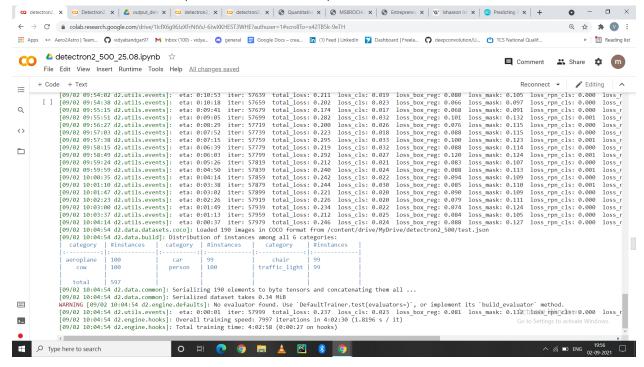# Work report

2 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 ] = 0.684
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

3. Inference:

```
[09/02 10:50:11 d2.evaluation.evaluator]: Inference done 11/190. 0.3727 s / img. ETA=0:01:08
[09/02 10:50:16 d2.evaluation.evaluator]: Inference done 24/190. 0.3886 s / img. ETA=0:01:05
[09/02 10:50:22 d2.evaluation.evaluator]: Inference done 37/190. 0.3954 s / img. ETA=0:01:01
[09/02 10:50:27 d2.evaluation.evaluator]: Inference done 50/190. 0.3968 s / img. ETA=0:00:56
[09/02 10:50:32 d2.evaluation.evaluator]: Inference done 63/190. 0.3950 s / img. ETA=0:00:51
[09/02 10:50:37 d2.evaluation.evaluator]: Inference done 76/190. 0.3966 s / img. ETA=0:00:46
[09/02 10:50:43 d2.evaluation.evaluator]: Inference done 89/190. 0.3974 s / img. ETA=0:00:40
[09/02 10:50:48 d2.evaluation.evaluator]: Inference done 102/190. 0.3963 s / img. ETA=0:00:35
[09/02 10:50:53 d2.evaluation.evaluator]: Inference done 115/190. 0.3965 s / img. ETA=0:00:30
[09/02 10:50:58 d2.evaluation.evaluator]: Inference done 128/190. 0.3965 s / img. ETA=0:00:25
[09/02 10:51:04 d2.evaluation.evaluator]: Inference done 141/190. 0.3970 s / img. ETA=0:00:19
[09/02 10:51:09 d2.evaluation.evaluator]: Inference done 154/190. 0.3952 s / img. ETA=0:00:14
[09/02 10:51:14 d2.evaluation.evaluator]: Inference done 167/190. 0.3950 s / img. ETA=0:00:09
[09/02 10:51:19 d2.evaluation.evaluator]: Inference done 180/190. 0.3954 s / img. ETA=0:00:04
[09/02 10:51:23 d2.evaluation.evaluator]: Total inference time: 0:01:14.438052 (0.402368 s / img per device, on 1 devices)
[09/02 10:51:23 d2.evaluation.evaluator]: Total inference pure compute time: 0:01:13 (0.394828 s / img per device, on 1 devices)
[09/02 10:51:23 d2.evaluation.coco_evaluation]: Preparing results for COCO format ...
[09/02 10:51:23 d2.evaluation.coco_evaluation]: Saving results to /content/drive/MyDrive/detectron2_500/output_detect/coco_instances_results.json
```

Evaluation:(01.09.2021)

1. Train evaluation:

```
Average Precision  (AP) @[ IoU=0.50:0.95 | area=   all | maxDets=100 ] = 0.671
Average Precision  (AP) @[ IoU=0.50      | area=   all | maxDets=100 ] = 0.965
Average Precision  (AP) @[ IoU=0.75      | area=   all | maxDets=100 ] = 0.802
Average Precision  (AP) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.608
Average Precision  (AP) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.707
Average Precision  (AP) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.834
Average Recall     (AR) @[ IoU=0.50:0.95 | area=   all | maxDets=  1 ] = 0.281
Average Recall     (AR) @[ IoU=0.50:0.95 | area=   all | maxDets= 10 ] = 0.717
Average Recall     (AR) @[ IoU=0.50:0.95 | area=   all | maxDets=100 ] = 0.742
Average Recall     (AR) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.677
Average Recall     (AR) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.776
Average Recall     (AR) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.874
[09/01 07:45:21 d2.evaluation.coco_evaluation]: Evaluation results for segm:
```

AP	AP50	AP75	APs	APm	APl
67.112	96.515	80.231	60.784	70.737	83.417

```
[09/01 07:45:21 d2.evaluation.coco_evaluation]: Per-category segm AP:
```

category	AP	category	AP	category	AP
aeroplane	69.001	car	70.164	chair	64.822
cow	64.355	person	65.236	traffic_light	69.094

2. Test evaluation:

```
Average Precision  (AP) @[ IoU=0.50:0.95 | area=   all | maxDets=100 ] = 0.239
Average Precision  (AP) @[ IoU=0.50      | area=   all | maxDets=100 ] = 0.433
Average Precision  (AP) @[ IoU=0.75      | area=   all | maxDets=100 ] = 0.255
Average Precision  (AP) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.113
Average Precision  (AP) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.322
Average Precision  (AP) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.399
Average Recall     (AR) @[ IoU=0.50:0.95 | area=   all | maxDets=  1 ] = 0.160
Average Recall     (AR) @[ IoU=0.50:0.95 | area=   all | maxDets= 10 ] = 0.354
Average Recall     (AR) @[ IoU=0.50:0.95 | area=   all | maxDets=100 ] = 0.363
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 ] = 0.432
Average Recall     (AR) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.548
[09/01 07:39:43 d2.evaluation.coco_evaluation]: Evaluation results for segm:
```

AP	AP50	AP75	APs	APm	APl
23.905	43.314	25.529	11.302	32.250	39.914

```
[09/01 07:39:43 d2.evaluation.coco_evaluation]: Per-category segm AP:
```

category	AP	category	AP	category	AP
aeroplane	38.574	car	13.750	chair	17.007
cow	41.265	person	10.261	traffic_light	22.571

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=0.973)
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
```