

In []:

```
'''This code was written by Danny Joel Devarapalli, Dheeraj Mavilla, Prashanth Karri, H  
arshit Gorijavolu'''
```

In []:

```
import numpy as np
import matplotlib.pyplot as plt
import os
from urllib.request import urlopen,urlretrieve
%matplotlib inline
import cv2
from keras.models import load_model
from sklearn.datasets import load_files
from keras.utils import np_utils
from glob import glob
from keras import applications
from keras.preprocessing.image import ImageDataGenerator
from keras import optimizers
from keras.models import Sequential,Model,load_model
from keras.layers import Dense, Dropout, Flatten, Conv2D, MaxPool2D,GlobalAveragePooling2D
from keras.callbacks import TensorBoard,ReduceLROnPlateau,ModelCheckpoint
```

Using TensorFlow backend.

In []:

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

Go to this URL in a browser: https://accounts.google.com/o/oauth2/auth?client_id=947318989803-6bn6qk8qdgf4n4g3pfee6491hc0brc4i.apps.googleusercontent.com&redirect_uri=urn%3aietf%3awg%3aoauth%3a2.0%3aob&response_type=code&scope=email%20https%3a%2f%2fwww.googleapis.com%2fauth%2fdocs.test%20https%3a%2f%2fwww.googleapis.com%2fauth%2fdrive%20https%3a%2f%2fwww.googleapis.com%2fauth%2fdrive.photos.readonly%20https%3a%2f%2fwww.googleapis.com%2fauth%2fpeopleapi.readonly

Enter your authorization code:

.....

