5 TEAM

DeepLearning Computer Vision

1 프로젝트 주제

프로젝트 주제를 선정하게 된 이유와 CV이 필요한 이유

2 Data Set 분석

사용한 Data Set에 대한 분석 및 모델링

3 최적의 Model선정 및 회고

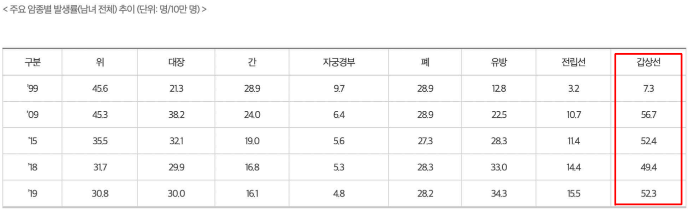
사용한 Data set과 model에 대한 회고

프로젝트 주제 & CV의 필요성

1

감상선 암 이미지 분류

2021년 12월 29일 보건복지부 - 보도자료



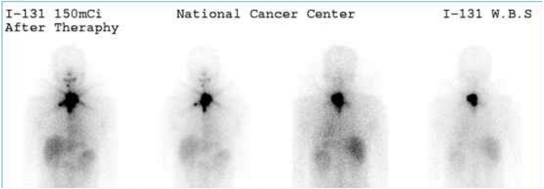
< 주요 암종별 발생률(남녀 전체) 추이 (단위: 명/10만 명) >

구분	위	대장	간	자궁경부	폐	유방	전립선	갑상선
’99	45.6	21.3	28.9	9.7	28.9	12.8	3.2	7.3
’09	45.3	38.2	24.0	6.4	28.9	22.5	10.7	56.7
’15	35.5	32.1	19.0	5.6	27.3	28.3	11.4	52.4
’18	31.7	29.9	16.8	5.3	28.3	33.0	14.4	49.4
’19	30.8	30.0	16.1	4.8	28.2	34.3	15.5	52.3

주요 암 중에서 발생률이 가장 높은 암이 갑상선 암이다.

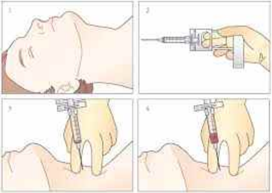
갑상선암 진단방법

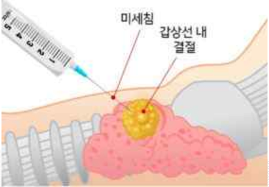
- 동위원소검사 (갑상선 스캔)



갑상선암 진단방법

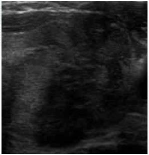
- 조직검사(세침흡인 세포검사)

