

마스크 착용 여부 이미지 식별

TEAM 2



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분류기만 학습

전체 학습

시사점

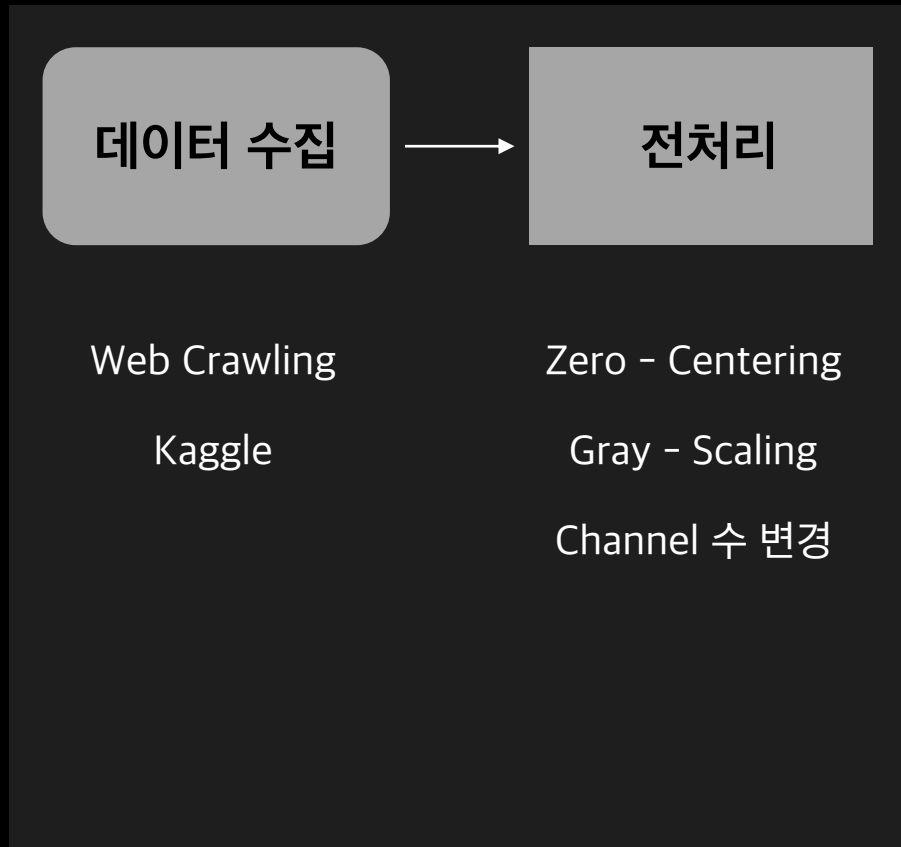
한계점

Tool

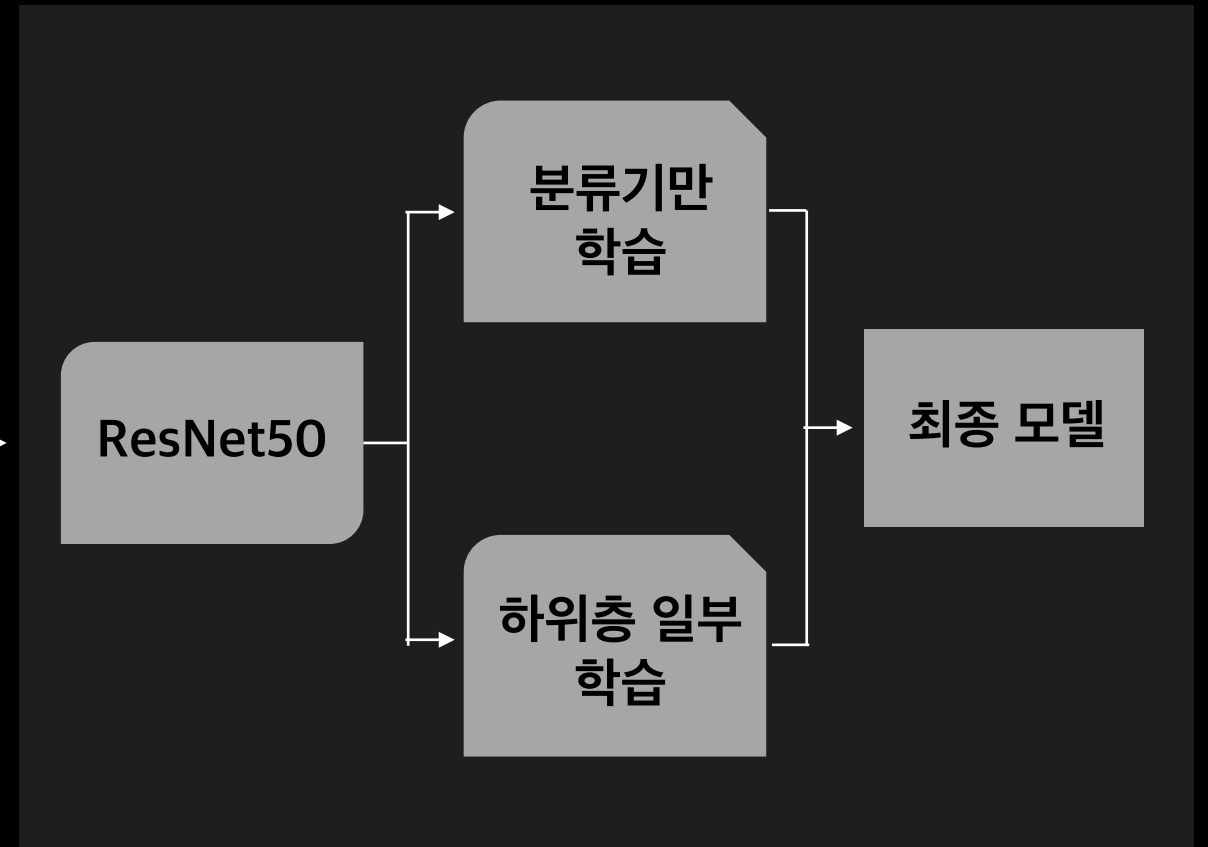
[Modeling Process]

