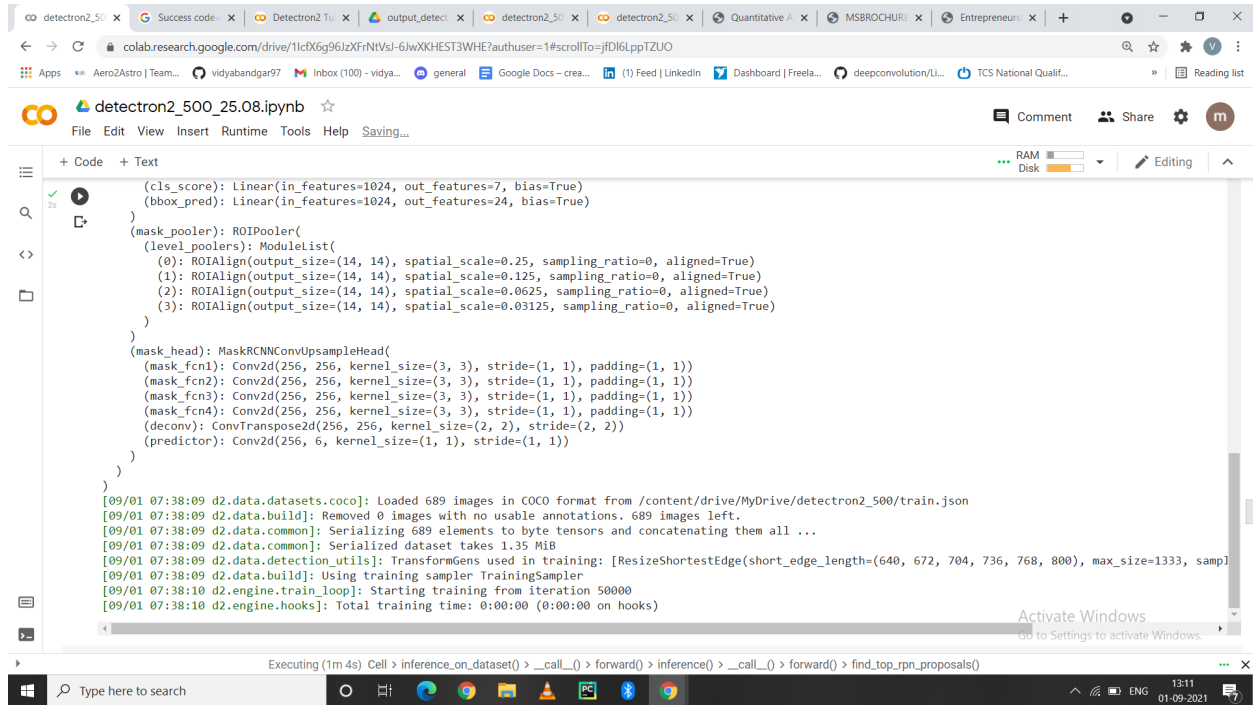


Work report

1 sep 2021

Detectron2 for 500 instances

Deformable convolution (3x and 42.7 box AP)



```
(cls_score): Linear(in_features=1024, out_features=7, bias=True)
(bbox_pred): Linear(in_features=1024, out_features=24, bias=True)
(mask_pooler): ROIAlign(
  (level_pools): ModuleList(
    (0): ROIAlign(output_size=(14, 14), spatial_scale=0.25, sampling_ratio=0, aligned=True)
    (1): ROIAlign(output_size=(14, 14), spatial_scale=0.125, sampling_ratio=0, aligned=True)
    (2): ROIAlign(output_size=(14, 14), spatial_scale=0.0625, sampling_ratio=0, aligned=True)
    (3): ROIAlign(output_size=(14, 14), spatial_scale=0.03125, sampling_ratio=0, aligned=True)
  )
)
(mask_head): MaskRCNNConvUpsampleHead(
  (mask_fc1): Conv2d(256, 256, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
  (mask_fc2): Conv2d(256, 256, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
  (mask_fc3): Conv2d(256, 256, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
  (mask_fc4): Conv2d(256, 256, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
  (deconv): ConvTranspose2d(256, 256, kernel_size=(2, 2), stride=(2, 2))
  (predictor): Conv2d(256, 6, kernel_size=(1, 1), stride=(1, 1))
)
)
)
[09/01 07:38:09 d2.data.datasets.coco]: Loaded 689 images in COCO format from /content/drive/MyDrive/detectron2_500/train.json
[09/01 07:38:09 d2.data.build]: Removed 0 images with no usable annotations. 689 images left.
[09/01 07:38:09 d2.data.common]: Serializing 689 elements to byte tensors and concatenating them all ...
[09/01 07:38:09 d2.data.common]: Serialized dataset takes 1.35 MiB
[09/01 07:38:09 d2.data.detection_utils]: TransformGens used in training: [ResizeShortestEdge(short_edge_length=(640, 672, 704, 736, 768, 800), max_size=1333, samp)]
[09/01 07:38:09 d2.data.build]: Using training sampler TrainingSampler
[09/01 07:38:10 d2.engine.train_loop]: Starting training from iteration 50000
[09/01 07:38:10 d2.engine.hooks]: Total training time: 0:00:00 (0:00:00 on hooks)
```