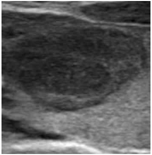




갑상선암 진단방법

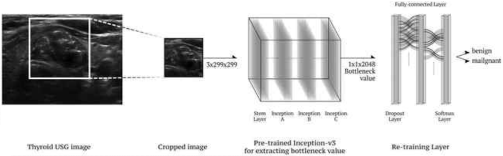
- 초음파 검사





갑상선암 진단방법

- 갑상선암 초음파 진단, 인공지능분석으로 보다 정확하게

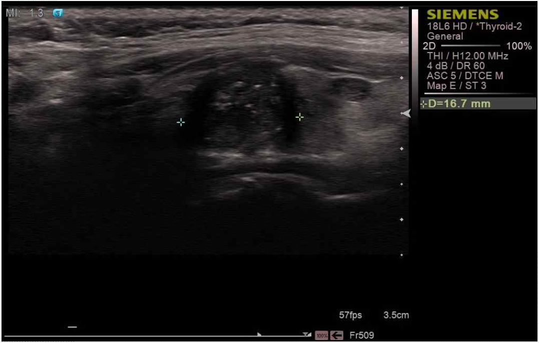


보라매병원 갑상선센터, ZeroOne AI 공동연구성과 발표

Data Set 분석 및 모델링

2

Image Data Sample

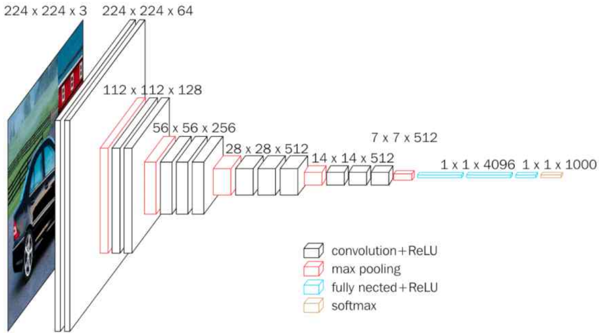


데이터에 대한 목표설정

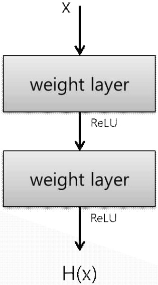
1. Model Select : VGG, ResNet, EfficientNet
2. DeepLearning : Classification
3. 성능 체크 : AUROC
4. HeapMap : Grad-CAM

Model Select：VGG, ResNet, EfficientNet

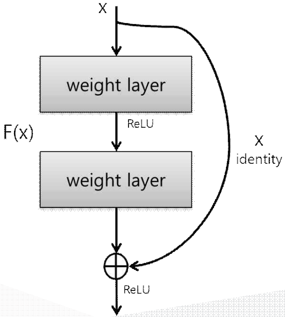
VGGnet


224 x 224 x 3
224 x 224 x 64
112 x 112 x 128
56 x 56 x 256
28 x 28 x 512
14 x 14 x 512
7 x 7 x 512
1 x 1 x 4096
1 x 1 x 1000
convolution+ReLU
max pooling
fully nected+ReLU
softmax

ResNet



기존 방식



$H(x) = F(x) + x$

Residual block

ResNext

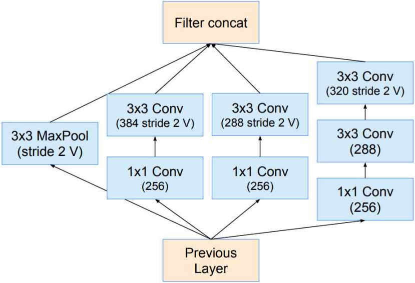


Figure 18. The schema for 17×17 to 8×8 grid-reduction module. Reduction-B module used by the wider Inception-ResNet-v1 network in Figure 15.

EfficientNet

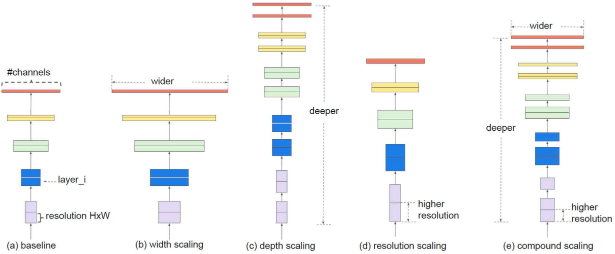
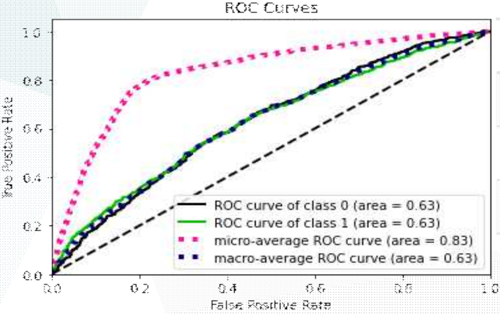


Figure 2. **Model Scaling.** (a) is a baseline network example; (b)-(d) are conventional scaling that only increases one dimension of network width, depth, or resolution. (e) is our proposed compound scaling method that uniformly scales all three dimensions with a fixed ratio.