Modeling Process

Data Collection

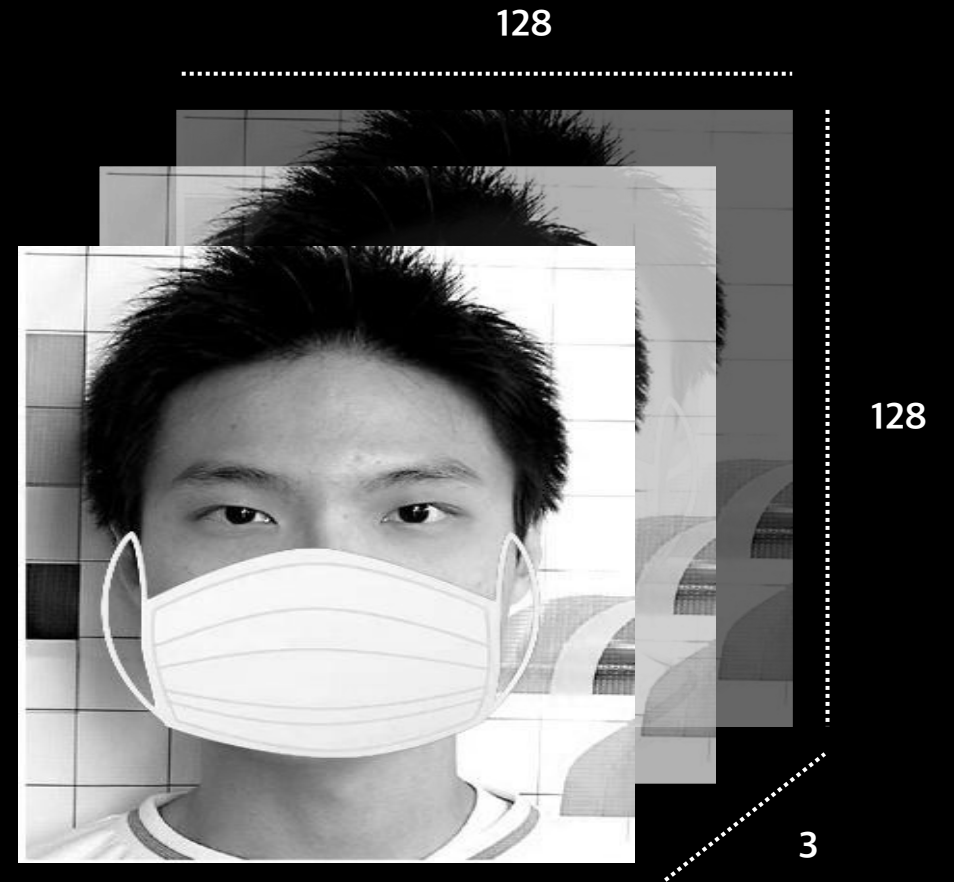


Transfer Learning



Error

