보행자 신호 인식

서강원 권형주 김채진

CONTENTS

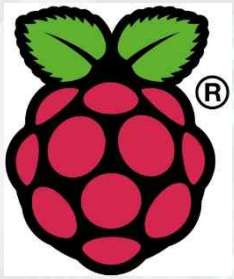
필요성

- 장애인 이동권 신장
- 인도보행 인공지능 분야 공개데이터 셋의 부족

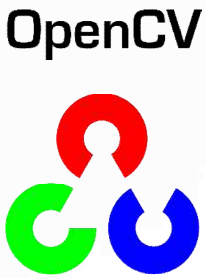
개발환경


LabelImg


python




YOLO


OpenCV


Flask

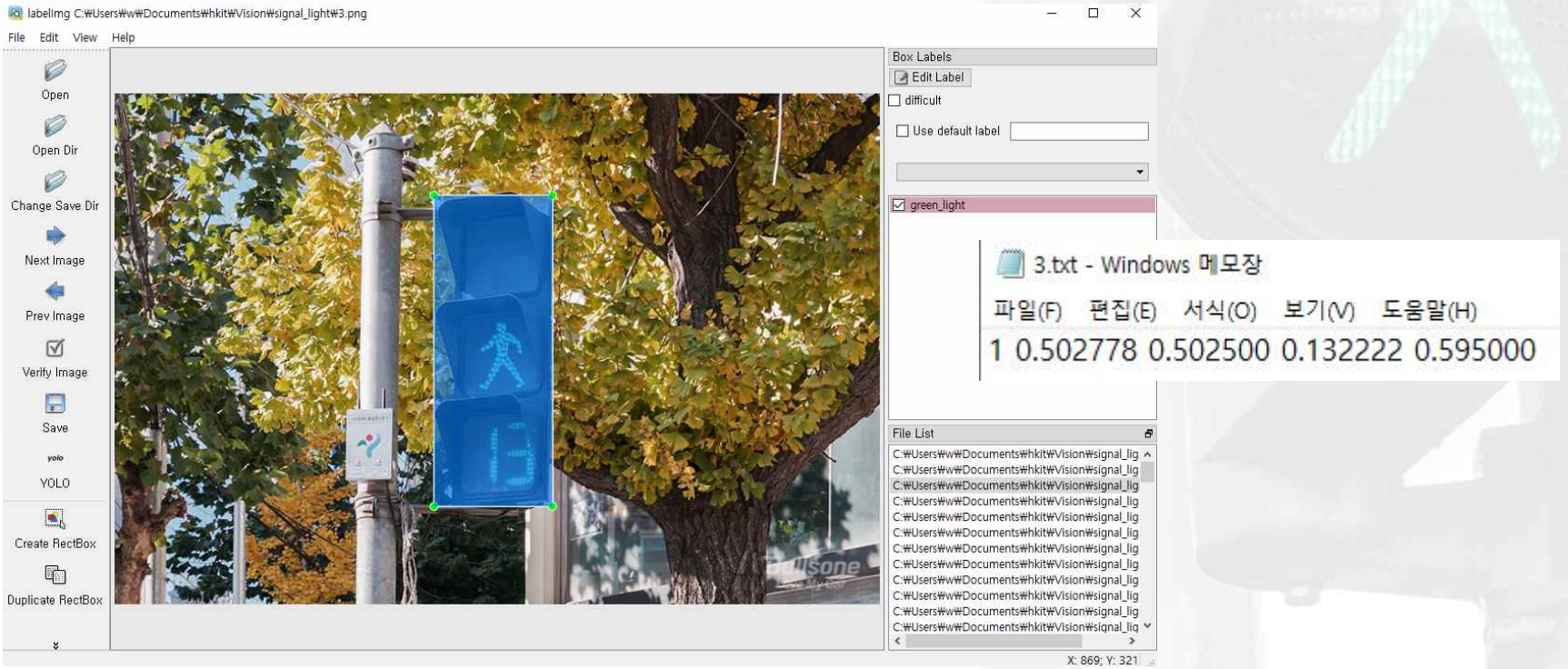

colab


Darknet


Visual Studio Code

이미지 라벨링

- python labelImg.py



트레이닝

1. Mount Google Drive

```
from google.colab import drive
drive.mount('/content/gdrive')
```

```
Mounted at /content/gdrive
```

