



Google Developer Student Clubs
Hanyang University

ML/DL 2주차

컴퓨터소프트웨어학부 20학번 방인규

```
lookup.KeyValue  
f.constant(['em  
=tf.constant([G  
.lookup.StaticV  
_buckets=5)
```

목차

1. 목표
2. Roboflow
3. YOLO
4. 데이터 학습
5. 결과 확인
6. 이후 개발 방향

목표

- Car Space Detection
 - 실제 주차장에 필요한 서비스
 - mAP 50-95
 - FPS

Roboflow

- 컴퓨터 비전 분야 데이터 제공
- 무료 데이터셋

Annotations

Group: parking-space

CLASSES LAYERS

empty 13

occupied 48

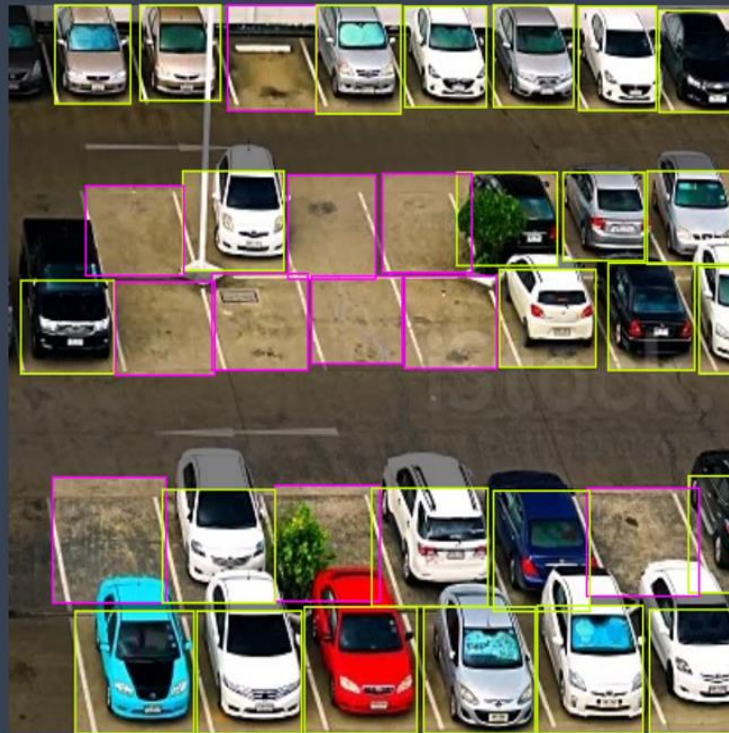
UNUSED CLASSES

car

Tags

No Tags Applied

Type and select tags below to add them to the image.



Roboflow

Car Space Find Image Dataset

VERSIONS

2023-12-07 5:42pm
v2 Dec 7, 2023

2023-12-01 9:50am
v1 Dec 1, 2023

v2 2023-12-07 5:42pm
Generated on Dec 7, 2023

Download Dataset

Popular Download Formats

YOLOv8

YOLOv5

YOLOv7

MT-YOLOv6

Pascal VOC XML

TFRecord

Other Formats

Your Download Code

Jupyter

Terminal

Raw URL

Paste this snippet into a [notebook from our model library](#) » to download and unzip [your dataset](#) »:

```
!pip install roboflow

from roboflow import RoboFlow
rf = RoboFlow(api_key="")
project = rf.workspace("tasariproject").project("car-space-find")
version = project.version(2)
dataset = version.download("yolov8")
```

Warning: Do not share this snippet beyond your team, it contains a private key that is tied to your Roboflow account. Acceptable use policy applies.


Done

Choose a Model

View All Images →

8%

TEST SET
21 Images

 Google Developer Student Clubs

YOLOv8

- You Only Look Once
- 실시간 물체 감지 및 이미지 분할 모델
- <https://github.com/ultralytics/ultralytics>

<https://docs.ultralytics.com/ko>

데이터 학습

```
!yolo task=detect mode=train model=/content/yolov8m.pt data={dataset.location}/data.yaml epochs=20 imgsz=640 plots=True
```

- 학습 데이터에서 detect 작업을 train 모드로 20 epoch 동안 학습합니다.
- 제가 선택한 Roboflow 데이터에서 학습 시간은 30분 정도 소요되었습니다.