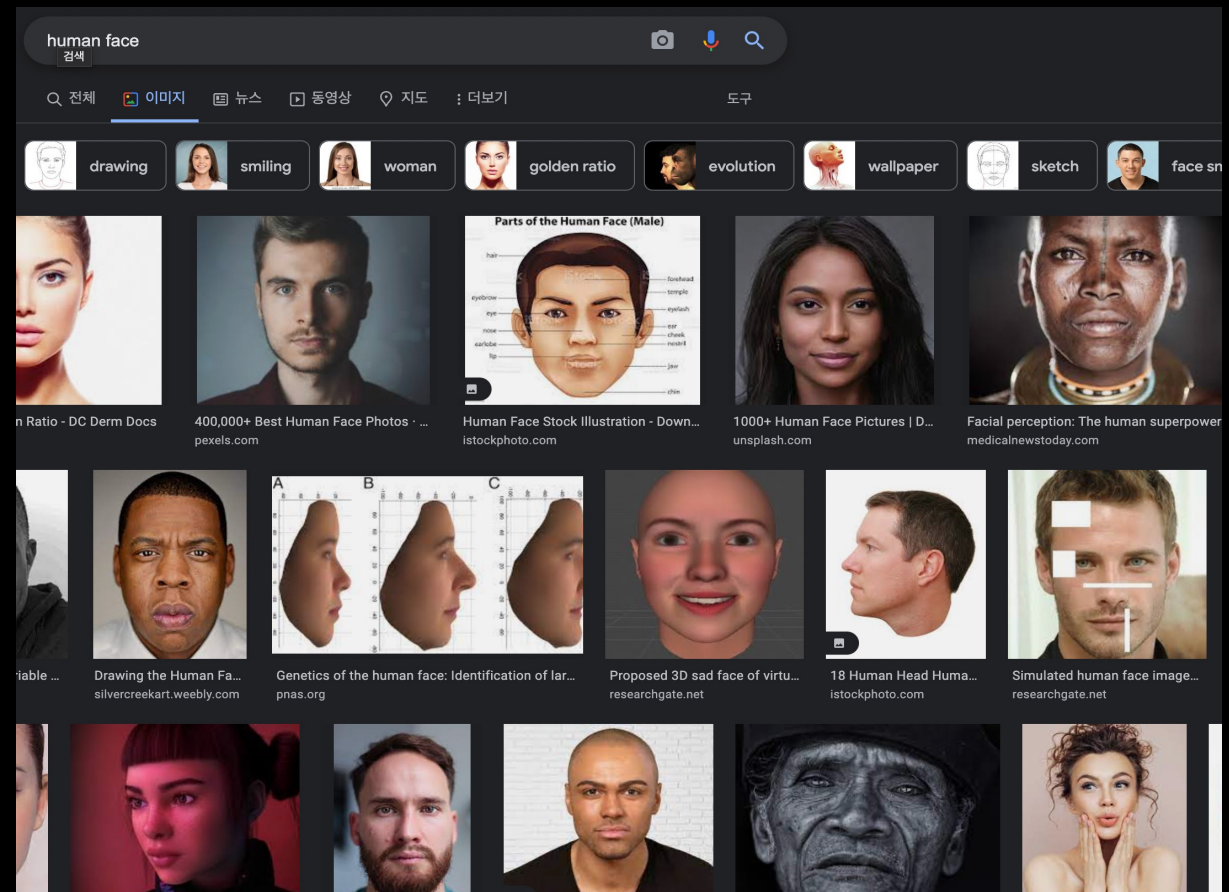
RAM 용량 초과



Gray Scaling
이미지 사이즈 및 Channel 변환

[Data Collection]