1. Train evaluation:

Metric	IoU	area	maxDets	Value
Average Precision (AP)	@ [IoU=0.50:0.95]	all	maxDets=100	0.671
Average Precision (AP)	@ [IoU=0.50]	all	maxDets=100	0.965
Average Precision (AP)	@ [IoU=0.75]	all	maxDets=100	0.802
Average Precision (AP)	@ [IoU=0.50:0.95]	small	maxDets=100	0.608
Average Precision (AP)	@ [IoU=0.50:0.95]	medium	maxDets=100	0.707
Average Precision (AP)	@ [IoU=0.50:0.95]	large	maxDets=100	0.834
Average Recall (AR)	@ [IoU=0.50:0.95]	all	maxDets= 1	0.281
Average Recall (AR)	@ [IoU=0.50:0.95]	all	maxDets= 10	0.717
Average Recall (AR)	@ [IoU=0.50:0.95]	all	maxDets=100	0.742
Average Recall (AR)	@ [IoU=0.50:0.95]	small	maxDets=100	0.677
Average Recall (AR)	@ [IoU=0.50:0.95]	medium	maxDets=100	0.776
Average Recall (AR)	@ [IoU=0.50:0.95]	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

3.

4. Inference:

```
[09/01 07:38:26 d2.evaluation.evaluator]: Start inference on 190 images
[09/01 07:38:31 d2.evaluation.evaluator]: Inference done 11/190. 0.3652 s / img. ETA=0:01:06
[09/01 07:38:36 d2.evaluation.evaluator]: Inference done 24/190. 0.3776 s / img. ETA=0:01:04
[09/01 07:38:41 d2.evaluation.evaluator]: Inference done 37/190. 0.3845 s / img. ETA=0:00:59
[09/01 07:38:46 d2.evaluation.evaluator]: Inference done 50/190. 0.3857 s / img. ETA=0:00:55
[09/01 07:38:51 d2.evaluation.evaluator]: Inference done 63/190. 0.3839 s / img. ETA=0:00:49
[09/01 07:38:56 d2.evaluation.evaluator]: Inference done 76/190. 0.3857 s / img. ETA=0:00:44
[09/01 07:39:02 d2.evaluation.evaluator]: Inference done 89/190. 0.3864 s / img. ETA=0:00:39
[09/01 07:39:07 d2.evaluation.evaluator]: Inference done 102/190. 0.3857 s / img. ETA=0:00:34
[09/01 07:39:12 d2.evaluation.evaluator]: Inference done 115/190. 0.3866 s / img. ETA=0:00:29
[09/01 07:39:17 d2.evaluation.evaluator]: Inference done 128/190. 0.3865 s / img. ETA=0:00:24
[09/01 07:39:22 d2.evaluation.evaluator]: Inference done 141/190. 0.3870 s / img. ETA=0:00:19
[09/01 07:39:28 d2.evaluation.evaluator]: Inference done 155/190. 0.3855 s / img. ETA=0:00:13
[09/01 07:39:33 d2.evaluation.evaluator]: Inference done 168/190. 0.3857 s / img. ETA=0:00:08
[09/01 07:39:38 d2.evaluation.evaluator]: Inference done 181/190. 0.3861 s / img. ETA=0:00:03
[09/01 07:39:41 d2.evaluation.evaluator]: Total inference time: 0:01:12.868909 (0.393886 s / img per device, on 1 devices)
[09/01 07:39:41 d2.evaluation.evaluator]: Total inference pure compute time: 0:01:11 (0.385610 s / img per device, on 1 devices)
```

Evaluation:(31.08.2021)

1. Train evaluation:

```
-----
Average Precision (AP) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.664
Average Precision (AP) @[ IoU=0.50      | area= all | maxDets=100 ] = 0.967
Average Precision (AP) @[ IoU=0.75      | area= all | maxDets=100 ] = 0.795
Average Precision (AP) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.596
Average Precision (AP) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.702
Average Precision (AP) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.826
Average Recall    (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 1 ] = 0.279
Average Recall    (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 10 ] = 0.710
Average Recall    (AR) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.734
Average Recall    (AR) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.664
Average Recall    (AR) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.770
Average Recall    (AR) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.868
```

[08/31 07:34:27 d2.evaluation.coco_evaluation]: Evaluation results for segm:

AP	AP50	AP75	APs	APm	APl
66.407	96.671	79.457	59.637	70.234	82.630

[08/31 07:34:27 d2.evaluation.coco_evaluation]: Per-category segm AP:

category	AP	category	AP	category	AP
aeroplane	68.636	car	68.759	chair	64.207
cow	62.719	person	65.339	traffic_light	68.784

2. Test evaluation:

```
Average Precision (AP) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.245
Average Precision (AP) @[ IoU=0.50      | area= all | maxDets=100 ] = 0.438
Average Precision (AP) @[ IoU=0.75      | area= all | maxDets=100 ] = 0.259
Average Precision (AP) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.122
Average Precision (AP) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.326
Average Precision (AP) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.378
Average Recall    (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 1 ] = 0.165
Average Recall    (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 10 ] = 0.369
Average Recall    (AR) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.378
Average Recall    (AR) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.242
Average Recall    (AR) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.453
Average Recall    (AR) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.535
```

[08/31 07:18:10 d2.evaluation.coco_evaluation]: Evaluation results for segm:

AP	AP50	AP75	APs	APm	APl
24.542	43.779	25.920	12.187	32.577	37.775

[08/31 07:18:10 d2.evaluation.coco_evaluation]: Per-category segm AP:

category	AP	category	AP	category	AP
aeroplane	39.863	car	15.229	chair	17.772
cow	39.277	person	11.053	traffic_light	24.057

5.

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] ppydet.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] ppydet.metrics.coco_utils INFO: per-category PR curve has output to bbox_pr_curve folder.
[08/14 05:42:23] ppydet.engine INFO: Total sample number: 1093, average FPS: 13.546782759184328

```