**NIA Project**

YOLOv4 Object Detection model is implemented by the NIA Project. The YOLOv4 model has been applied to 506,396 trained images and 62,568 valid images in the NIA project. We have already implemented the latest updated weight file (construction\_final\_best.weights) to execute the evaluation results.

**Here is the commands for docker file execution in Yolov4:**

**1. zip 파일 압축 풀기**

**2. 도커 이미지 로드**

docker load -i docker-darknet\_yolo.tar

**3. 도커 실행(컨테이너)**

docker run --rm -it --ipc=host --net=host --gpus all --shm-size=8gb -v D:\docker-darknet-yolov3-yolov4-training-test

4. 도커 컨테이너 ID 복사

**5. 도커 일시정지 후 프롬프트로 복귀**

ctrl+p+q

**6. 데이터셋 복사**

docker cp D:\docker-darknet-yolov3-yolov4-training-test\construction\_final <Container ID>:darknet/

**7. 웨이트값(pth) 복사**

docker cp work\_dirs <컨테이너 ID>:/docker-darknet\_yolo/

**8. 설정파일 복사**

docker cp configs <컨테이너 ID>:/docker-darknet\_yolo/

**9. 도커 컨테이너 복귀**

docker exec -it <Container ID> /bin/bash

**10. 모델 트레이닝**

(gpu 1개)

./darknet detector train ./construction\_final/construction\_final.data ./ construction\_final/construction\_final.cfg yolov4.weights -map -dont\_show -clear

**12. 학습된 모델 활용 testset 결과 확인**

* (mAP 산출)./darknet detector test ./construction\_final/construction\_final.data ./construction\_final/construction\_final.cfg ./construction\_final/construction\_final\_best.weights data/example\_img.jpg -dont\_show
* (mAP Evaluation results)./darknet detector map ./construction\_final/construction\_final.data ./construction\_final/construction\_final.cfg ./construction\_final/construction\_final\_best.weights

In evaluation results, there are 66 classes for NIA project. Here is the list:

|  |  |  |  |
| --- | --- | --- | --- |
| **Class\_id** | **Name** | **AP** | **(TP, FP)** |
| 0 | SO-01 | 99.98% | TP=6463, FP =57 |
| 1 | SO-02 | 99.91% | TP=5767, FP= 268 |
| 2 | SO-03 | 100.0% | TP=654, FP=0 |
| 3 | SO-04 | 99.6% | TP=2718, FP=80 |
| 4 | SO-05 | 100.0% | TP=728, FP =19 |
| 5 | SO-06 | 99.27% | TP=1030,FP=51 |
| 6 | SO-07 | 99.98% | TP=1484, FP=6 |
| 7 | SO-08 | 99.65% | TP=516, FP=28 |
| 8 | SO-09 | 96.80% | TP= 1591, FP =157 |
| 9 | SO-10 | 96.53% | TP =2396, FP=262 |
| 10 | SO-11 | 92.06% | TP=612, FP =118 |
| 11 | SO-12 | 88.69% | TP =1548, FP=330 |
| 12 | SO-14 | 95.84% | TP = 2581, FP=417 |
| 13 | SO-15 | 88.23% | TP = 813, FP =192 |
| 14 | SO-18 | 94.88% | TP =127, FP =32 |
| 15 | SO-19 | 97.78% | TP = 655, FP =62 |
| 16 | SO-20 | 97.59% | TP =867, FP =91 |
| 17 | SO-22 | 80.35% | TP = 866, FP =309 |
| 18 | SO-23 | 0.0% | TP = 0, FP =0 |
| 19 | SO-24 | 93.58% | TP = 3556, FP = 534 |
| 20 | SO-25 | 90.56% | TP = 1119, FP=311 |
| 21 | SO-26 | 96.32% | TP = 1634, FP= 87 |
| 22 | SO-27 | 93.52% | TP = 12 , FP =0 |
| 23 | SO-29 | 95.73% | TP = 641, FP = 114 |
| 24 | UA-01 | 99.99% | TP = 4022, FP = 412 |
| 25 | UA-02 | 100.0% | TP = 4050, FP = 72 |
| 26 | UA-03 | 100.0% | TP = 4008, FP = 3 |
| 27 | UA-04 | 99.97% | TP = 2942, FP=1 |
| 28 | UA-05 | 100.0% | TP = 748, FP = 22 |
| 29 | UA-07 | 100.0% | TP =822, FP =5 |
| 30 | UA-08 | 100.0% | TP = 750, FP =0 |
| 31 | UA-09 | 100.0% | TP = 780, FP = 0 |
| 32 | UA-11 | 100.0% | TP = 1033, FP =0 |
| 33 | UA-13 | 100.0% | TP = 1906, FP =0 |
| 34 | UA-14 | 100.0% | TP =974, FP =3 |
| 35 | UA-15 | 100.0% | TP =784, FP = 1 |
| 36 | UA-17 | 100.0% | TP = 397, FP = 1 |
| 37 | UA-18 | 100.0% | TP =387, FP =0 |
| 38 | UA-19 | 100.0% | TP = 486, FP =0 |
| 39 | UA-20 | 100.0% | TP = 389, FP =0 |
| 40 | UA-21 | 100.0% | TP =353, FP = 0 |
| 41 | UA-23 | 100.0% | TP = 1085, FP =4 |
| 42 | UA-25 | 99.91% | TP = 1081, FP =0 |
| 43 | UA-26 | 100.0% | TP =1160, FP =0 |
| 44 | UA-27 | 99.91% | TP = 1125, FP =1 |
| 45 | UA-30 | 99.92% | TP = 1220, FP =5 |
| 46 | UC-01 | 99.08% | TP = 1654, FP =180 |
| 47 | UC-02 | 100.0% | TP = 739, FP =1 |
| 48 | UC-03 | 99.88% | TP = 807, FP =0 |
| 49 | UC-04 | 99.89 | TP = 918, FP =0 |
| 50 | UC-05 | 99.83% | TP = 1817, FP =33 |
| 51 | UC-06 | 100.0% | TP = 906, FP =0 |
| 52 | UC-07 | 100.0% | TP =217, FP = 0 |
| 53 | UC-08 | 99.21% | TP = 236, FP =1 |
| 54 | UC-09 | 100.0% | TP =746, FP = 4 |
| 55 | UC-10 | 99.86% | TP = 729, FP= 1 |
| 56 | UC-11 | 99.86% | TP = 660, FP = 89 |
| 57 | UC -12 | 99.77% | TP = 744, FP =1 |
| 58 | WO-01 | 99.91% | TP = 13545, FP =228 |
| 59 | WO-03 | 99.93% | TP= 2515, FP=0 |
| 60 | WO-04 | 99.84% | TP =2937, FP = 7 |
| 61 | WO-05 | 99.97% | TP =4055, FP=88 |
| 62 | WO-06 | 99.98% | TP=4042, FP = 676 |
| 63 | WO-07 | 99.96% | TP = 4007, FP =2 |
| 64 | WO-08 | 99.95% | TP = 3960, FP =2 |
| 65 | WO-09 | 99.72% | TP =1075, FP =0 |

For conf\_thresh =0.25, precision =0.96, recall =0.98, F1-score =0.97

For conf\_thresh =0.25, TP = 115198, FP= 5368, FN= 2674, average IoU = 87.72%

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

Mean average precision ([mAP@0.50](mailto:mAP@0.50)) =0.968664, OR 96.87%

Total Detection Time: 1720 seconds