데이터 수집 - Web Crawling



Data Collection

데이터 수집 - Kaggle

<https://www.kaggle.com/datasets/prasoonkottarathil/face-mask-lite-dataset>



PRASOON KOTTARATHIL · UPDATED 2 YEARS AGO

Face Mask Lite Dataset

Dataset contains People with mask and without mask



Total : 20000 files (25GB)

with_mask : 10000 files

without_mask : 10000 files

Data Collection

데이터 전처리 - Zero Centering / Gray Scaling / Channel

```
x_datasets = np.array(x_datasets)
x_datasets = tf.image.rgb_to_grayscale(x_datasets) # grayscale
x_datasets = np.array(x_datasets)

y_datasets = np.array(y_datasets)

train_x, test_x, train_y, test_y = train_test_split(x_datasets, y_datasets,
                                                    test_size=test_size,
                                                    random_state=random_state,
                                                    stratify=y_datasets)

# zero-centering
train_x -= np.mean(train_x, axis=0)
test_x -= np.mean(train_x, axis=0)

# 채널 크기를 3으로 변경
### 데이터_x.shape -> (데이터 개수, x축, y축, 채널) 채널 index 수를 늘리기 위해 axis = 3으로 해야 한다
train_x = tf.repeat(train_x, 3, axis=3)
test_x = tf.repeat(test_x, 3, axis=3)
```