Mounted at /content/drive

```
!pip install -U -q PyDrive
from pydrive.auth import GoogleAuth
from pydrive.drive import GoogleDrive
import google.colab
from oauth2client.client import GoogleCredentials
import glob, os

folder_id = '/content/drive/My Drive/Colab Backup'
dir_to_backup = '/content/drive/My Drive/Colab Backup/Copy Big data'
mycreds_file_contents = '{"access_token": "ya29.a0AfH6SMAfrsGMg6lBqN6LEZW484rDvGid96tpvYEFLT6pAWJpXNc6WyWDLaw5hKAjju46KDLPukTD9PMn81Zm9wQN5rTrq3AGQEHZ2GLSwu0gIqs3k3L6oBHUn2ttGiJFEXYS1FBrAEypIjq-nOb5axCpobIf05ooSFruIT5NHIX", "client_id": "32555940559.apps.googleusercontent.com", "client_secret": "ZmssLNjJy2998hD4CTg2ejr2", "refresh_token": "1//05nkqfGkJ9maPCgyIARAAGAUSNWf-L9IrGmqCGJIBvoEXeyvUaLOBd9teJk_IQ2HFUPk6fhGTqCDhDW4WKzwiierXV3c_EsJmMok", "token_expiry": "2020-05-14T17:28:32Z", "token_uri": "https://oauth2.googleapis.com/token", "user_agent": "Python client library", "revoke_url": "https://oauth2.googleapis.com/revoke", "id_token": {"iss": "https://accounts.google.com", "azp": "32555940559.apps.googleusercontent.com", "aud": "32555940559.apps.googleusercontent.com", "sub": "113969137687744701622", "email": "dannyevarapalli6@gmail.com", "email_verified": true, "at_hash": "jrgrYi6CI3OznTf3crfE6Q", "iat": 1589473713, "exp": 1589477313}, "id_token_jwt": "eyJhbGciOiJIUzI1NiIsImtpZCI6ImMxNzcwODE0YmE2YTcwNjkzMmI5NDExZGEzYzZlOTBjbMmJmNWl5MjcilLCJ0eXAiOiJKV1QiLCJpdjY291bnRzLmdvb2dsZS5jb20iLCJhenAiOiIzMjU1NTk0MDU1OS5hcHBzLmdvb2dsZXVzZXJjb250ZW50LmNvbSI5ImF1ZCI6ImYNTU1OTQwNTU5LmFwcHMuz29vZ2xlZDNlcmNvbnRlbncuY29tIiwic3ViIjoimTEzOTY5MTM3Njg3NzQ0NzAxNjIyIiwiaWF0IjkyYW5ueWRldmFyYXBhbGxpNkNbnWFpbC5jb20iLCJlbWVubGF92ZXJpZml1ZCI6dHJ1ZSwiYXRfaGFzaCI6ImpyZ3J5aTZDSTNPek50ZjNjcjZFNlEiLCJpYXQiOiJlODk0NmM3MTMsImV4cCI6MTU4OTQ3NzNmM30.UCYsQbAIYmDfjTH6xaIDB4KSq5fB-ug-DPTyFVMx9ildSBULvQ8pxzLHCXMli9slniRSYrgNrAewp7qHc7skJTpJh34APsVsSB9WyEFnog5G0FAzX0pZ_c10bYYl8BMgvXk6weXkF6GHmwSpmFLctVs7QEby0j3ehKyWeDLn4bqyoZcEM_OYSX6ZZj6s6XvJZ-hV84G23gqs0ndzJHBSd5dkXFrGcmFsCNMCfwRqtKoUoc3H25ceCdSJPLCQLA_Wu72ZddTWqFvgNLJDhnhodfhEZUIYyzAKPZNxdgPTRt9pPkMg8scI0bvQShUOJ6SOyWLHSr257jhPhS5MapUNBW", "token_response": {"access_token": "ya29.a0AfH6SMAfrsGMg6lBqN6LEZW484rDvGid96tpvYEFLT6pAWJpXNc6WyWDLaw5hKAjju46KDLPukTD9PMn81Zm9wQN5rTrq3AGQEHZ2GLSwu0gIqs3k3L6oBHUn2ttGiJFEXYS1FBrAEypIjq-nOb5axCpobIf05ooSFruIT5NHIX", "expires_in": 3599, "scope": "https://www.googleapis.com/auth/appengine.admin https://www.googleapis.com/auth/userinfo.email https://www.googleapis.com/auth/accounts.reauth openid https://www.googleapis.com/auth/cloud-platform https://www.googleapis.com/auth/compute https://www.googleapis.com/auth/drive", "token_type": "Bearer", "id_token": "eyJhbGciOiJIUzI1NiIsImtpZCI6ImMxNzcwODE0YmE2YTcwNjkzMmI5NDExZGEzYzZlOTBjbMmJmNWl5MjcilLCJ0eXAiOiJKV1QiLCJpdjY291bnRzLmdvb2dsZS5jb20iLCJhenAiOiIzMjU1NTk0MDU1OS5hcHBzLmdvb2dsZXVzZXJjb250ZW50LmNvbSI5ImF1ZCI6ImYNTU1OTQwNTU5LmFwcHMuz29vZ2xlZDNlcmNvbnRlbncuY29tIiwic3ViIjoimTEzOTY5MTM3Njg3NzQ0NzAxNjIyIiwiaWF0IjkyYW5ueWRldmFyYXBhbGxpNkNbnWFpbC5jb20iLCJlbWVubGF92ZXJpZml1ZCI6dHJ1ZSwiYXRfaGFzaCI6ImpyZ3J5aTZDSTNPek50ZjNjcjZFNlEiLCJpYXQiOiJlODk0NmM3MTMsImV4cCI6MTU4OTQ3NzNmM30.UCYsQbAIYmDfjTH6xaIDB4KSq5fB-ug-DPTyFVMx9ildSBULvQ8pxzLHCXMli9slniRSYrgNrAewp7qHc7skJTpJh34APsVsSB9WyEFnog5G0FAzX0pZ_c10bYYl8BMgvXk6weXkF6GHmwSpmFLctVs7QEby0j3ehKyWeDLn4bqyoZcEM_OYSX6ZZj6s6XvJZ-hV84G23gqs0ndzJHBSd5dkXFrGcmFsCNMCfwRqtKoUoc3H25ceCdSJPLCQLA_Wu72ZddTWqFvgNLJDhnhodfhEZUIYyzAKPZNxdgPTRt9pPkMg8scI0bvQShUOJ6SOyWLHSr257jhPhS5MapUNBW"}, "scopes": [], "token_info_uri": null, "invalid": false, "_class": "GoogleCredentials", "_module": "oauth2client.client"}'
mycreds_file = 'mycreds.json'

with open(mycreds_file, 'w') as f:
    f.write(mycreds_file_contents)

def authenticate_pydrive():
    gauth = GoogleAuth()

# https://stackoverflow.com/a/24542604/5096199
# Try to load saved client credentials
```

```

gauth.LoadCredentialsFile(mycreds_file)
if gauth.credentials is None:
    # Authenticate if they're not there
    google.colab.auth.authenticate_user()
    gauth.credentials = GoogleCredentials.get_application_default()
elif gauth.access_token_expired:
    # Refresh them if expired
    gauth.Refresh()
else:
    # Initialize the saved creds
    gauth.Authorize()
# Save the current credentials to a file
gauth.SaveCredentialsFile(mycreds_file)

drive = GoogleDrive(gauth)
return drive

def backup_pydrive():
    drive = authenticate_pydrive()
    paths = list(glob.iglob(os.path.join(dir_to_backup, '**'), recursive=True))
    print(paths)

    # Delete existing files
    files = drive.ListFile({'q': "'%s' in parents" % folder_id}).GetList()
    for file in files:
        if file['title'] in paths:
            file.Delete()

    for path in paths:
        if os.path.isdir(path) or os.stat(path).st_size == 0:
            continue
        file = drive.CreateFile({'title': path, 'parents':
                                [{"kind": "drive#fileLink", "id": folder_id}]})
        file.SetContentFile(path)
        file.Upload()
        print('Backed up %s' % path)

def restore_pydrive():
    drive = authenticate_pydrive()
    files = drive.ListFile({'q': "'%s' in parents" % folder_id}).GetList()
    for file in files:
        os.makedirs(os.path.dirname(file['title']), exist_ok=True)
        file.GetContentFile(file['title'])
        print('Restored %s' % file['title'])

authenticate_pydrive()
!cat {mycreds_file}

