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✓ Fine Tuning for model **DenseNet201**

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

⇨ Mounted at /content/drive

```
import tensorflow as tf
```

```
from tensorflow import keras
tf.random.set_seed(42)
```

```
import numpy as np
np.random.seed(42)
```

```
import matplotlib.pyplot as plt
%matplotlib inline
```

```
from numpy import load
```

```
X_train_std = load('/content/drive/MyDrive/DLPROJECT/X_train_std.npy')
X_test_std = load('/content/drive/MyDrive/DLPROJECT/X_test_std.npy')
```

```
y_train = load('/content/drive/MyDrive/DLPROJECT/y_train.npy')
y_test = load('/content/drive/MyDrive/DLPROJECT/y_test.npy')
```

```
print("X_train_std_shape: {}".format(X_train_std.shape))
print("X_test_std_shape: {}".format(X_test_std.shape))
```

⇨ X_train_std_shape: (383, 299, 299, 3)
X_test_std_shape: (128, 299, 299, 3)

```
model2_FT = keras.models.load_model('/content/drive/MyDrive/DLPROJECT/01_DenseNet201_Tran
```

```
model2_FT.summary()
```



conv2_block6_0_bn (BatchNormalization)	(None, 75, 75, 224)	896	conv2_bloc
conv2_block6_0_relu (Activation)	(None, 75, 75, 224)	0	conv2_bloc
conv2_block6_1_conv (Conv2D)	(None, 75, 75, 128)	28,672	conv2_bloc
conv2_block6_1_bn (BatchNormalization)	(None, 75, 75, 128)	512	conv2_bloc
conv2_block6_1_relu (Activation)	(None, 75, 75, 128)	0	conv2_bloc
conv2_block6_2_conv (Conv2D)	(None, 75, 75, 32)	36,864	conv2_bloc
conv2_block6_concat (Concatenate)	(None, 75, 75, 256)	0	conv2_bloc conv2_bloc
pool2_bn (BatchNormalization)	(None, 75, 75, 256)	1,024	conv2_bloc
pool2_relu (Activation)	(None, 75, 75, 256)	0	pool2_bn[0
pool2_conv (Conv2D)	(None, 75, 75, 128)	32,768	pool2_relu
pool2_pool (AveragePooling2D)	(None, 37, 37, 128)	0	pool2_conv
conv3_block1_0_bn (BatchNormalization)	(None, 37, 37, 128)	512	pool2_pool
conv3_block1_0_relu (Activation)	(None, 37, 37, 128)	0	conv3_bloc
conv3_block1_1_conv (Conv2D)	(None, 37, 37, 128)	16,384	conv3_bloc
conv3_block1_1_bn (BatchNormalization)	(None, 37, 37, 128)	512	conv3_bloc
conv3_block1_1_relu (Activation)	(None, 37, 37, 128)	0	conv3_bloc
conv3_block1_2_conv (Conv2D)	(None, 37, 37, 32)	36,864	conv3_bloc
conv3_block1_concat (Concatenate)	(None, 37, 37, 160)	0	pool2_pool conv3_bloc
conv3_block2_0_bn (BatchNormalization)	(None, 37, 37, 160)	640	conv3_bloc
conv3_block2_0_relu (Activation)	(None, 37, 37, 160)	0	conv3_bloc

