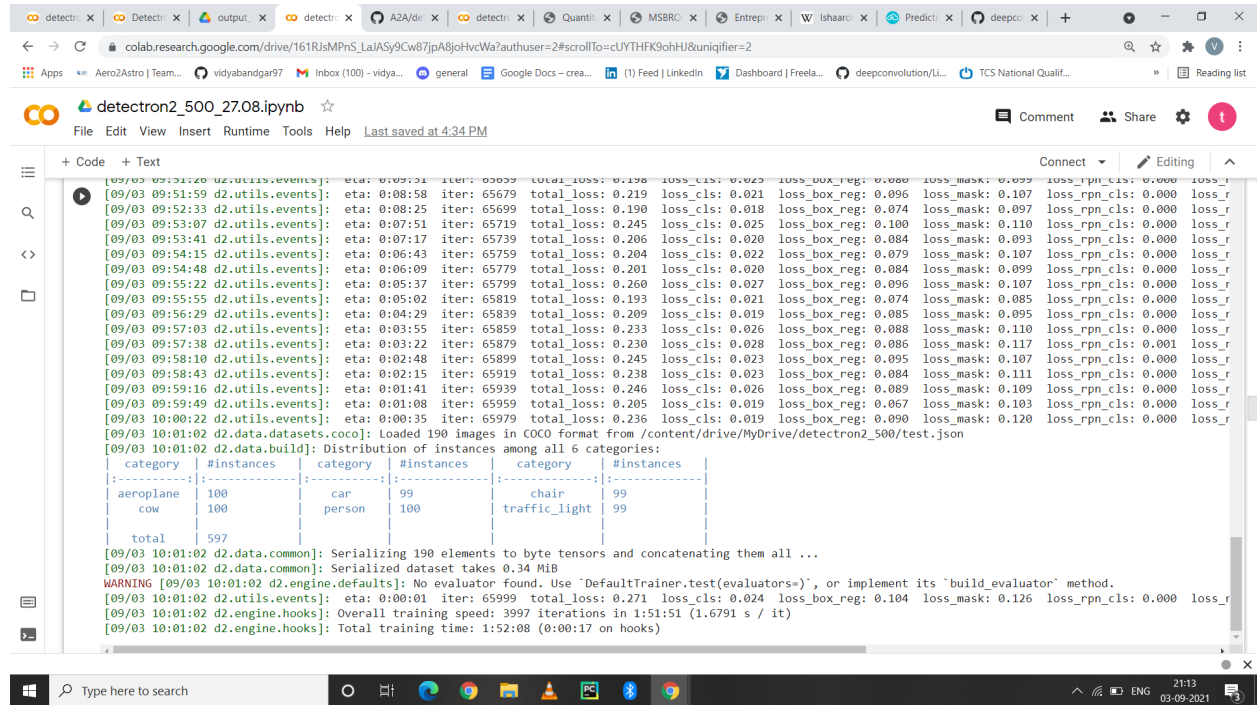


Work report

3 Sep 2021

Detectron2 for 500 instances

Deformable convolution (3x and 42.7 box AP)



```
[09/03 09:51:26 d2.utils.events]: eta: 0:08:58 iter: 65679 total_loss: 0.219 loss_cls: 0.021 loss_box_reg: 0.096 loss_mask: 0.107 loss_rpn_cls: 0.000 loss_rpn_box_reg: 0.000
[09/03 09:51:59 d2.utils.events]: eta: 0:08:58 iter: 65679 total_loss: 0.219 loss_cls: 0.021 loss_box_reg: 0.096 loss_mask: 0.107 loss_rpn_cls: 0.000 loss_rpn_box_reg: 0.000
[09/03 09:52:33 d2.utils.events]: eta: 0:08:25 iter: 65699 total_loss: 0.190 loss_cls: 0.018 loss_box_reg: 0.074 loss_mask: 0.097 loss_rpn_cls: 0.000 loss_rpn_box_reg: 0.000
[09/03 09:53:07 d2.utils.events]: eta: 0:07:51 iter: 65719 total_loss: 0.245 loss_cls: 0.025 loss_box_reg: 0.100 loss_mask: 0.110 loss_rpn_cls: 0.000 loss_rpn_box_reg: 0.000
[09/03 09:53:41 d2.utils.events]: eta: 0:07:17 iter: 65739 total_loss: 0.206 loss_cls: 0.020 loss_box_reg: 0.084 loss_mask: 0.093 loss_rpn_cls: 0.000 loss_rpn_box_reg: 0.000
[09/03 09:54:15 d2.utils.events]: eta: 0:06:43 iter: 65759 total_loss: 0.204 loss_cls: 0.022 loss_box_reg: 0.079 loss_mask: 0.107 loss_rpn_cls: 0.000 loss_rpn_box_reg: 0.000
[09/03 09:54:48 d2.utils.events]: eta: 0:06:09 iter: 65779 total_loss: 0.201 loss_cls: 0.020 loss_box_reg: 0.084 loss_mask: 0.099 loss_rpn_cls: 0.000 loss_rpn_box_reg: 0.000
[09/03 09:55:22 d2.utils.events]: eta: 0:05:37 iter: 65799 total_loss: 0.260 loss_cls: 0.027 loss_box_reg: 0.096 loss_mask: 0.107 loss_rpn_cls: 0.000 loss_rpn_box_reg: 0.000
[09/03 09:55:55 d2.utils.events]: eta: 0:05:02 iter: 65819 total_loss: 0.193 loss_cls: 0.021 loss_box_reg: 0.074 loss_mask: 0.085 loss_rpn_cls: 0.000 loss_rpn_box_reg: 0.000
[09/03 09:56:29 d2.utils.events]: eta: 0:04:29 iter: 65839 total_loss: 0.209 loss_cls: 0.019 loss_box_reg: 0.085 loss_mask: 0.095 loss_rpn_cls: 0.000 loss_rpn_box_reg: 0.000
[09/03 09:57:03 d2.utils.events]: eta: 0:03:55 iter: 65859 total_loss: 0.233 loss_cls: 0.026 loss_box_reg: 0.088 loss_mask: 0.110 loss_rpn_cls: 0.000 loss_rpn_box_reg: 0.000