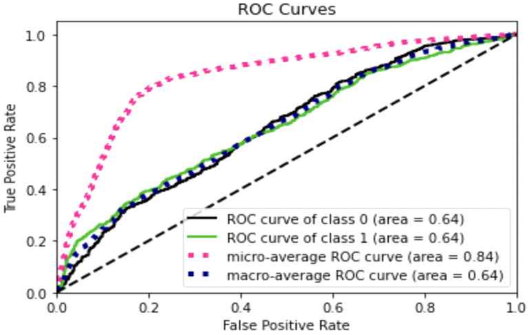
원본 이미지를 통해 학습한 결과

VGG model

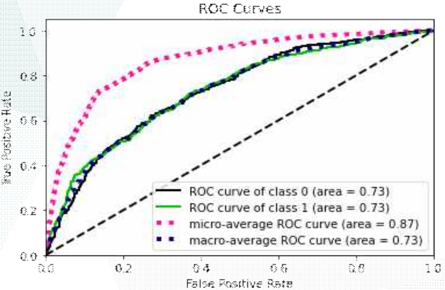


Epoch	001
Loss	0.7504
Accuracy	0.7877
Val-Loss	0.5160
Val-Acc	0.7885

ResNet-158 model

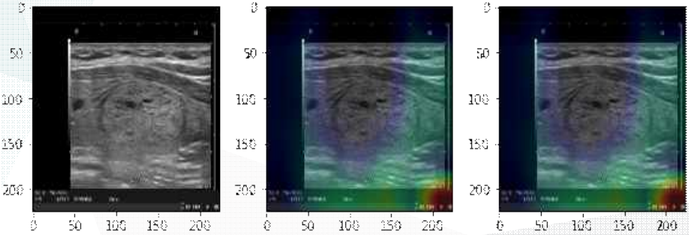


EfficientNet model



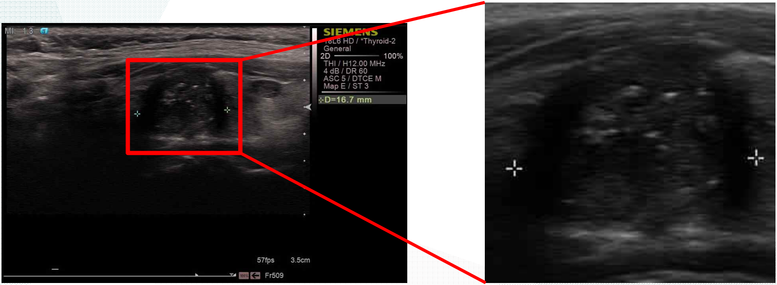
Epoch	005
Loss	0.2807
Accuracy	0.8852
Val-Loss	1.1896
Val-Acc	0.2466

EfficientNet model Grad-CAM



Crop 이미지를 통해 학습한 결과

이미지 데이터 _ Crop

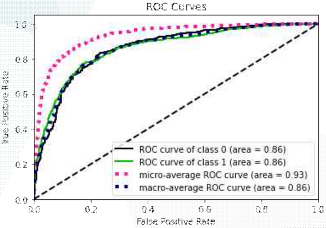


*원본 이미지에서 갑상선 부분에 해당하는 부분을 강사님께 들어서 이미지를 crop하였다.

1. VGG model

VGG16 model에 대한 classification 결과

020-0.3502-0.8582-0.3409-0.8680.hdf5



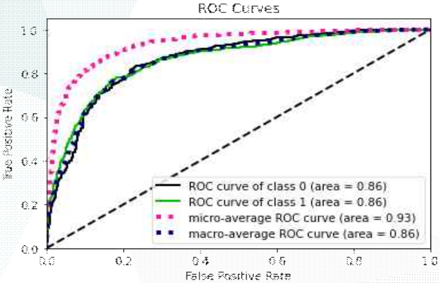
Crop 이미지를 통해 학습한 결과

epoch를 돌릴수록 성능이 더 좋아졌다.

