

MLDL STUDY 02

- YOLOv8xx.pt Model 비교
- Data augmentation

```
lookup.KeyValue  
f.constant(['em  
=tf.constant([0  
=tf.lookup.StaticV  
init,  
num_oov_buckets=5)
```

```
lookup.StaticVocabular  
initializer,  
num_oov_buckets,  
lookup_key_dtype=None  
name=None,  
experimental_is_open
```

Model 비교

YOLOv8n.pt vs YOLOv8m.pt

YOLOv8n.pt

| 모델 | 파일 이름 | 작업 | 추론 | 유효성 검사 | 교육 | 내보내기 |
|--------|--|--------------------|----|--------|----|------|
| YOLOv8 | yolov8n.pt yolov8s.pt yolov8m.pt yolov8l.pt yolov8x.pt | 탐지 | ✓ | ✓ | ✓ | ✓ |

[탐지\(COCO\)](#)
[감지\(Open Images V7\)](#)
[세분화\(COCO\)](#)
[분류\(이미지넷\)](#)
[포즈 \(COCO\)](#)
[OBB\(DOTAv1\)](#)

사전 학습된 80개의 클래스를 포함하여 [COCO에서](#) 학습된 이러한 모델의 사용 예제는 [탐지 문서](#)를 참조하세요.

| 모델 | 크기 (픽셀) | mAPval 50-95 | 속도 CPU ONNX (ms) | 속도 A100 TensorRT (ms) | 매개변수 (M) | FLOPs (B) |
|-------------------------|------------|-----------------|------------------------|-----------------------------|-------------|--------------|
| YOLOv8n | 640 | 37.3 | 80.4 | 0.99 | 3.2 | 8.7 |
| YOLOv8s | 640 | 44.9 | 128.4 | 1.20 | 11.2 | 28.6 |
| YOLOv8m | 640 | 50.2 | 234.7 | 1.83 | 25.9 | 78.9 |
| YOLOv8l | 640 | 52.9 | 375.2 | 2.39 | 43.7 | 165.2 |
| YOLOv8x | 640 | 53.9 | 479.1 | 3.53 | 68.2 | 257.8 |