[09/03 09:57:38 d2.utils.events]: eta: 0:03:22 iter: 65879 total_loss: 0.230 loss_cls: 0.028 loss_box_reg: 0.086 loss_mask: 0.117 loss_rpn_cls: 0.001 loss_rpn_box_reg: 0.001
[09/03 09:58:10 d2.utils.events]: eta: 0:02:48 iter: 65899 total_loss: 0.245 loss_cls: 0.023 loss_box_reg: 0.095 loss_mask: 0.107 loss_rpn_cls: 0.000 loss_rpn_box_reg: 0.000
[09/03 09:58:43 d2.utils.events]: eta: 0:02:15 iter: 65919 total_loss: 0.238 loss_cls: 0.023 loss_box_reg: 0.084 loss_mask: 0.111 loss_rpn_cls: 0.000 loss_rpn_box_reg: 0.000
[09/03 09:59:16 d2.utils.events]: eta: 0:01:41 iter: 65939 total_loss: 0.246 loss_cls: 0.026 loss_box_reg: 0.089 loss_mask: 0.109 loss_rpn_cls: 0.000 loss_rpn_box_reg: 0.000
[09/03 09:59:49 d2.utils.events]: eta: 0:01:08 iter: 65959 total_loss: 0.205 loss_cls: 0.019 loss_box_reg: 0.067 loss_mask: 0.103 loss_rpn_cls: 0.000 loss_rpn_box_reg: 0.000
[09/03 10:00:22 d2.utils.events]: eta: 0:00:35 iter: 65979 total_loss: 0.236 loss_cls: 0.019 loss_box_reg: 0.090 loss_mask: 0.120 loss_rpn_cls: 0.000 loss_rpn_box_reg: 0.000
[09/03 10:01:02 d2.data.datasets.coco]: Loaded 190 images in COCO format from /content/drive/MyDrive/detectron2_500/test.json
[09/03 10:01:02 d2.data.build]: Distribution of instances among all 6 categories:
category      #instances  category      #instances  category      #instances
-----
aeroplane     100         car            99          chair         99
cow           100         person        100         traffic_light 99
total         597
[09/03 10:01:02 d2.data.common]: Serializing 190 elements to byte tensors and concatenating them all ...
[09/03 10:01:02 d2.data.common]: Serialized dataset takes 0.34 MiB
WARNING [09/03 10:01:02 d2.engine.defaults]: No evaluator found. Use `DefaultTrainer.test(evaluators=)`, or implement its `build_evaluator` method.
[09/03 10:01:02 d2.utils.events]: eta: 0:00:01 iter: 65999 total_loss: 0.271 loss_cls: 0.024 loss_box_reg: 0.104 loss_mask: 0.126 loss_rpn_cls: 0.000 loss_rpn_box_reg: 0.000
[09/03 10:01:02 d2.engine.hooks]: Overall training speed: 3997 iterations in 1:51:51 (1.6791 s / it)
[09/03 10:01:02 d2.engine.hooks]: Total training time: 1:52:08 (0:00:17 on hooks)
```