다만 아까 원본 이미지에 대해서 성능이 그마나 좋았던 EfficientNet_B5에 대해서 Grad-CAM을 보았을 때,

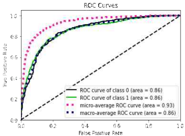
Feature 선택이 잘 안되었기에 해당 과정도 함께 확인

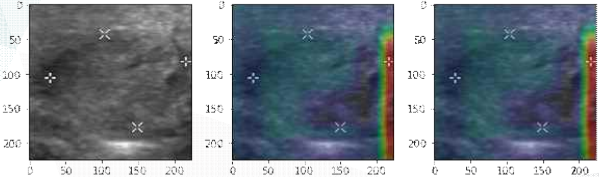
VGG model



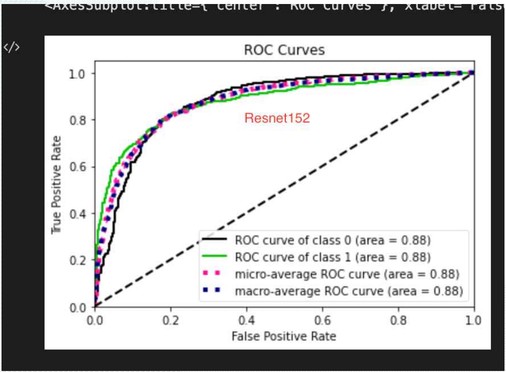
Epoch	020
Loss	0.3502
Accuracy	0.8582
Val-Loss	0.3409
Val-Acc	0.8680

VGG model


ROC Curves
True Positive Rate
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
False Positive Rate
ROC curve of class 0 (area = 0.86)
ROC curve of class 1 (area = 0.86)
micro-average ROC curve (area = 0.93)
macro-average ROC curve (area = 0.86)

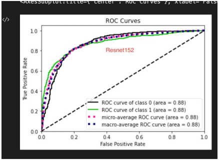

0
50
100
150
200
0
50
100
150
200
0
50
100
150
200
0
50
100
150
200
0
50
100
150
200
0
50
100
150
200

ResNet-152

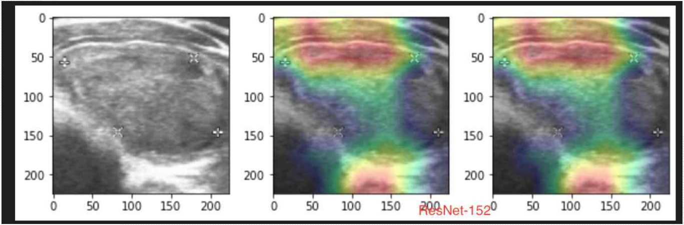


```
<AxesSubplot:title={'center': 'ROC Curves'}, xlabel='Fals
```

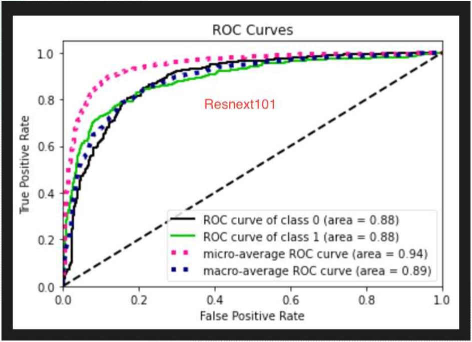
ResNet-152



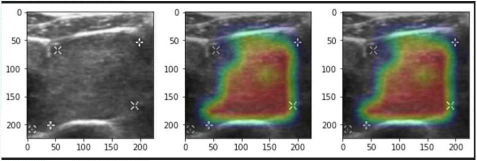
```
<AxesSubplot:title={'center': 'ROC Curves'}, xlabel='Fals
```

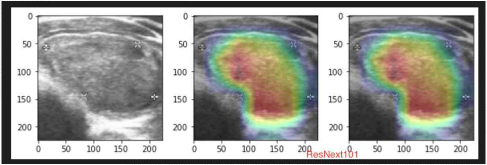


ResNet-101

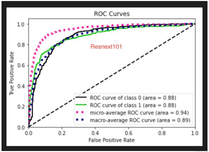

ROC Curves
Resnext101
True Positive Rate
False Positive Rate
0.0
0.2
0.4
0.6
0.8
1.0
0.0
0.2
0.4
0.6
0.8
1.0
ROC curve of class 0 (area = 0.88)
ROC curve of class 1 (area = 0.88)
micro-average ROC curve (area = 0.94)
macro-average ROC curve (area = 0.89)