YOLOv8n.pt

```
import torch
yolov8n_model = torch.load('yolov8n.pt')
print(yolov8n_model)

)
(m): ModuleList(
  (0): Bottleneck(
    (cv1): Conv(
      (conv): Conv2d(32, 32, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1), bias=False)
      (bn): BatchNorm2d(32, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
      (act): SiLU(inplace=True)
    )
    (cv2): Conv(
      (conv): Conv2d(32, 32, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1), bias=False)
      (bn): BatchNorm2d(32, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
      (act): SiLU(inplace=True)
    )
  )
)
)
(16): Conv(
  (conv): Conv2d(64, 64, kernel_size=(3, 3), stride=(2, 2), padding=(1, 1), bias=False)
  (bn): BatchNorm2d(64, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
  (act): SiLU(inplace=True)
)
(17): Concat()
(18): C2f(
  (cv1): Conv(
    (conv): Conv2d(192, 128, kernel_size=(1, 1), stride=(1, 1), bias=False)
    (bn): BatchNorm2d(128, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
    (act): SiLU(inplace=True)
  )
  (cv2): Conv(
    (conv): Conv2d(192, 128, kernel_size=(1, 1), stride=(1, 1), bias=False)
    (bn): BatchNorm2d(128, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
```

```
{'epoch': -1, 'best_fitness': None, 'model': DetectionModel(
  (model): Sequential(
    (0): Conv(
      (conv): Conv2d(3, 16, kernel_size=(3, 3), stride=(2, 2), padding=(1, 1),
      bias=False)
      (bn): BatchNorm2d(16, eps=0.001, momentum=0.03, affine=True,
      track_running_stats=True)
      (act): SiLU(inplace=True)
    )
    (1): Conv(
      (conv): Conv2d(16, 32, kernel_size=(3, 3), stride=(2, 2), padding=(1,
      1), bias=False)
      (bn): BatchNorm2d(32, eps=0.001, momentum=0.03, affine=True,
      track_running_stats=True)
      (act): SiLU(inplace=True)
    )
    (2): C2f(
      (cv1): Conv(
        (conv): Conv2d(32, 32, kernel_size=(1, 1), stride=(1, 1), bias=False)
        (bn): BatchNorm2d(32, eps=0.001, momentum=0.03, affine=True,
        track_running_stats=True)
        (act): SiLU(inplace=True)
      )
      (cv2): Conv(
        (conv): Conv2d(48, 32, kernel_size=(1, 1), stride=(1, 1), bias=False)
        (bn): BatchNorm2d(32, eps=0.001, momentum=0.03, affine=True,
        track_running_stats=True)
        (act): SiLU(inplace=True)
      )
    )
  )
)
```

```
{'epoch': -1, 'best_fitness': None, 'model': DetectionModel(
  (model): Sequential(
    (0): Conv(
      (conv): Conv2d(3, 48, kernel_size=(3, 3), stride=(2, 2), padding=(1, 1),
      bias=False)
      (bn): BatchNorm2d(48, eps=0.001, momentum=0.03, affine=True,
      track_running_stats=True)
      (act): SiLU(inplace=True)
    )
    (1): Conv(
      (conv): Conv2d(48, 96, kernel_size=(3, 3), stride=(2, 2), padding=(1,
      1), bias=False)
      (bn): BatchNorm2d(96, eps=0.001, momentum=0.03, affine=True,
      track_running_stats=True)
      (act): SiLU(inplace=True)
    )
    (2): C2f(
      (cv1): Conv(
        (conv): Conv2d(96, 96, kernel_size=(1, 1), stride=(1, 1), bias=False)
        (bn): BatchNorm2d(96, eps=0.001, momentum=0.03, affine=True,
        track_running_stats=True)
        (act): SiLU(inplace=True)
      )
      (cv2): Conv(
        (conv): Conv2d(192, 96, kernel_size=(1, 1), stride=(1, 1), bias=False)
        (bn): BatchNorm2d(96, eps=0.001, momentum=0.03, affine=True,
        track_running_stats=True)
        (act): SiLU(inplace=True)
      )
    )
  )
)
```

```

(7): Conv(
  (conv): Conv2d(128, 256, kernel_size=(3, 3), stride=(2, 2), padding=(1, 1), bias=False)
  (bn): BatchNorm2d(256, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
  (act): SiLU(inplace=True)
)
(8): C2f(
  (cv1): Conv(
    (conv): Conv2d(256, 256, kernel_size=(1, 1), stride=(1, 1), bias=False)
    (bn): BatchNorm2d(256, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
    (act): SiLU(inplace=True)
  )
  (cv2): Conv(
    (conv): Conv2d(384, 256, kernel_size=(1, 1), stride=(1, 1), bias=False)
    (bn): BatchNorm2d(256, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
    (act): SiLU(inplace=True)
  )
  (m): ModuleList(
    (0): Bottleneck(
      (cv1): Conv(
        (conv): Conv2d(128, 128, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1), bias=False)
        (bn): BatchNorm2d(128, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
        (act): SiLU(inplace=True)
      )
      (cv2): Conv(
        (conv): Conv2d(128, 128, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1), bias=False)
        (bn): BatchNorm2d(128, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
        (act): SiLU(inplace=True)
      )
    )
  )
)
(9): SPPF(
  (cv1): Conv(
    (conv): Conv2d(256, 128, kernel_size=(1, 1), stride=(1, 1), bias=False)
    (bn): BatchNorm2d(128, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
    (act): SiLU(inplace=True)
  )
  (cv2): Conv(
    (conv): Conv2d(512, 256, kernel_size=(1, 1), stride=(1, 1), bias=False)
    (bn): BatchNorm2d(256, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
    (act): SiLU(inplace=True)
  )
  (m): MaxPool2d(kernel_size=5, stride=1, padding=2, dilation=1, ceil_mode=False)
)
(10): Upsample(scale_factor=2.0, mode='nearest')
(11): Concat()
(12): C2f(
  (cv1): Conv(
    (conv): Conv2d(384, 128, kernel_size=(1, 1), stride=(1, 1), bias=False)
    (bn): BatchNorm2d(128, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
    (act): SiLU(inplace=True)
  )