1. Train evaluation:

```

Average Precision (AP) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.693
Average Precision (AP) @[ IoU=0.50 | area= all | maxDets=100 ] = 0.975
Average Precision (AP) @[ IoU=0.75 | area= all | maxDets=100 ] = 0.835
Average Precision (AP) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.635
Average Precision (AP) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.724
Average Precision (AP) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.841
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 1 ] = 0.289
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 10 ] = 0.737
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.763
Average Recall (AR) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.699
Average Recall (AR) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.791
Average Recall (AR) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.886
```

[09/03 11:01:52 d2.evaluation.coco_evaluation]: Evaluation results for segm:

AP	AP50	AP75	APs	APm	APl
69.275	97.530	83.488	63.503	72.443	84.113

[09/03 11:01:52 d2.evaluation.coco_evaluation]: Per-category segm AP:

category	AP	category	AP	category	AP
aeroplane	70.870	car	71.502	chair	67.471
cow	65.325	person	67.419	traffic_light	73.061

2. Test evaluation:

```
Average Precision (AP) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.242
Average Precision (AP) @[ IoU=0.50      | area= all | maxDets=100 ] = 0.428
Average Precision (AP) @[ IoU=0.75      | area= all | maxDets=100 ] = 0.247
Average Precision (AP) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.123
Average Precision (AP) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.333
Average Precision (AP) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.393
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 1 ] = 0.163
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 10 ] = 0.355
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.365
Average Recall (AR) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.224
Average Recall (AR) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.437
Average Recall (AR) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.542
```

[09/03 11:03:59 d2.evaluation.coco_evaluation]: Evaluation results for segm:

AP	AP50	AP75	APs	APm	APl
24.213	42.763	24.718	12.327	33.260	39.347

[09/03 11:03:59 d2.evaluation.coco_evaluation]: Per-category segm AP:

category	AP	category	AP	category	AP
aeroplane	39.783	car	14.816	chair	16.688
cow	41.186	person	9.332	traffic_light	23.473