2. Install CUDA related modules, cuDNN

```
!tar -xzvf /content/gdrive/MyDrive/darknet/cuDNN/cudnn-10.1-linux-x64-v7.6.5.32.tgz -C /usr/local/
!chmod a+r /usr/local/cuda/include/cudnn.h

!cat /usr/local/cuda/include/cudnn.h | grep CUDNN_MAJOR -A 2
```

3. Install DarkNet

```
!git clone https://github.com/kriyeng/darknet/
%cd darknet

!git checkout feature/google-colab

!make
```

```
import os
if not os.path.exists('/content/gdrive/MyDrive/darknet/bin'):
    os.makedirs('/content/gdrive/MyDrive/darknet/bin')

!cp ./darknet /content/gdrive/MyDrive/darknet/bin/darknet
```

트레이닝

4. Custom Data & Config Setting

train.txt

```
1 /content/gdrive/MyDrive/darknet/custom/1.jpg
2 /content/gdrive/MyDrive/darknet/custom/2.jpg
3 /content/gdrive/MyDrive/darknet/custom/3.png
4 /content/gdrive/MyDrive/darknet/custom/4.jpg
5 /content/gdrive/MyDrive/darknet/custom/5.jpg
6 /content/gdrive/MyDrive/darknet/custom/6.jpg
7 /content/gdrive/MyDrive/darknet/custom/7.jpg
8 /content/gdrive/MyDrive/darknet/custom/8.jpg
9 /content/gdrive/MyDrive/darknet/custom/9.jpg
10 /content/gdrive/MyDrive/darknet/custom/10.jpg
11 /content/gdrive/MyDrive/darknet/custom/11.jpg
12 /content/gdrive/MyDrive/darknet/custom/12.jpg
13 /content/gdrive/MyDrive/darknet/custom/13.jpg
14 /content/gdrive/MyDrive/darknet/custom/14.jpg
15 /content/gdrive/MyDrive/darknet/custom/15.jpg
```

custom_data.data

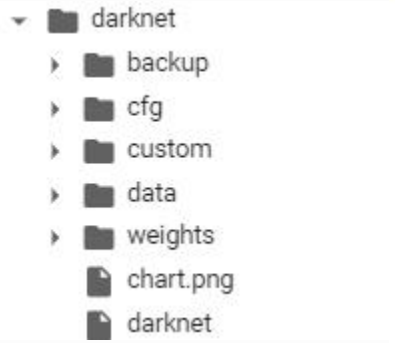
```
1 classes = 2
2 train = /content/gdrive/MyDrive/darknet/custom/train.txt
3 valid = /content/gdrive/MyDrive/darknet/custom/test.txt
4 names = /content/gdrive/MyDrive/darknet/custom/classes.names
5 backup = backup
```

custom_data.data

```
1 classes = 2
2 train = /content/gdrive/MyDrive/darknet/custom/train.txt
3 valid = /content/gdrive/MyDrive/darknet/custom/test.txt
4 names = /content/gdrive/MyDrive/darknet/custom/classes.names
5 backup = backup
```

트레이닝

4. Custom Data & Config Setting



classes.txt

```
1 red_light
2 green_light
```

custom-train-yolo.cfg

```
1 [net]
2 # Testing
3 #batch=1
4 #subdivisions=1
5 # Training
6 batch=32
7 subdivisions=16
8 height=416
9 width=416
10 channels=3
11 momentum=0.9
12 decay=0.0005
13 angle=0
14 saturation = 1.5
15 exposure = 1.5
16 hue=.1
17
18 learning_rate=0.001
19 burn_in=1000
20 max_batches = 4000
21 policy=steps
22 steps=3200,3600
23 scales=.1,.1
```