Data Collection

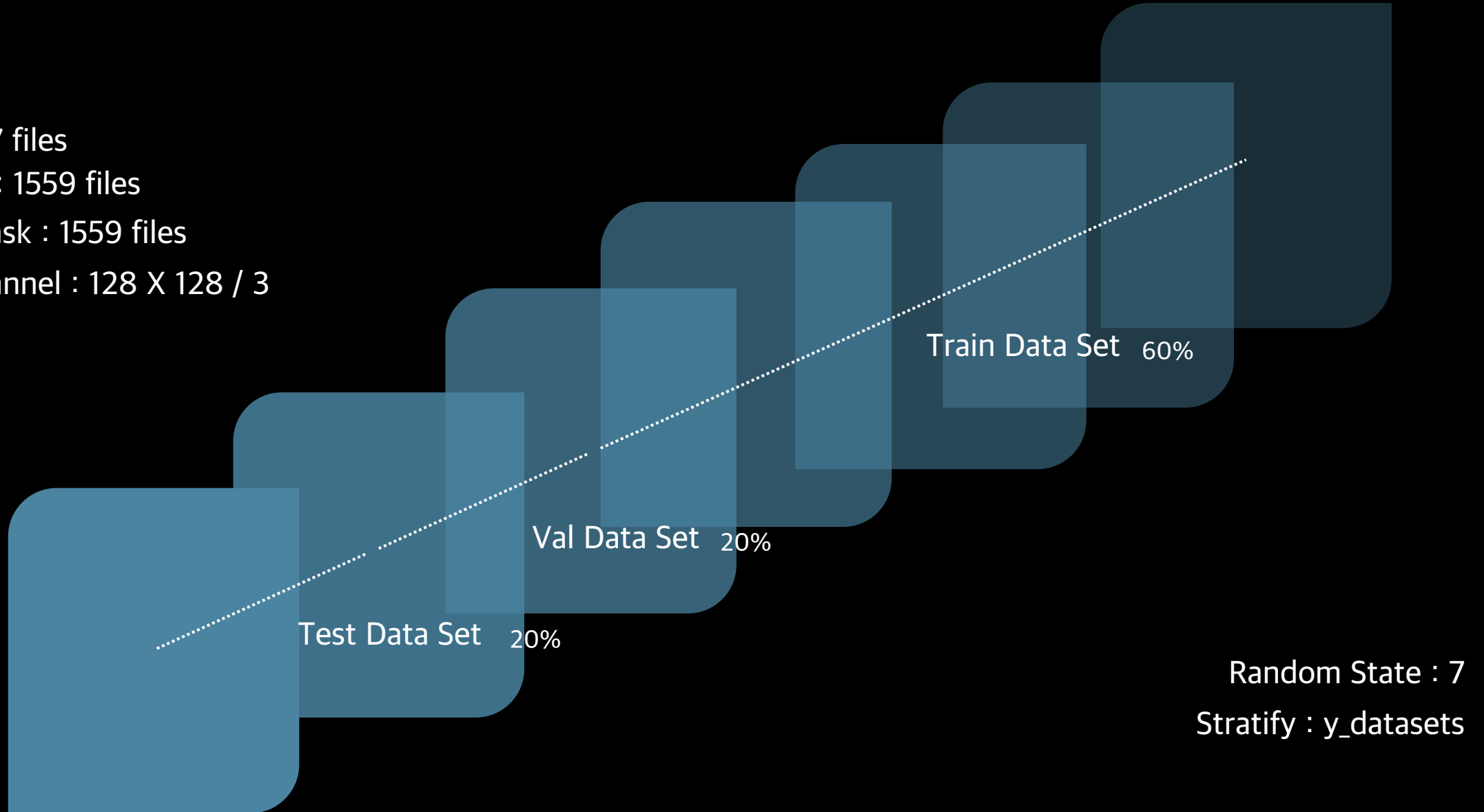
Data Set

Total : 3107 files

With_Mask : 1559 files

Without_Mask : 1559 files

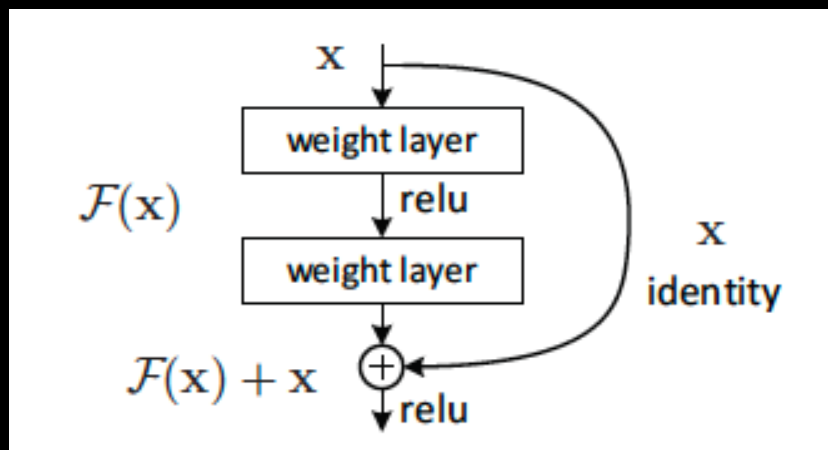
Shape / Channel : 128 X 128 / 3



[Transfer Learning]