```

```

{"access_token": "ya29.a0AfH6SMAfrsGMg6lBqN6LEZW484rDvGid96tpvYEFLT6pAWJpX
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l, "token_uri": "https://oauth2.googleapis.com/token", "user_agent": "Pyth
on client library", "revoke_uri": "https://oauth2.googleapis.com/revoke",
"id_token": null, "id_token_jwt": null, "token_response": null, "scopes":
[], "token_info_uri": null, "invalid": false, "_class": "GoogleCredential
s", "_module": "oauth2client.client"}

```

In []:

```
git clone https://github.com/tensorflow/models/blob/master/research/slim/nets/resnet_utils.py
```

```
base_model = applications.ResNet101(weights= 'imagenet', include_top=False, input_shape = (224,224,3))
```

Cloning into 'resnet_utils.py'...

fatal: repository 'https://github.com/tensorflow/models/blob/master/research/slim/nets/resnet_utils.py/' not found

Downloading data from https://github.com/keras-team/keras-applications/releases/download/resnet/resnet101_weights_tf_dim_ordering_tf_kernels_notop.h5

171450368/171446536 [=====] - 7s 0us/step

In []:

```
x = base_model.output
x = GlobalAveragePooling2D()(x)
x = Dropout(0.4)(x)
predictions = Dense(3, activation= 'softmax')(x)
model = Model(inputs = base_model.input, outputs = predictions)
```

In []:

```
from keras.optimizers import SGD, Adam
adam = Adam(lr=0.0001)
model.compile(optimizer= adam, loss='sparse_categorical_crossentropy', metrics=['accuracy'])
```

```
sgd = SGD(lr=0.01, momentum=0.9, nesterov=False)
```

In []:

```
model.summary()
```

Model: "model_1"

Layer (type)	Output Shape	Param #	Connected to
=====			
input_1 (InputLayer)	(None, 224, 224, 3)	0	
conv1_pad (ZeroPadding2D) [0][0]	(None, 230, 230, 3)	0	input_1
conv1_conv (Conv2D) [0][0]	(None, 112, 112, 64)	9472	conv1_pad
conv1_bn (BatchNormalization) v[0][0]	(None, 112, 112, 64)	256	conv1_conv
conv1_relu (Activation) [0][0]	(None, 112, 112, 64)	0	conv1_bn
pool1_pad (ZeroPadding2D) u[0][0]	(None, 114, 114, 64)	0	conv1_relu
pool1_pool (MaxPooling2D) [0][0]	(None, 56, 56, 64)	0	pool1_pad
conv2_block1_1_conv (Conv2D) l[0][0]	(None, 56, 56, 64)	4160	pool1_pool
conv2_block1_1_bn (BatchNormalization) ck1_1_conv[0][0]	(None, 56, 56, 64)	256	conv2_block1_1_conv
conv2_block1_1_relu (Activation) ck1_1_bn[0][0]	(None, 56, 56, 64)	0	conv2_block1_1_bn
conv2_block1_2_conv (Conv2D) ck1_1_relu[0][0]	(None, 56, 56, 64)	36928	conv2_block1_1_relu
conv2_block1_2_bn (BatchNormalization) ck1_2_conv[0][0]	(None, 56, 56, 64)	256	conv2_block1_2_conv
conv2_block1_2_relu (Activation) ck1_2_bn[0][0]	(None, 56, 56, 64)	0	conv2_block1_2_bn
conv2_block1_0_conv (Conv2D) l[0][0]	(None, 56, 56, 256)	16640	pool1_pool