conv3_block2_1_conv (Conv2D)	(None, 37, 37, 128)	20,480	conv3_bloc
conv3_block2_1_bn (BatchNormalization)	(None, 37, 37, 128)	512	conv3_bloc
conv3_block2_1_relu (Activation)	(None, 37, 37, 128)	0	conv3_bloc
conv3_block2_2_conv (Conv2D)	(None, 37, 37, 32)	36,864	conv3_bloc
conv3_block2_concat (Concatenate)	(None, 37, 37, 192)	0	conv3_bloc conv3_bloc
conv3_block3_0_bn (BatchNormalization)	(None, 37, 37, 192)	768	conv3_bloc
conv3_block3_0_relu (Activation)	(None, 37, 37, 192)	0	conv3_bloc
conv3_block3_1_conv (Conv2D)	(None, 37, 37, 128)	24,576	conv3_bloc
conv3_block3_1_bn (BatchNormalization)	(None, 37, 37, 128)	512	conv3_bloc
conv3_block3_1_relu (Activation)	(None, 37, 37, 128)	0	conv3_bloc
conv3_block3_2_conv (Conv2D)	(None, 37, 37, 32)	36,864	conv3_bloc
conv3_block3_concat (Concatenate)	(None, 37, 37, 224)	0	conv3_bloc conv3_bloc
conv3_block4_0_bn (BatchNormalization)	(None, 37, 37, 224)	896	conv3_bloc
conv3_block4_0_relu (Activation)	(None, 37, 37, 224)	0	conv3_bloc
conv3_block4_1_conv (Conv2D)	(None, 37, 37, 128)	28,672	conv3_bloc
conv3_block4_1_bn (BatchNormalization)	(None, 37, 37, 128)	512	conv3_bloc
conv3_block4_1_relu (Activation)	(None, 37, 37, 128)	0	conv3_bloc
conv3_block4_2_conv (Conv2D)	(None, 37, 37, 32)	36,864	conv3_bloc
conv3_block4_concat (Concatenate)	(None, 37, 37, 256)	0	conv3_bloc conv3_bloc
conv3_block5_0_bn (BatchNormalization)	(None, 37, 37, 256)	1,024	conv3_bloc
conv3_block5_0_relu	(None, 37, 37, 256)	0	conv3_bloc

(Activation)			
conv3_block5_1_conv (Conv2D)	(None , 37, 37, 128)	32,768	conv3_bloc
conv3_block5_1_bn (BatchNormalization)	(None , 37, 37, 128)	512	conv3_bloc
conv3_block5_1_relu (Activation)	(None , 37, 37, 128)	0	conv3_bloc
conv3_block5_2_conv (Conv2D)	(None , 37, 37, 32)	36,864	conv3_bloc
conv3_block5_concat (Concatenate)	(None , 37, 37, 288)	0	conv3_bloc conv3_bloc
conv3_block6_0_bn (BatchNormalization)	(None , 37, 37, 288)	1,152	conv3_bloc
conv3_block6_0_relu (Activation)	(None , 37, 37, 288)	0	conv3_bloc
conv3_block6_1_conv (Conv2D)	(None , 37, 37, 128)	36,864	conv3_bloc
conv3_block6_1_bn (BatchNormalization)	(None , 37, 37, 128)	512	conv3_bloc
conv3_block6_1_relu (Activation)	(None , 37, 37, 128)	0	conv3_bloc
conv3_block6_2_conv (Conv2D)	(None , 37, 37, 32)	36,864	conv3_bloc
conv3_block6_concat (Concatenate)	(None , 37, 37, 320)	0	conv3_bloc conv3_bloc
conv3_block7_0_bn (BatchNormalization)	(None , 37, 37, 320)	1,280	conv3_bloc
conv3_block7_0_relu (Activation)	(None , 37, 37, 320)	0	conv3_bloc
conv3_block7_1_conv (Conv2D)	(None , 37, 37, 128)	40,960	conv3_bloc
conv3_block7_1_bn (BatchNormalization)	(None , 37, 37, 128)	512	conv3_bloc
conv3_block7_1_relu (Activation)	(None , 37, 37, 128)	0	conv3_bloc
conv3_block7_2_conv (Conv2D)	(None , 37, 37, 32)	36,864	conv3_bloc
conv3_block7_concat (Concatenate)	(None , 37, 37, 352)	0	conv3_bloc conv3_bloc
conv3_block8_0_bn (BatchNormalization)	(None , 37, 37, 352)	1,408	conv3_bloc