Transfer Learning

ResNet50



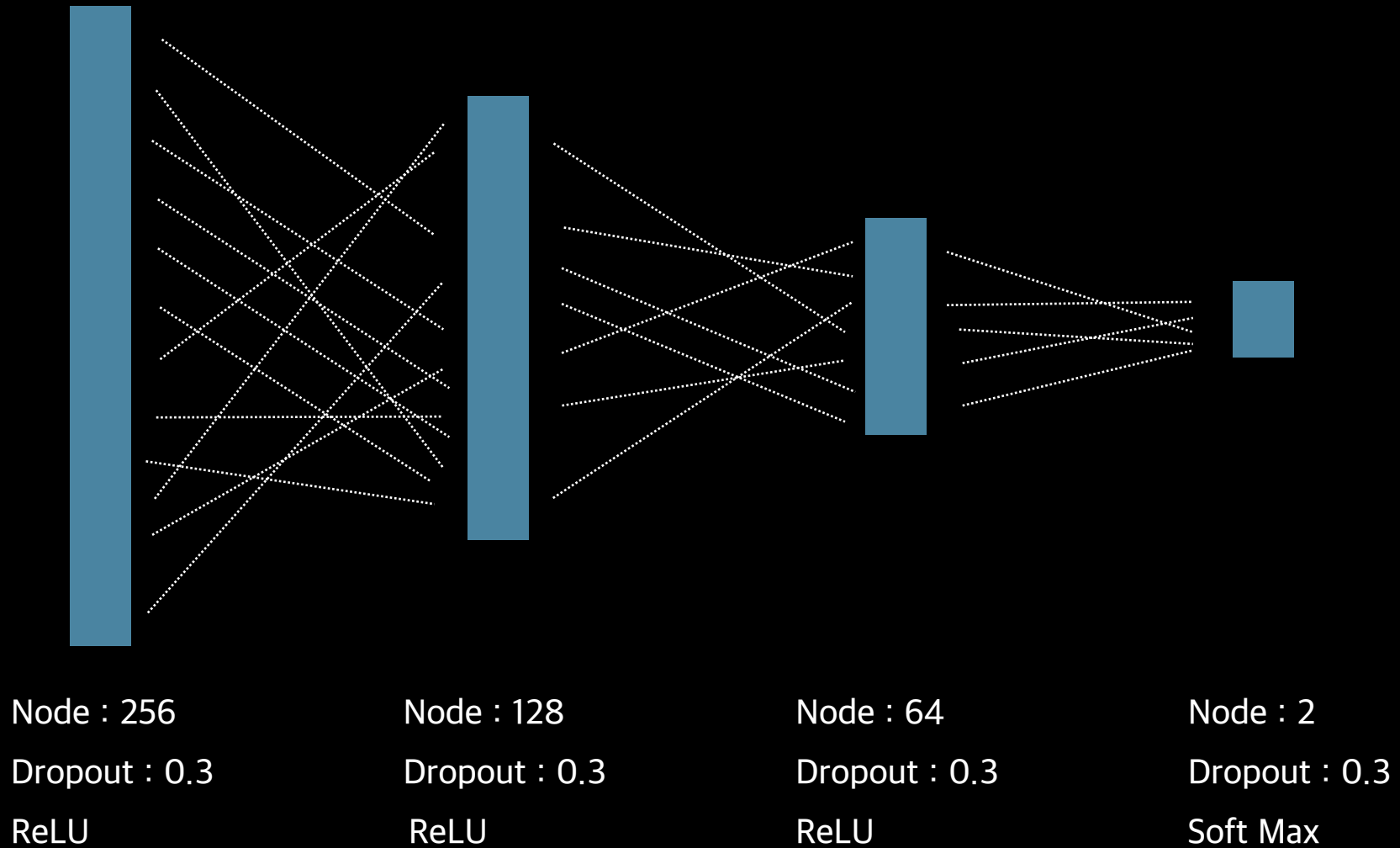
ResNet50 모델 선택 이유

1. 타 모델에 비해 우수한 성능 (2014년 ILSVRC 우승)
2. 이미지 분류에 관하여 기존에 학습됨
3. 단순한 구조

method	top-1 err.	top-5 err.
VGG [41] (ILSVRC'14)	-	8.43 [†]
GoogLeNet [44] (ILSVRC'14)	-	7.89
VGG [41] (v5)	24.4	7.1
PReLU-net [13]	21.59	5.71
BN-inception [16]	21.99	5.81
ResNet-34 B	21.84	5.71
ResNet-34 C	21.53	5.60
ResNet-50	20.74	5.25
ResNet-101	19.87	4.60
ResNet-152	19.38	4.49

Transfer Learning

Classification



Transfer Learning

분류기만 학습

```
base_model = ResNet50(include_top=False, input_shape = (128, 128, 3), weights = 'imagenet')

base_model.trainable = False

inputs = tf.keras.Input(shape=(128, 128, 3))

x = base_model(inputs, training=False) # batchnorm 부분 update 방지

x = tf.keras.layers.Flatten()(x)
x = tf.keras.layers.Dense(256, activation='relu')(x)
x = tf.keras.layers.Dropout(0.3)(x)
x = tf.keras.layers.Dense(128, activation='relu')(x)
x = tf.keras.layers.Dropout(0.3)(x)
x = tf.keras.layers.Dense(64, activation='relu')(x)
x = tf.keras.layers.Dropout(0.3)(x)
outputs = tf.keras.layers.Dense(2, activation='softmax')(x)

model = tf.keras.Model(inputs, outputs)

model.compile(optimizer = tf.keras.optimizers.Adam(learning_rate= 0.001),
              loss = 'sparse_categorical_crossentropy',
              metrics=['accuracy'])
```