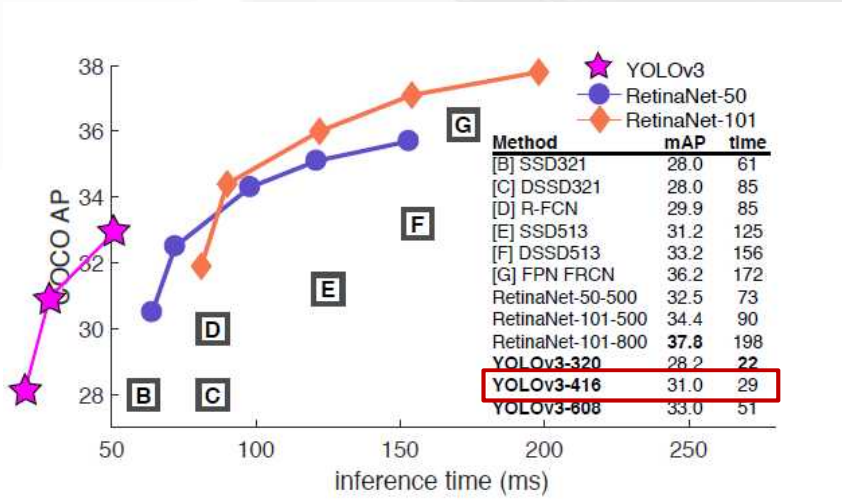
Line 603, 689, 776

```
603 filters=21
604 activation=linear
605
606
607 [yolo]
608 mask = 6,
609 anchors =
610 classes=2
```

```
689 filters=21
690 activation=linear
```

```
776 filters=21
777 activation=linear
778
779
780 [yolo]
781 mask = 0,1,2
782 anchors = 10,13,
783 classes=2
```

```
]
= 3,4,5
rs = 10,13,
es=2
```



Method	mAP	time
[B] SSD321	28.0	61
[C] DSSD321	28.0	85
[D] R-FCN	29.9	85
[E] SSD513	31.2	125
[F] DSSD513	33.2	156
[G] FPN FRCN	36.2	172
RetinaNet-50-500	32.5	73
RetinaNet-101-500	34.4	90
RetinaNet-101-800	**37.8**	198
YOLOv3-320	28.2	**22**
YOLOv3-416	31.0	29
YOLOv3-608	33.0	51

트레이닝

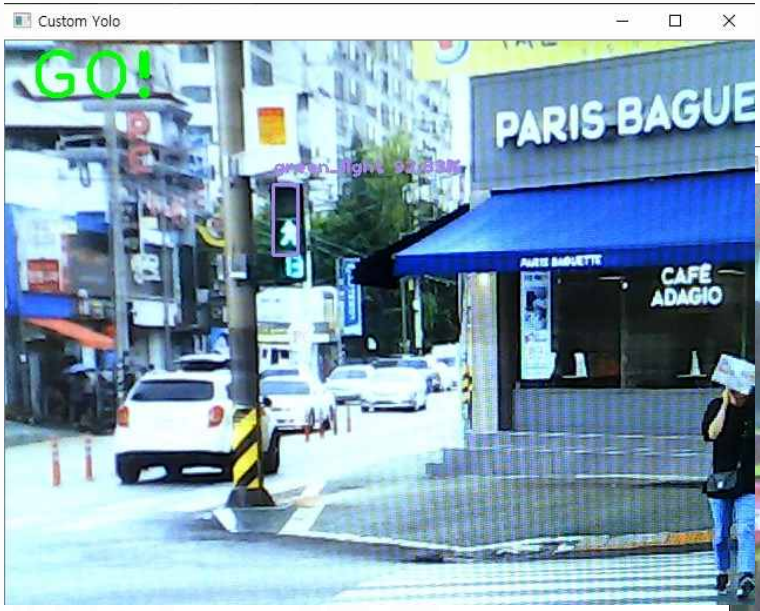
5. YOLO Custom Training

```
!cp -r "/content/gdrive/MyDrive/darknet/custom" .
!cp -r '/content/gdrive/MyDrive/darknet/weights' .
!cp -ar '/content/gdrive/MyDrive/darknet/data' .

!cp -r '/content/gdrive/MyDrive/darknet/cfg' .
```

```
!./darknet detector train custom/custom_data.data custom/custom-train-yolo.cfg weights/darknet53.conv.74 -dont_show

 3919: 0.054528, 0.051870 avg loss, 0.000010 rate, 4.541475 seconds, 125408 images
Loaded: 0.000068 seconds

 3920: 0.055639, 0.052247 avg loss, 0.000010 rate, 4.538612 seconds, 125440 images
Resizing
576 x 576
 try to allocate additional workspace_size = 97.55 MB
 CUDA allocate done!
Loaded: 0.000040 seconds

 3921: 0.042042, 0.051226 avg loss, 0.000010 rate, 4.376238 seconds, 125472 images
Loaded: 0.000061 seconds

 3922: 0.089138, 0.055017 avg loss, 0.000010 rate, 4.532853 seconds, 125504 images
Loaded: 0.000072 seconds

 3923: 0.046218, 0.054137 avg loss, 0.000010 rate, 4.521683 seconds, 125536 images
Loaded: 0.000043 seconds

 3924: 0.099355, 0.058659 avg loss, 0.000010 rate, 4.529135 seconds, 125568 images
Loaded: 0.000060 seconds

 3925: 0.075108, 0.060304 avg loss, 0.000010 rate, 4.519848 seconds, 125600 images
```

