

## Aero2Astro

Panneerselvam N

(17/08/2021)

I had trained pp\_yolo v2 model upto 1711 epochs. The minimum loss is 18 and it's still fluctuates in between 18 to 30.

Evaluated with both training and test datasets, the mAP is **decreased** with compared to previous checkpoints. I think model tries to overfit, because training mAP keep increasing , but test mAP starts decreasing.

**Previous model Evaluation Result (PP -Yolo v1 1000 ins , bs = 4, lr = 0.0002)**

### Training Data:

```
Accumulating evaluation results...
DONE (t=0.85s).
Average Precision (AP) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.454
Average Precision (AP) @[ IoU=0.50 | area= all | maxDets=100 ] = 0.751
Average Precision (AP) @[ IoU=0.75 | area= all | maxDets=100 ] = 0.499
Average Precision (AP) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.359
Average Precision (AP) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.588
Average Precision (AP) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.579
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 1 ] = 0.173
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 10 ] = 0.479
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.580
Average Recall (AR) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.498
Average Recall (AR) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.699
Average Recall (AR) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.710
[08/15 07:11:53] ppdet.metrics.coco_utils INFO: Per-category of bbox AP:
+-----+-----+-----+-----+-----+
| category | AP | category | AP | category | AP |
+-----+-----+-----+-----+-----+
| bird | 0.451 | book | 0.315 | bottle | 0.601 |
| car | 0.173 | chair | 0.616 | person | 0.567 |
+-----+-----+-----+-----+-----+
[08/15 07:11:53] ppdet.metrics.coco_utils INFO: per-category PR curve has output to bbox
[08/15 07:11:53] ppdet.engine INFO: Total sample number: 1093, average FPS: 18.4354342262
```

### Test Data:

```
Accumulating evaluation results...
DONE (t=0.15s).
Average Precision (AP) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.056
Average Precision (AP) @[ IoU=0.50 | area= all | maxDets=100 ] = 0.113
Average Precision (AP) @[ IoU=0.75 | area= all | maxDets=100 ] = 0.049
Average Precision (AP) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.044
Average Precision (AP) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.066
Average Precision (AP) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.130
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 1 ] = 0.051
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 10 ] = 0.134
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.179
Average Recall (AR) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.144
Average Recall (AR) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.231
Average Recall (AR) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.201
[08/13 14:25:45] ppdet.metrics.coco_utils INFO: Per-category of bbox AP:
+-----+-----+-----+-----+-----+
| category | AP | category | AP | category | AP |
+-----+-----+-----+-----+-----+
| bird | 0.146 | book | 0.007 | bottle | 0.175 |
| car | 0.007 | person | 0.000 | chair | 0.000 |
+-----+-----+-----+-----+-----+
[08/13 14:25:45] ppdet.metrics.coco_utils INFO: per-category PR curve has output to bbox_pr_curve folder.
[08/13 14:25:45] ppdet.engine INFO: Total sample number: 177, average FPS: 18.61171957113853
```

## Current Model(PP-yolo v2 500 ins , bs=8, lr=0.0002)

### Previous Chekpoints: (at 1455 epochs)

#### Training Data :

```
Accumulating evaluation results...
DONE (t=0.70s).
Average Precision (AP) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.572
Average Precision (AP) @[ IoU=0.50 | area= all | maxDets=100 ] = 0.926
Average Precision (AP) @[ IoU=0.75 | area= all | maxDets=100 ] = 0.641
Average Precision (AP) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.478
Average Precision (AP) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.681
Average Precision (AP) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.705
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 1 ] = 0.248
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 10 ] = 0.627
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.706
Average Recall (AR) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.616
Average Recall (AR) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.788
Average Recall (AR) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.827
[08/15 07:17:04] ppdet.metrics.coco_utils INFO: Per-category of bbox AP:
+-----+-----+-----+-----+-----+
| category | AP | category | AP | category | AP |
+-----+-----+-----+-----+-----+
| aeroplane | 0.632 | car | 0.546 | chair | 0.587 |
| cow | 0.639 | person | 0.553 | traffic_light | 0.477 |
+-----+-----+-----+-----+-----+
[08/15 07:17:04] ppdet.metrics.coco_utils INFO: per-category PR curve has output to bbox_pr_curve folder.
[08/15 07:17:04] ppdet.engine INFO: Total sample number: 689, average FPS: 11.891761248375017
```