Transfer Learning

하위층 일부 학습

```
# Resnet50 하위층 설정
base_model = ResNet50(include_top=False, input_shape = (128, 128, 3), weights = 'imagenet')

base_model.trainable = False

for layer in base_model.layers[-10:]:
    layer.trainable = True

inputs = tf.keras.Input(shape=(128, 128, 3))

x = base_model(inputs, training=False) # batchnorm 부분 update 방지

x = tf.keras.layers.Flatten()(x)
x = tf.keras.layers.Dense(256, activation='relu')(x)
x = tf.keras.layers.Dropout(0.3)(x)
x = tf.keras.layers.Dense(128, activation='relu')(x)
x = tf.keras.layers.Dropout(0.3)(x)
x = tf.keras.layers.Dense(64, activation='relu')(x)
x = tf.keras.layers.Dropout(0.3)(x)
outputs = tf.keras.layers.Dense(2, activation='softmax')(x)

model = tf.keras.Model(inputs, outputs)

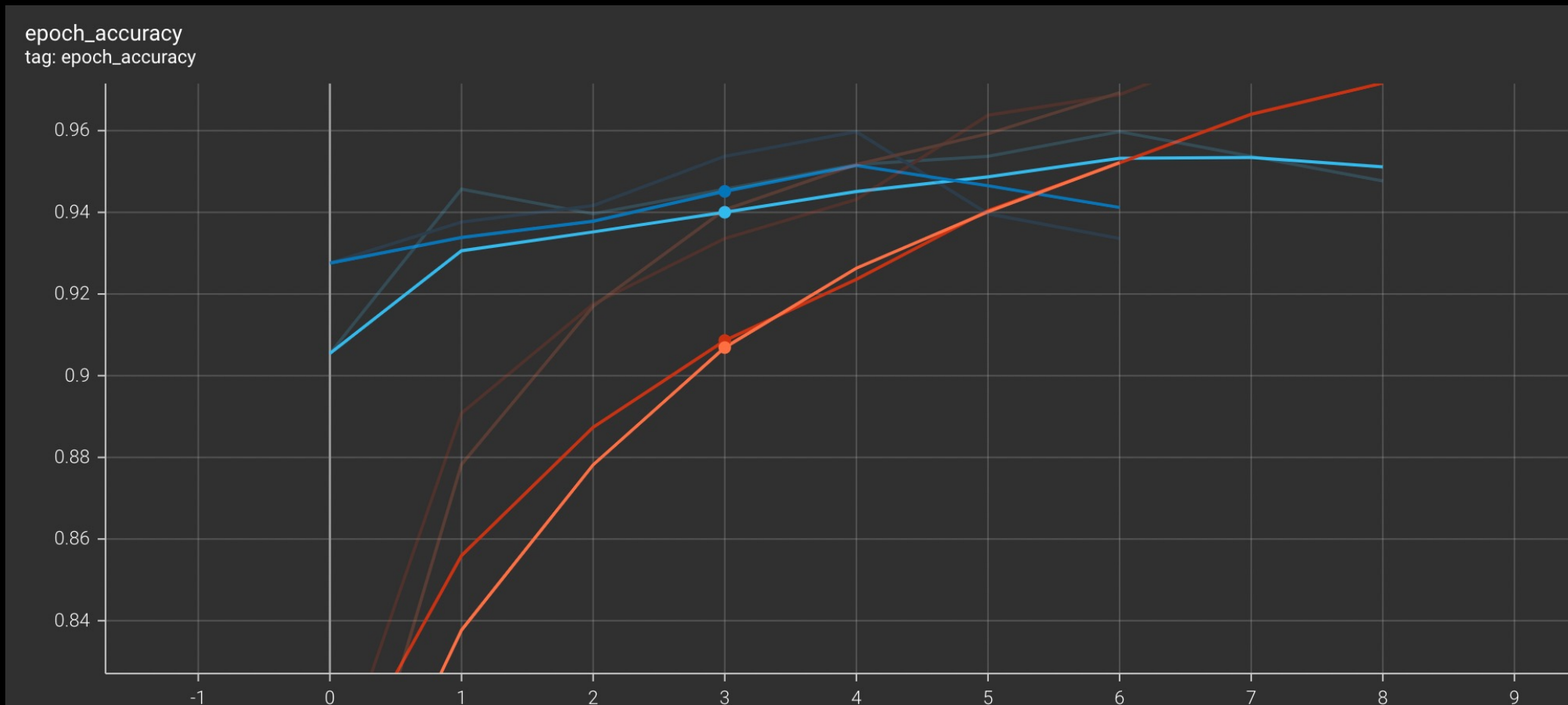
model.compile(optimizer = tf.keras.optimizers.Adam(learning_rate= 0.001),
              loss = 'sparse_categorical_crossentropy',
              metrics=['accuracy'])
```