결과

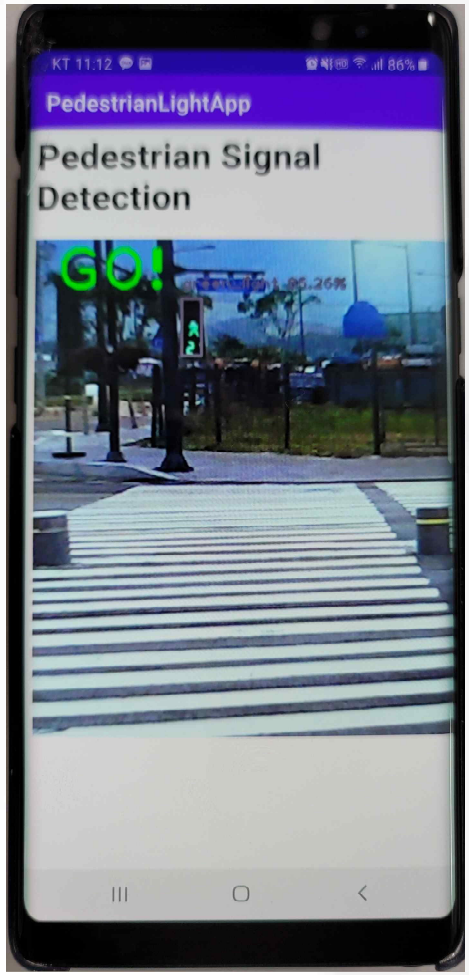
```
if names[i] == "red_light":
    cv2.putText(img, "STOP!", (20, 50), font, 4, (0,0,255), 3)
else:
    cv2.putText(img, "GO!", (20, 50), font, 4, (0,255,0), 3)
```

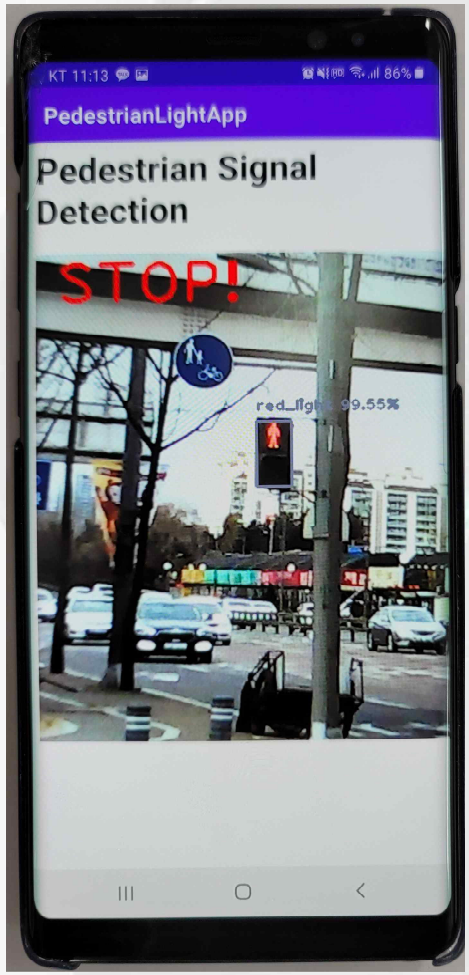


결과


SAMSUNG


Pedestrian Signal Detection
주의 요함 | 221.164.153.220:5000
Pedestrian Signal Detection
STOP!


KT 11:12
86%
PedestrianLightApp
Pedestrian Signal Detection
GO!


KT 11:13
86%
PedestrianLightApp
Pedestrian Signal Detection
STOP!

활용분야

Thank You