#### Test Data :

```
Evaluate annotation type *bbox*
DONE (t=1.68s).
Accumulating evaluation results...
DONE (t=0.20s).
Average Precision (AP) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.194
Average Precision (AP) @[ IoU=0.50 | area= all | maxDets=100 ] = 0.368
Average Precision (AP) @[ IoU=0.75 | area= all | maxDets=100 ] = 0.173
Average Precision (AP) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.121
Average Precision (AP) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.256
Average Precision (AP) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.318
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 1 ] = 0.140
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 10 ] = 0.335
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.413
Average Recall (AR) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.267
Average Recall (AR) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.488
Average Recall (AR) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.678
[08/15 07:20:38] ppdet.metrics.coco_utils INFO: Per-category of bbox AP:
+-----+-----+-----+-----+-----+
| category | AP | category | AP | category | AP |
+-----+-----+-----+-----+-----+
| aeroplane | 0.346 | car | 0.103 | chair | 0.117 |
| cow | 0.358 | person | 0.068 | traffic_light | 0.171 |
+-----+-----+-----+-----+-----+
[08/15 07:20:38] ppdet.metrics.coco_utils INFO: per-category PR curve has output to bbox_pr_c
[08/15 07:20:38] ppdet.engine INFO: Total sample number: 190, average FPS: 4.517461871323083
```



## Current Checkpoints :(at 1711 epochs)

### Training Data :

```
Accumulating evaluation results...
DONE (t=0.64s).
Average Precision (AP) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.622
Average Precision (AP) @[ IoU=0.50 | area= all | maxDets=100 ] = 0.944
Average Precision (AP) @[ IoU=0.75 | area= all | maxDets=100 ] = 0.730
Average Precision (AP) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.538
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 ] = 0.738
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 1 ] = 0.260
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 10 ] = 0.670
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.739
Average Recall (AR) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.662
Average Recall (AR) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.820
Average Recall (AR) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.848
[08/17 12:37:24] ppdet.metrics.coco_utils INFO: Per-category of bbox AP:
+-----+-----+-----+-----+-----+
| category | AP   | category | AP   | category | AP   |
+-----+-----+-----+-----+-----+
| aeroplane | 0.704 | car      | 0.584 | chair    | 0.644 |
| cow       | 0.676 | person   | 0.601 | traffic_light | 0.522 |
+-----+-----+-----+-----+-----+
[08/17 12:37:24] ppdet.metrics.coco_utils INFO: per-category PR curve has output to bbox_pr_curve
[08/17 12:37:24] ppdet.engine INFO: Total sample number: 689, average FPS: 11.880296439736922
```