데이터 학습

- Confusion Matrix
 - 학습 후 예측 성능을 측정하기 위해 예측 value와 실제 value를 비교하는 표
- 정밀도(Precision)
- 재현도(Recall)
- F1 Score
 - 정밀도와 재현도의 조화평균

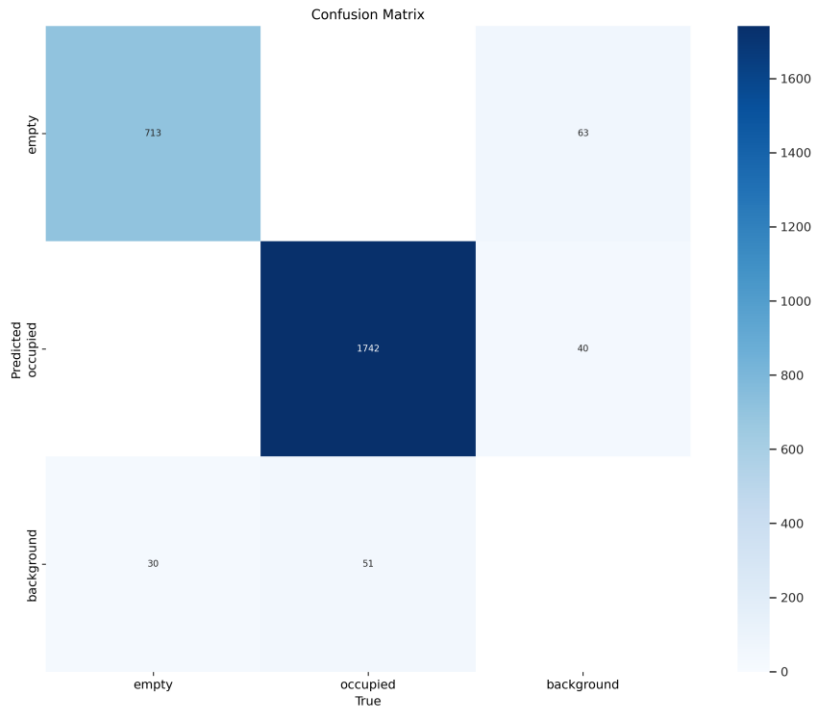
```
Precision = TP / (TP + FP)
```

```
Recall = TP / (TP + FN)
```

```
Score = 2*Precision*Recall / (Precision + Recall)
```

```
print(Score)
```

```
0.9387755102040817
```



결과 확인

- Validation

```
!yolo task=detect mode=val model=runs/detect/train/weights/best.pt data={dataset.location}/data.yaml
```

Ultralytics YOLOv8.1.38 🚀 Python-3.10.12 torch-2.2.1+cu121 CUDA:0 (Tesla T4, 15102MiB)

Model summary (fused): 218 layers, 25840918 parameters, 0 gradients, 78.7 GFLOPs

val: Scanning /content/Car-Space-Find-2/valid/labels.cache... 119 images, 1 backgrounds, 0 corrupt: 100% 119/119 [00:00<?, ?it/s]

WARNING ⚠️ Box and segment counts should be equal, but got len(segments) = 2087, len(boxes) = 2536. To resolve this only boxes will

Class	Images	Instances	Box(P	R	mAP50	mAP50-95): 100% 8/8 [00:12<00:00, 1.57s/it]
all	119	2536	0.97	0.957	0.977	0.921
empty	119	743	0.949	0.945	0.973	0.878
occupied	119	1793	0.99	0.969	0.981	0.964

Speed: 2.5ms preprocess, 23.6ms inference, 0.1ms loss, 8.1ms postprocess per image