분류기 하위 10층 학습

Transfer Learning

분류기만 학습 / 하위층 일부 학습 - epoch_accuracy

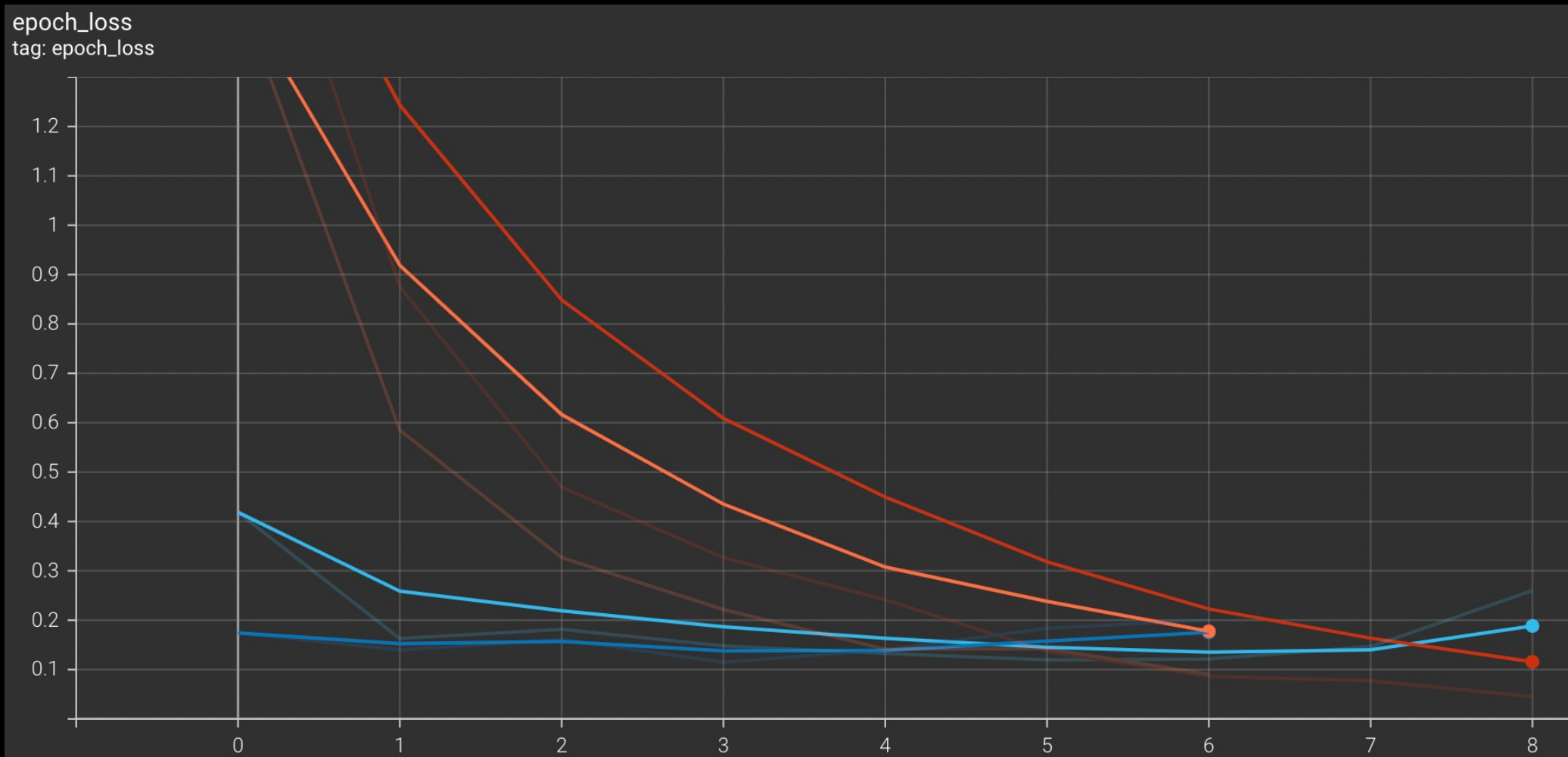
- ✓ 20220508only_classifi_model/train
- ✓ 20220508only_classifi_model/validation
- ✓ 20220508part_lean_model/train
- ✓ 20220508part_lean_model/validation



Transfer Learning

분류기만 학습 / 하위층 일부 학습 - epoch_loss

- ✓ 20220508only_classifi_model/train
- ✓ 20220508only_classifi_model/validation
- ✓ 20220508part_lean_model/train
- ✓ 20220508part_lean_model/validation



Fin

시사점 / 한계점 / Tool

시사점

방역 수칙 준수 여부 확인

다양한 실내 장소에 적용

한계점

1. 다양한 모델 비사용
2. 다양한 전이 학습 비사용
3. 잘못된 마스크 착용
이미지 비학습 / 비분류

Tool



THANK YOU

TEAM 2

옥지성 | 전규원 | 박재현 | 이소정 | 권남우