```

```

(7): Conv(
  (conv): Conv2d(384, 576, kernel_size=(3, 3), stride=(2, 2), padding=(1, 1), bias=False)
  (bn): BatchNorm2d(576, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
  (act): SiLU(inplace=True)
)
(8): C2f(
  (cv1): Conv(
    (conv): Conv2d(576, 576, kernel_size=(1, 1), stride=(1, 1), bias=False)
    (bn): BatchNorm2d(576, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
    (act): SiLU(inplace=True)
  )
  (cv2): Conv(
    (conv): Conv2d(1152, 576, kernel_size=(1, 1), stride=(1, 1), bias=False)
    (bn): BatchNorm2d(576, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
    (act): SiLU(inplace=True)
  )
  (m): ModuleList(
    (0-1): 2 x Bottleneck(
      (cv1): Conv(
        (conv): Conv2d(288, 288, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1), bias=False)
        (bn): BatchNorm2d(288, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
        (act): SiLU(inplace=True)
      )
      (cv2): Conv(
        (conv): Conv2d(288, 288, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1), bias=False)
        (bn): BatchNorm2d(288, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
        (act): SiLU(inplace=True)
      )
    )
  )
)
(9): SPPF(
  (cv1): Conv(
    (conv): Conv2d(576, 288, kernel_size=(1, 1), stride=(1, 1), bias=False)
    (bn): BatchNorm2d(288, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
    (act): SiLU(inplace=True)
  )
  (cv2): Conv(
    (conv): Conv2d(1152, 576, kernel_size=(1, 1), stride=(1, 1), bias=False)
    (bn): BatchNorm2d(576, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
    (act): SiLU(inplace=True)
  )
  (m): MaxPool2d(kernel_size=5, stride=1, padding=2, dilation=1, ceil_mode=False)
)
(10): Upsample(scale_factor=2.0, mode='nearest')
(11): Concat()
(12): C2f(
  (cv1): Conv(
    (conv): Conv2d(960, 384, kernel_size=(1, 1), stride=(1, 1), bias=False)
    (bn): BatchNorm2d(384, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
    (act): SiLU(inplace=True)
  )

```

Data augmentation

Data Augmentation

Transferred 319/355 items from pretrained weights

TensorBoard: Start with 'tensorboard --logdir runs/detect/train6', view at <http://localhost:6006/>

Freezing layer 'model.22.dfl.conv.weight'

AMP: running Automatic Mixed Precision (AMP) checks with YOLOv8n...

AMP: checks passed 

train: Scanning /content/Real-time-parking-lot-vehicle-detection-1/train/labels.cache... 1618 images, 0 backgrounds, 0 corrupt: 100% 1618/1618 [00:00<?, ?it/s]

augmentations: Blur(p=0.01, blur_limit=(3, 7)), MedianBlur(p=0.01, blur_limit=(3, 7)), ToGray(p=0.01), CLAHE(p=0.01, clip_limit=(1, 4.0), tile_grid_size=(8, 8))

val: Scanning /content/Real-time-parking-lot-vehicle-detection-1/valid/labels.cache... 215 images, 0 backgrounds, 0 corrupt: 100% 215/215 [00:00<?, ?it/s]

Plotting labels to runs/detect/train6/labels.jpg...

optimizer: 'optimizer=auto' found, ignoring 'lr0=0.01' and 'momentum=0.937' and determining best 'optimizer', 'lr0' and 'momentum' automatically...

optimizer: AdamW(lr=0.001667, momentum=0.9) with parameter groups 57 weight(decay=0.0), 64 weight(decay=0.0005), 63 bias(decay=0.0)


TensorBoard: model graph visualization added 

Image sizes 640 train, 640 val

Using 2 dataloader workers

Logging results to **runs/detect/train6**

Starting training for 20 epochs...


```
[81] import albumentations as A
      from albumentations.pytorch import ToTensorV2
      from torchvision import transforms
```

<https://icyking.tistory.com/entry/Albumentations%E2%9D%98-%E2%8D%B0%E2%9D%B4%E2%84%B0-%E2%A6%9D%EA%B0%95-%E2%9D%B4%E2%95%B4>

```
[78] # import torchvision.transforms as transforms
      # from torchvision.datasets import ImageFolder
      # from torch.utils.data import DataLoader

      # dataset_location = dataset.location
      # data_yaml = dataset_location + "/data.yaml"

      # data_augmentation = transforms.Compose([
      #     transforms.RandomRotation(degrees = 30),
      #     transforms.RandomHorizontalFlip()
      # ])

      # dataset_2 = ImageFolder(root = dataset_location, transform = data_augmentation)
      # dataloader = DataLoader(dataset_2, batch_size = 32, shuffle = True)
```