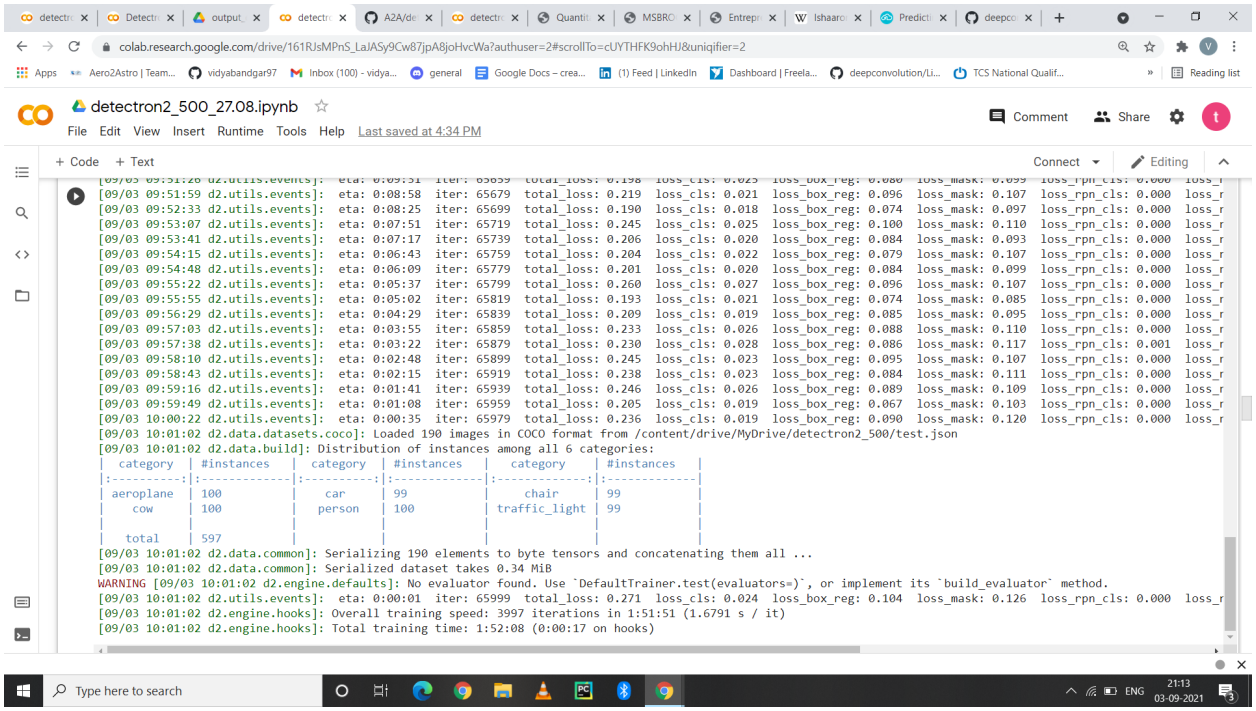
Work report

3 Sep 2021

Detectron2 for 500 instances
Deformable convolution (3x and 42.7 box AP)



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   |  APl   |
|:------:|:------:|:------:|:------:|:------:|:------:|
| 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   |  APl   |
|:------:|:------:|:------:|:------:|:------:|:------:|
| 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

```
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, averge FPS: 13.546782759184328
```