T.Compose([T.ToTensor()]) # Defing PyTorch Transform
  img = transform(img) # Apply the transform to the image
  pred = model([img]) # Pass the image to the model
  pred_class = [COCO_INSTANCE_CATEGORY_NAMES[i] for i in list(pred[0]['labels'].
↪numpy())] # Get the Prediction Score
```

```
  pred_boxes = [[(i[0], i[1]), (i[2], i[3])] for i in list(pred[0]['boxes'].
↪detach().numpy())] # Bounding boxes
  pred_score = list(pred[0]['scores'].detach().numpy())
  pred_t = [pred_score.index(x) for x in pred_score if x > threshold][-1] # Get␣
↪list of index with score greater than threshold.
  pred_boxes = pred_boxes[:pred_t+1]
  pred_class = pred_class[:pred_t+1]
  return pred_boxes, pred_class
```

[14]:
```
def object_detection_api(img_path, threshold=0.5, rect_th=3, text_size=3,␣
↪text_th=3):

  boxes, pred_cls = get_prediction(img_path, threshold) # Get predictions
  img = cv2.imread(img_path) # Read image with cv2
  img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB) # Convert to RGB
  for i in range(len(boxes)):
    cv2.rectangle(img, boxes[i][0], boxes[i][1],color=(0, 255, 0),␣
↪thickness=rect_th) # Draw Rectangle with the coordinates
    cv2.putText(img,pred_cls[i], boxes[i][0],  cv2.FONT_HERSHEY_SIMPLEX,␣
↪text_size, (0,255,0),thickness=text_th) # Write the prediction class
  plt.figure(figsize=(20,30)) # display the output image
  plt.imshow(img)
  plt.xticks([])
  plt.yticks([])
  plt.show()
```

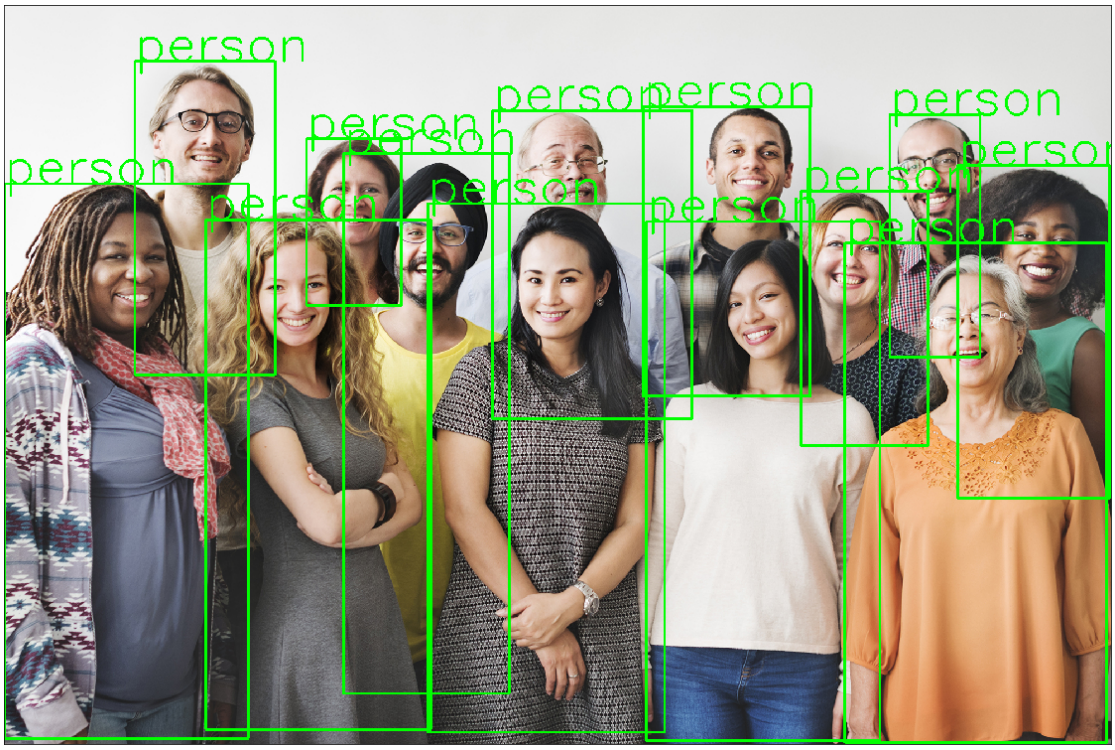
[6]:
```
!wget https://www.wsha.org/wp-content/uploads/banner-diverse-group-of-people-2.
↪jpg -O people.jpg
```

```
--2020-03-02 22:37:25--  https://www.wsha.org/wp-content/uploads/banner-diverse-
group-of-people-2.jpg
Resolving www.wsha.org (www.wsha.org)… 104.198.7.33
Connecting to www.wsha.org (www.wsha.org)|104.198.7.33|:443… connected.
HTTP request sent, awaiting response… 200 OK
Length: 1923610 (1.8M) [image/jpeg]
Saving to: ‘people.jpg’

people.jpg          100%[===================>]   1.83M  1.95MB/s    in 0.9s

2020-03-02 22:37:27 (1.95 MB/s) - ‘people.jpg’ saved [1923610/1923610]
```

[21]:
```
object_detection_api('./people.jpg', threshold=0.8)
```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