Results saved to **runs/detect/val**

결과 확인

- Test

```
lyolo task=detect mode=predict model=runs/detect/train/weights/best.pt source={dataset.location}/test/images
```

```
Ultralytics YOLOv8.1.38 Python-3.10.12 torch-2.2.1+cu121 CUDA:0 (Tesla T4, 15102MiB)
```

```
Model summary (fused): 218 layers, 25840918 parameters, 0 gradients, 78.7 GFLOPs
```

```
image 1/21 /content/Car-Space-Find-2/test/images/2022-11-15-14-09-20_mp4-38.jpg.rf.3ad16ed293cc641721b5f749b61f51f4.jpg: 640x640 13 emptys, 3 occupieds, 37.1ms
image 2/21 /content/Car-Space-Find-2/test/images/2022-11-15-14-11-26_mp4-37.jpg.rf.f1fa47b5f7ff059824c17d5674f08de2.jpg: 640x640 3 emptys, 4 occupieds, 37.1ms
image 3/21 /content/Car-Space-Find-2/test/images/4k-time-lapse-car-parking-lot-stock-video-download-video-clip-now-istock_TyROSAGZ_mp4-117.jpg.rf.cd667d88dde2f5101086c38cd349c
image 4/21 /content/Car-Space-Find-2/test/images/4k-time-lapse-car-parking-lot-stock-video-download-video-clip-now-istock_TyROSAGZ_mp4-137.jpg.rf.80d9f694f4ced027ed0fd85205e7e
image 5/21 /content/Car-Space-Find-2/test/images/4k-time-lapse-car-parking-lot-stock-video-download-video-clip-now-istock_TyROSAGZ_mp4-219.jpg.rf.5114e592254e08f36a118a0a698966
image 6/21 /content/Car-Space-Find-2/test/images/4k-time-lapse-car-parking-lot-stock-video-download-video-clip-now-istock_TyROSAGZ_mp4-305.jpg.rf.05c5369b927e6bf3f127ccb8be48a9
image 7/21 /content/Car-Space-Find-2/test/images/4k-time-lapse-car-parking-lot-stock-video-download-video-clip-now-istock_TyROSAGZ_mp4-36.jpg.rf.8d745ea63148542721a3567ad1afdbb
image 8/21 /content/Car-Space-Find-2/test/images/4k-time-lapse-car-parking-lot-stock-video-download-video-clip-now-istock_TyROSAGZ_mp4-400.jpg.rf.41e253b3139c79d33d444b0a46272c
image 9/21 /content/Car-Space-Find-2/test/images/4k-time-lapse-car-parking-lot-stock-video-download-video-clip-now-istock_TyROSAGZ_mp4-590.jpg.rf.de6e4591189124aab581065de5fcaf
image 10/21 /content/Car-Space-Find-2/test/images/4k-time-lapse-car-parking-lot-stock-video-download-video-clip-now-istock_TyROSAGZ_mp4-609.jpg.rf.6ebdbf0a95df26ffcc09bcb16089d
image 11/21 /content/Car-Space-Find-2/test/images/4k-time-lapse-car-parking-lot-stock-video-download-video-clip-now-istock_TyROSAGZ_mp4-699.jpg.rf.0adb3e6fa7350f36ccbd8a4806239
image 12/21 /content/Car-Space-Find-2/test/images/4k-time-lapse-car-parking-lot-stock-video-download-video-clip-now-istock_TyROSAGZ_mp4-834.jpg.rf.6a0871b141642414b567e247b5f3c
image 13/21 /content/Car-Space-Find-2/test/images/4k-time-lapse-car-parking-lot-stock-video-download-video-clip-now-istock_TyROSAGZ_mp4-84.jpg.rf.c781e69b65c9a0b0f318e69dac2e33
image 14/21 /content/Car-Space-Find-2/test/images/4k-time-lapse-car-parking-lot-stock-video-download-video-clip-now-istock_TyROSAGZ_mp4-900.jpg.rf.0b32c06ce408999cbdefabea8ee7
image 15/21 /content/Car-Space-Find-2/test/images/4k-time-lapse-car-parking-lot-stock-video-download-video-clip-now-istock_TyROSAGZ_mp4-92.jpg.rf.d92a7c316e511a0fda2ebf7daaa3a0
image 16/21 /content/Car-Space-Find-2/test/images/4k-time-lapse-car-parking-lot-stock-video-download-video-clip-now-istock_TyROSAGZ_mp4-942.jpg.rf.7f080cf6e9d768ca2e55b9f2202ba
image 17/21 /content/Car-Space-Find-2/test/images/KakaoTalk_20230515_201313910_03.jpg.rf.3f51e32bf2cd9732443c8ac927b06644.jpg: 640x640 1 empty, 20.2ms
image 18/21 /content/Car-Space-Find-2/test/images/KakaoTalk_20230515_201313910_05.jpg.rf.0e3ca3f5c4c9b84865881ced3557c760.jpg: 640x640 1 empty, 20.1ms
image 19/21 /content/Car-Space-Find-2/test/images/KakaoTalk_20230515_201418099_01.jpg.rf.24db28f7cc6d26310643652f08374b25.jpg: 640x640 2 emptys, 20.0ms
image 20/21 /content/Car-Space-Find-2/test/images/KakaoTalk_20230515_201418099_08.jpg.rf.4d5d7b6e8aa84e3a67637e74010e04fb.jpg: 640x640 3 emptys, 19.7ms
image 21/21 /content/Car-Space-Find-2/test/images/KakaoTalk_20230515_201418099_12.jpg.rf.533514e3ef299d45a7348f4834343387.jpg: 640x640 1 empty, 1 occupied, 19.8ms
Speed: 1.6ms preprocess, 26.3ms inference, 28.4ms postprocess per image at shape (1, 3, 640, 640)
```