ResNet-101

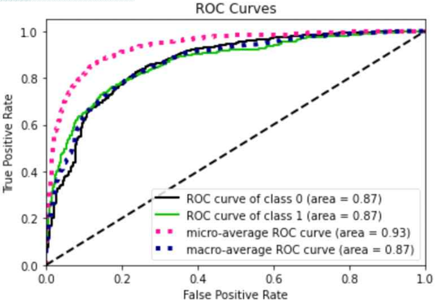




ResNext101

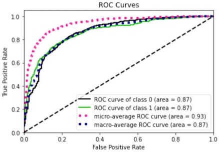


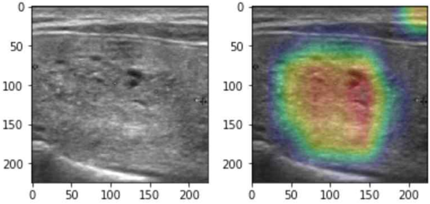
EfficientNetB5 model



Epoch	006
Loss	0.3090
Accuracy	0.8742
Val-Loss	0.3629
Val-Acc	0.8540

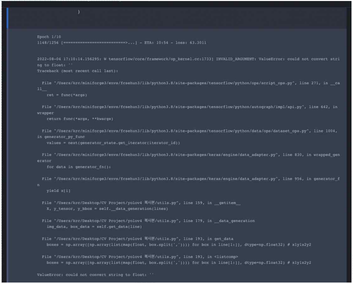
EfficientNet model



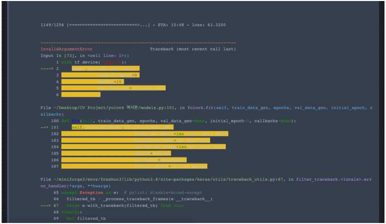


Object Detection & MultiInput

Object Detection

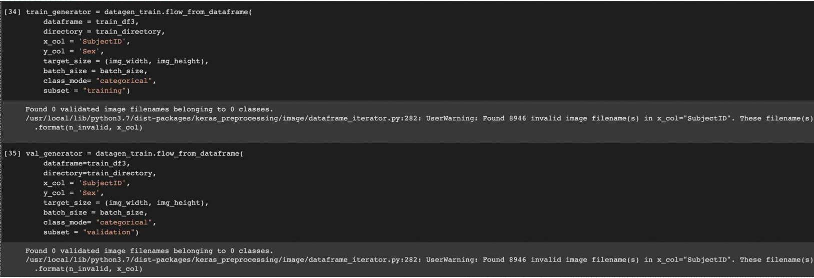


```
                    )

Epoch 1/10
1148/1256 [==========================>...] - ETA: 10:54 - loss: 63.3011


2022-08-04 17:10:14.156295: W tensorflow/core/framework/op_kernel.cc:1733] INVALID_ARGUMENT: ValueError: could not convert stri
ng to float: ''
Traceback (most recent call last):

  File "/Users/krc/miniforge3/envs/fcsehun3/lib/python3.8/site-packages/tensorflow/python/ops/script_ops.py", line 271, in __ca
ll__
    ret = func(*args)

  File "/Users/krc/miniforge3/envs/fcsehun3/lib/python3.8/site-packages/tensorflow/python/autograph/impl/api.py", line 642, in
wrapper
    return func(*args, **kwargs)

  File "/Users/krc/miniforge3/envs/fcsehun3/lib/python3.8/site-packages/tensorflow/python/data/ops/dataset_ops.py", line 1004,
in generator_py_func
    values = next(generator_state.get_iterator(iterator_id))

  File "/Users/krc/miniforge3/envs/fcsehun3/lib/python3.8/site-packages/keras/engine/data_adapter.py", line 830, in wrapped_gen
erator
    for data in generator_fn():

  File "/Users/krc/miniforge3/envs/fcsehun3/lib/python3.8/site-packages/keras/engine/data_adapter.py", line 956, in generator_f
n
    yield x[i]

  File "/Users/krc/Desktop/CV Project/yolov4 복사본/utils.py", line 159, in __getitem__
    X, y_tensor, y_bbox = self.__data_generation(lines)

  File "/Users/krc/Desktop/CV Project/yolov4 복사본/utils.py", line 179, in __data_generation
    img_data, box_data = self.get_data(line)

  File "/Users/krc/Desktop/CV Project/yolov4 복사본/utils.py", line 193, in get_data
    boxes = np.array([np.array(list(map(float, box.split(',')))) for box in line[1:]], dtype=np.float32) # x1y1x2y2

  File "/Users/krc/Desktop/CV Project/yolov4 복사본/utils.py", line 193, in <listcomp>
    boxes = np.array([np.array(list(map(float, box.split(',')))) for box in line[1:]], dtype=np.float32) # x1y1x2y2

ValueError: could not convert string to float: ''
```



```
1149/1256 [==========================>...] - ETA: 10:48 - loss: 63.3200


---------------------------------------------------------------------------
InvalidArgumentError                      Traceback (most recent call last)