3. Inference:

```
[09/03 11:02:52 d2.evaluation.evaluator]: Inference done 11/190. 0.3359 s / img. ETA=0:01:01
[09/03 11:02:57 d2.evaluation.evaluator]: Inference done 25/190. 0.3498 s / img. ETA=0:00:58
[09/03 11:03:02 d2.evaluation.evaluator]: Inference done 39/190. 0.3563 s / img. ETA=0:00:54
[09/03 11:03:07 d2.evaluation.evaluator]: Inference done 53/190. 0.3563 s / img. ETA=0:00:49
[09/03 11:03:12 d2.evaluation.evaluator]: Inference done 67/190. 0.3568 s / img. ETA=0:00:44
[09/03 11:03:18 d2.evaluation.evaluator]: Inference done 81/190. 0.3589 s / img. ETA=0:00:39
[09/03 11:03:23 d2.evaluation.evaluator]: Inference done 95/190. 0.3606 s / img. ETA=0:00:34
[09/03 11:03:28 d2.evaluation.evaluator]: Inference done 109/190. 0.3599 s / img. ETA=0:00:29
[09/03 11:03:33 d2.evaluation.evaluator]: Inference done 123/190. 0.3609 s / img. ETA=0:00:24
[09/03 11:03:38 d2.evaluation.evaluator]: Inference done 137/190. 0.3619 s / img. ETA=0:00:19
[09/03 11:03:44 d2.evaluation.evaluator]: Inference done 152/190. 0.3604 s / img. ETA=0:00:13
[09/03 11:03:49 d2.evaluation.evaluator]: Inference done 166/190. 0.3603 s / img. ETA=0:00:08
[09/03 11:03:54 d2.evaluation.evaluator]: Inference done 180/190. 0.3610 s / img. ETA=0:00:03
[09/03 11:03:58 d2.evaluation.evaluator]: Total inference time: 0:01:08.002385 (0.367580 s / img per device, on 1 devices)
[09/03 11:03:58 d2.evaluation.evaluator]: Total inference pure compute time: 0:01:06 (0.360500 s / img per device, on 1 devices)
[09/03 11:03:58 d2.evaluation.coco_evaluation]: Preparing results for COCO format ...
[09/03 11:03:58 d2.evaluation.coco_evaluation]: Saving results to /content/drive/MyDrive/detectron2_500/output_detect/coco_instances_results.json
```

Evaluation:(02.09.2021)

1. Train evaluation:

```
Average Precision (AP) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.684
Average Precision (AP) @[ IoU=0.50      | area= all | maxDets=100 ] = 0.969
Average Precision (AP) @[ IoU=0.75      | area= all | maxDets=100 ] = 0.819
Average Precision (AP) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.622
Average Precision (AP) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.723
Average Precision (AP) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.838
Average Recall    (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 1 ] = 0.286
Average Recall    (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 10 ] = 0.729
Average Recall    (AR) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.754
Average Recall    (AR) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.688
Average Recall    (AR) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.787
Average Recall    (AR) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.877
[09/02 10:58:59 d2.evaluation.coco_evaluation]: Evaluation results for segm:
| AP | AP50 | AP75 | APs | APm | AP1 |
|:-----:|:-----:|:-----:|:-----:|:-----:|:-----:|
| 68.398 | 96.917 | 81.912 | 62.207 | 72.333 | 83.818 |
[09/02 10:58:59 d2.evaluation.coco_evaluation]: Per-category segm AP:
| category | AP | category | AP | category | AP |
|:-----:|:-----:|:-----:|:-----:|:-----:|:-----:|
| aeroplane | 70.458 | car | 70.475 | chair | 66.117 |
| cow | 64.706 | person | 66.906 | traffic_light | 71.725 |
```

2. Test evaluation:

```
Average Precision (AP) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.242
Average Precision (AP) @[ IoU=0.50      | area= all | maxDets=100 ] = 0.434
Average Precision (AP) @[ IoU=0.75      | area= all | maxDets=100 ] = 0.265
Average Precision (AP) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.120
Average Precision (AP) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.338
Average Precision (AP) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.388
Average Recall    (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 1 ] = 0.163
Average Recall    (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 10 ] = 0.355
Average Recall    (AR) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.365
Average Recall    (AR) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.219
Average Recall    (AR) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.450
Average Recall    (AR) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.544
[09/02 10:51:25 d2.evaluation.coco_evaluation]: Evaluation results for segm:
| AP | AP50 | AP75 | APs | APm | AP1 |
|:-----:|:-----:|:-----:|:-----:|:-----:|:-----:|
| 24.198 | 43.379 | 26.451 | 11.997 | 33.753 | 38.784 |
[09/02 10:51:25 d2.evaluation.coco_evaluation]: Per-category segm AP:
| category | AP | category | AP | category | AP |
|:-----:|:-----:|:-----:|:-----:|:-----:|:-----:|
| aeroplane | 40.207 | car | 14.769 | chair | 15.868 |
| cow | 43.465 | person | 8.808 | traffic_light | 22.069 |
```

yolov4 for 1000 instances.