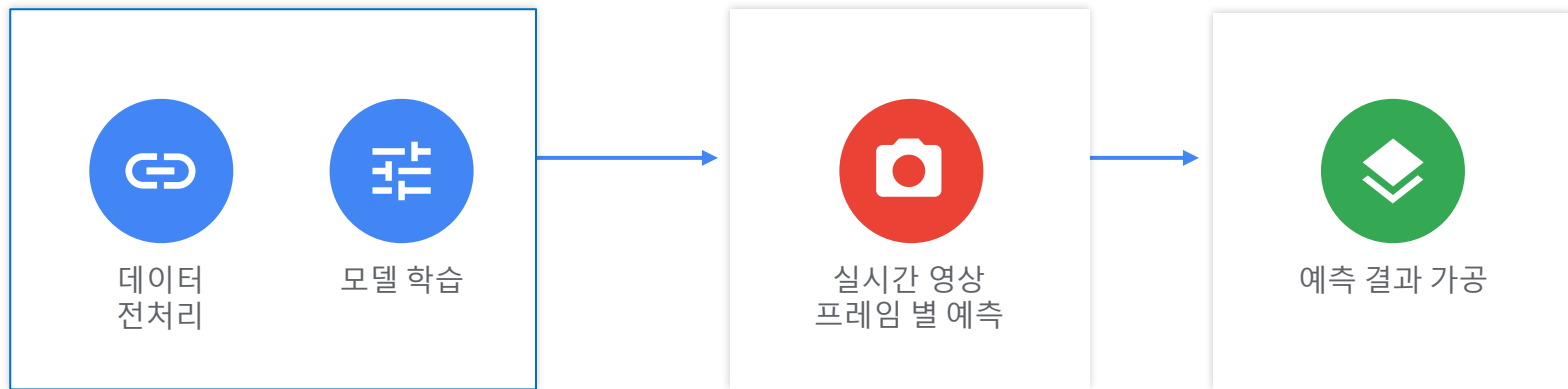


결과 확인

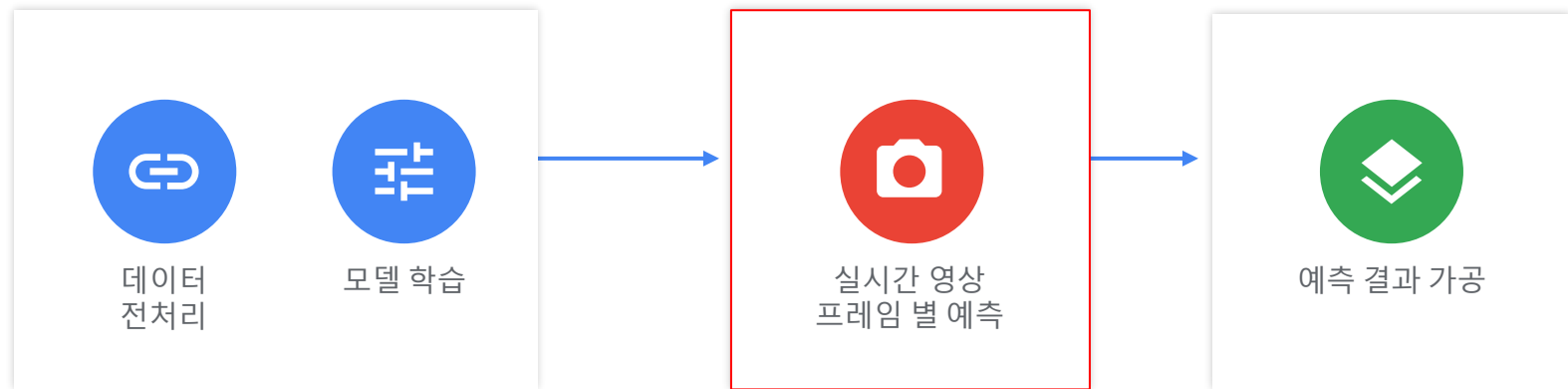
- Test



이후 개발 방향



이후 개발 방향



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  crossAxisAlignment: CrossAxisAlignment.  
  children: [  
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QnA