### Test data :

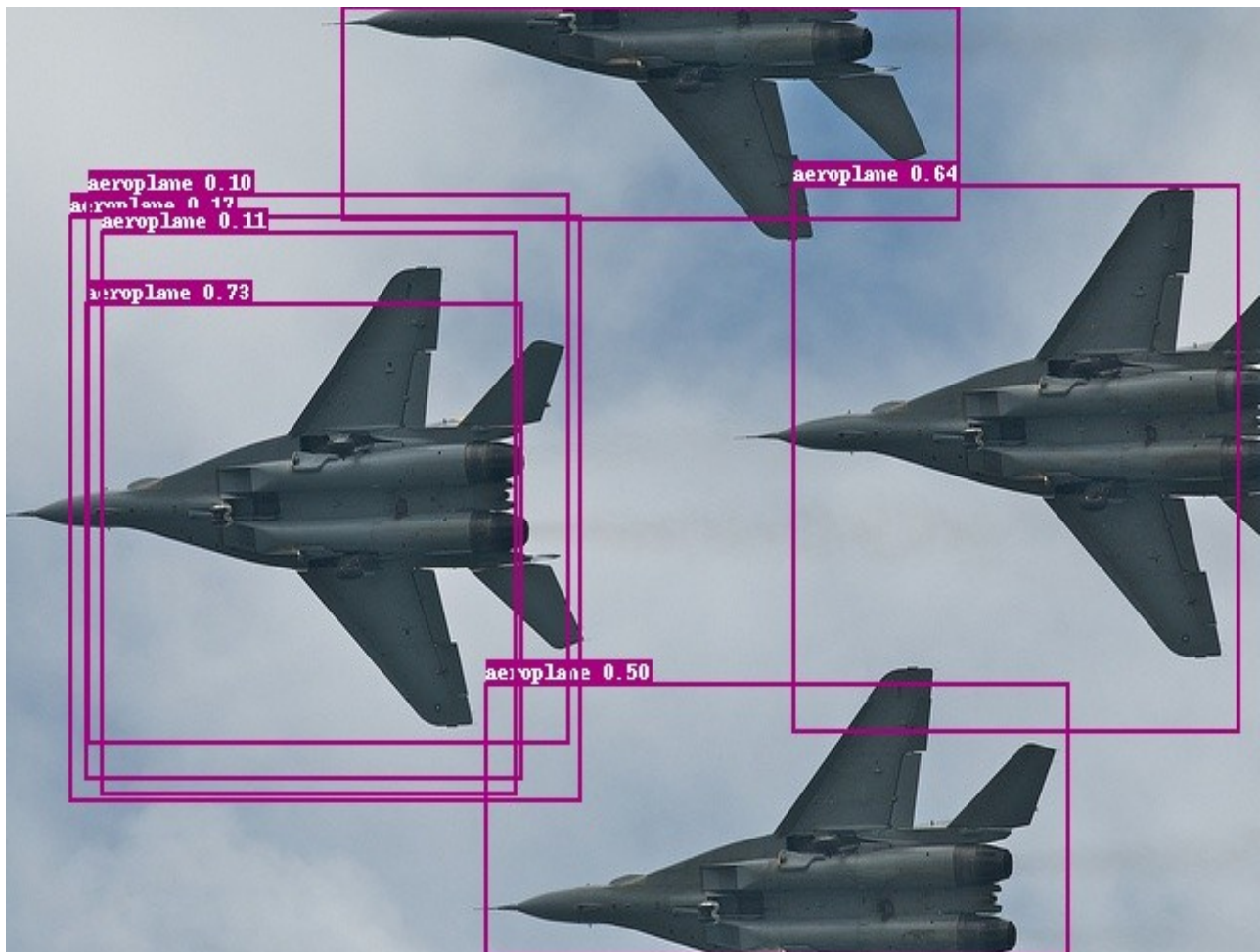
```
Accumulating evaluation results...
DONE (t=0.20s).
Average Precision (AP) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.191
Average Precision (AP) @[ IoU=0.50 | area= all | maxDets=100 ] = 0.362
Average Precision (AP) @[ IoU=0.75 | area= all | maxDets=100 ] = 0.167
Average Precision (AP) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.117
Average Precision (AP) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.257
Average Precision (AP) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.307
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 1 ] = 0.137
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 10 ] = 0.334
Average Recall (AR) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.409
Average Recall (AR) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.259
Average Recall (AR) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.490
Average Recall (AR) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.643
[08/17 12:34:19] ppdet.metrics.coco_utils INFO: Per-category of bbox AP:
+-----+-----+-----+-----+-----+
| category | AP   | category | AP   | category | AP   |
+-----+-----+-----+-----+-----+
| aeroplane | 0.343 | car      | 0.100 | chair    | 0.132 |
| cow       | 0.352 | person   | 0.055 | traffic_light | 0.164 |
+-----+-----+-----+-----+-----+
[08/17 12:34:19] ppdet.metrics.coco_utils INFO: per-category PR curve has output to bbox_pr_curve
[08/17 12:34:19] ppdet.engine INFO: Total sample number: 190, average FPS: 5.877382970685596
```

## Model Inference Speed:(test data)

```
save_result to: output/images/000000119911.jpg  
class_id:5, confidence:0.8260, left_top:[98.94,50.00],right_bottom:[155.39,197.71]  
class_id:5, confidence:0.6252, left_top:[99.31,355.17],right_bottom:[128.85,409.25]  
save_result to: output/images/COCO_val2014_000000304240.jpg  
----- Inference Time Info -----  
total_time(ms): 855505.3, img_num: 229  
average latency time(ms): 3735.83, QPS: 0.267678  
preprocess_time(ms): 82.20, inference_time(ms): 3653.60, postprocess_time(ms): 0.00
```

## Detection result:

Threshold = 0.1











Notebook link :

[https://github.com/Panneer003/Aero2astro\\_code/blob/main/PP\\_Yolo\\_with\\_official/pp\\_yolo\\_v2\\_1711\\_epochs\\_500ins.ipynb](https://github.com/Panneer003/Aero2astro_code/blob/main/PP_Yolo_with_official/pp_yolo_v2_1711_epochs_500ins.ipynb)