Epochs 32303

Map

1. Train

calculation mAP (mean average precision)...

Detection layer: 139 - type = 28

Detection layer: 150 - type = 28

Detection layer: 161 - type = 28

1192

detections_count = 17173, unique_truth_count = 9852

class_id = 0, name = bird, ap = 85.69% (TP = 359, FP = 106)

class_id = 1, name = book, ap = 78.50% (TP = 788, FP = 199)

class_id = 2, name = bottle, ap = 95.00% (TP = 946, FP = 80)

class_id = 3, name = car, ap = 90.15% (TP = 4847, FP = 512)

class_id = 4, name = person, ap = 98.29% (TP = 976, FP = 40)

class_id = 5, name = chair, ap = 96.68% (TP = 960, FP = 50)

for conf_thresh = 0.25, precision = 0.90, recall = 0.90, F1-score = 0.90

for conf_thresh = 0.25, TP = 8876, FP = 987, FN = 976, average IoU = 77.70 %

IoU threshold = 50 %, used Area-Under-Curve for each unique Recall

mean average precision (mAP@0.50) = 0.907192, or 90.72 %

Total Detection Time: 683 Seconds

2. Test

```

calculation mAP (mean average precision)...
Detection layer: 139 - type = 28
Detection layer: 150 - type = 28
Detection layer: 161 - type = 28
180
detections_count = 2164, unique_truth_count = 1995
class_id = 0, name = bird, ap = 12.87%          (TP = 31, FP = 25)
class_id = 1, name = book, ap = 0.09%           (TP = 1, FP = 72)
class_id = 2, name = bottle, ap = 12.56%        (TP = 39, FP = 50)
class_id = 3, name = car, ap = 4.83%            (TP = 126, FP = 294)
class_id = 4, name = chair, ap = 11.40%         (TP = 27, FP = 59)
class_id = 5, name = person, ap = 4.13%         (TP = 12, FP = 63)

for conf_thresh = 0.25, precision = 0.30, recall = 0.12, F1-score = 0.17
for conf_thresh = 0.25, TP = 236, FP = 563, FN = 1759, average IoU = 24.12 %

IoU threshold = 50 %, used Area-Under-Curve for each unique Recall
mean average precision (mAP@0.50) = 0.076448, or 7.64 %
Total Detection Time: 103 Seconds

```

Pp-yolo for 1000 instances

```

DONE (t=0.77s)
creating index...
index created!
Running per image evaluation...
Evaluate annotation type *bbox*
DONE (t=7.72s).
Accumulating evaluation results...
DONE (t=1.40s).
Average Precision (AP) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.039
Average Precision (AP) @[ IoU=0.50 | area= all | maxDets=100 ] = 0.111
Average Precision (AP) @[ IoU=0.75 | area= all | maxDets=100 ] = 0.017
Average Precision (AP) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.037
Average Precision (AP) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.051
Average Precision (AP) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.031
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 1 ] = 0.047
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 10 ] = 0.147
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.210
Average Recall (AR) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.160
Average Recall (AR) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.260
Average Recall (AR) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.243
[08/14 05:42:22] ppdet.metrics.coco_utils INFO: Per-category of bbox AP:
+-----+-----+-----+-----+
| category | AP | category | AP | category | AP |
+-----+-----+-----+-----+
| bird | 0.011 | book | 0.015 | bottle | 0.124 |
| car | 0.002 | chair | 0.016 | person | 0.064 |
+-----+-----+-----+-----+
[08/14 05:42:22] ppdet.metrics.coco_utils INFO: per-category PR curve has output to bbox_pr_curve folder.
[08/14 05:42:23] ppdet.engine INFO: Total sample number: 1093, average FPS: 13.546782759184328

```