Input In [73], in <cell line: 1>()
      1 with tf.device('/gpu:0'):
----> 2     model.fit(train_data_gen,
      3               initial_epoch=0,
      4               epochs=10,
      5               val_data_gen=[illegible]
      6               )

File ~/Desktop/CV Project/yolov4 복사본/models.py:101, in Yolov4.fit(self, train_data_gen, epochs, val_data_gen, initial_epoch, c
allbacks)
    100 def fit(self, train_data_gen, epochs, val_data_gen=None, initial_epoch=0, callbacks=None):
--> 101     self.training_model.fit(train_data_gen,
    102                             steps_per_epoch=len(train_data_gen),
    103                             validation_data=val_data_gen,
    104                             validation_steps=len(val_data_gen),
    105                             epochs=epochs,
    106                             callbacks=callbacks,
    107                             initial_epoch=initial_epoch)

File ~/miniforge3/envs/fcsehun3/lib/python3.8/site-packages/keras/utils/traceback_utils.py:67, in filter_traceback.<locals>.err
or_handler(*args, **kwargs)
     65 except Exception as e:  # pylint: disable=broad-except
     66   filtered_tb = _process_traceback_frames(e.__traceback__)
---> 67   raise e.with_traceback(filtered_tb) from None
     68 finally:
     69   del filtered_tb
```

MultiInput



```
[34] train_generator = datagen_train.flow_from_dataframe(
        dataframe = train_df3,
        directory = train_directory,
        x_col = 'SubjectID',
        y_col = 'Sex',
        target_size = (img_width, img_height),
        batch_size = batch_size,
        class_mode= "categorical",
        subset = "training")
```

```
Found 0 validated image filenames belonging to 0 classes.
/usr/local/lib/python3.7/dist-packages/keras_preprocessing/image/dataframe_iterator.py:282: UserWarning: Found 8946 invalid image filename(s) in x_col="SubjectID". These filename(s)
  .format(n_invalid, x_col)
```

```
[35] val_generator = datagen_train.flow_from_dataframe(
        dataframe=train_df3,
        directory=train_directory,
        x_col = 'SubjectID',
        y_col = 'Sex',
        target_size = (img_width, img_height),
        batch_size = batch_size,
        class_mode= "categorical",
        subset = "validation")
```

```
Found 0 validated image filenames belonging to 0 classes.
/usr/local/lib/python3.7/dist-packages/keras_preprocessing/image/dataframe_iterator.py:282: UserWarning: Found 8946 invalid image filename(s) in x_col="SubjectID". These filename(s)
  .format(n_invalid, x_col)
```

Thank you