conv2_block1_3_conv (Conv2D)	(None, 56, 56, 256)	16640	conv2_blo
ck1_2_relu[0][0]			
conv2_block1_0_bn (BatchNormali	(None, 56, 56, 256)	1024	conv2_blo
ck1_0_conv[0][0]			
conv2_block1_3_bn (BatchNormali	(None, 56, 56, 256)	1024	conv2_blo
ck1_3_conv[0][0]			
conv2_block1_add (Add)	(None, 56, 56, 256)	0	conv2_blo
ck1_0_bn[0][0]			conv2_blo
ck1_3_bn[0][0]			
conv2_block1_out (Activation)	(None, 56, 56, 256)	0	conv2_blo
ck1_add[0][0]			
conv2_block2_1_conv (Conv2D)	(None, 56, 56, 64)	16448	conv2_blo
ck1_out[0][0]			
conv2_block2_1_bn (BatchNormali	(None, 56, 56, 64)	256	conv2_blo
ck2_1_conv[0][0]			
conv2_block2_1_relu (Activation	(None, 56, 56, 64)	0	conv2_blo
ck2_1_bn[0][0]			
conv2_block2_2_conv (Conv2D)	(None, 56, 56, 64)	36928	conv2_blo
ck2_1_relu[0][0]			
conv2_block2_2_bn (BatchNormali	(None, 56, 56, 64)	256	conv2_blo
ck2_2_conv[0][0]			
conv2_block2_2_relu (Activation	(None, 56, 56, 64)	0	conv2_blo
ck2_2_bn[0][0]			
conv2_block2_3_conv (Conv2D)	(None, 56, 56, 256)	16640	conv2_blo
ck2_2_relu[0][0]			
conv2_block2_3_bn (BatchNormali	(None, 56, 56, 256)	1024	conv2_blo
ck2_3_conv[0][0]			
conv2_block2_add (Add)	(None, 56, 56, 256)	0	conv2_blo
ck1_out[0][0]			conv2_blo
ck2_3_bn[0][0]			

conv2_block2_out (Activation)	(None, 56, 56, 256)	0	conv2_block2_add[0][0]
conv2_block3_1_conv (Conv2D)	(None, 56, 56, 64)	16448	conv2_block3_out[0][0]
conv2_block3_1_bn (Batch Normalization)	(None, 56, 56, 64)	256	conv2_block3_1_conv[0][0]
conv2_block3_1_relu (Activation)	(None, 56, 56, 64)	0	conv2_block3_1_bn[0][0]
conv2_block3_2_conv (Conv2D)	(None, 56, 56, 64)	36928	conv2_block3_1_relu[0][0]
conv2_block3_2_bn (Batch Normalization)	(None, 56, 56, 64)	256	conv2_block3_2_conv[0][0]
conv2_block3_2_relu (Activation)	(None, 56, 56, 64)	0	conv2_block3_2_bn[0][0]
conv2_block3_3_conv (Conv2D)	(None, 56, 56, 256)	16640	conv2_block3_2_relu[0][0]
conv2_block3_3_bn (Batch Normalization)	(None, 56, 56, 256)	1024	conv2_block3_3_conv[0][0]
conv2_block3_add (Add)	(None, 56, 56, 256)	0	conv2_block3_3_bn[0][0]
conv2_block3_out (Activation)	(None, 56, 56, 256)	0	conv2_block3_add[0][0]
conv3_block1_1_conv (Conv2D)	(None, 28, 28, 128)	32896	conv2_block3_out[0][0]
conv3_block1_1_bn (Batch Normalization)	(None, 28, 28, 128)	512	conv3_block1_1_conv[0][0]
conv3_block1_1_relu (Activation)	(None, 28, 28, 128)	0	conv3_block1_1_bn[0][0]
conv3_block1_2_conv (Conv2D)	(None, 28, 28, 128)	147584	conv3_block1_1_relu[0][0]

conv3_block1_2_bn (BatchNormali ck1_2_conv[0][0])	(None, 28, 28, 128)	512	conv3_blo
conv3_block1_2_relu (Activation ck1_2_bn[0][0])	(None, 28, 28, 128)	0	conv3_blo
conv3_block1_0_conv (Conv2D) ck3_out[0][0])	(None, 28, 28, 512)	131584	conv2_blo
conv3_block1_3_conv (Conv2D) ck1_2_relu[0][0])	(None, 28, 28, 512)	66048	conv3_blo
conv3_block1_0_bn (BatchNormali ck1_0_conv[0][0])	(None, 28, 28, 512)	2048	conv3_blo
conv3_block1_3_bn (BatchNormali ck1_3_conv[0][0])	(None, 28, 28, 512)	2048	conv3_blo
conv3_block1_add (Add) ck1_0_bn[0][0])	(None, 28, 28, 512)	0	conv3_blo
ck1_3_bn[0][0])			conv3_blo
conv3_block1_out (Activation) ck1_add[0][0])	(None, 28, 28, 512)	0	conv3_blo
conv3_block2_1_conv (Conv2D) ck1_out[0][0])	(None, 28, 28, 128)	65664	conv3_blo
conv3_block2_1_bn (BatchNormali ck2_1_conv[0][0])	(None, 28, 28, 128)	512	conv3_blo
conv3_block2_1_relu (Activation ck2_1_bn[0][0])	(None, 28, 28, 128)	0	conv3_blo
conv3_block2_2_conv (Conv2D) ck2_1_relu[0][0])	(None, 28, 28, 128)	147584	conv3_blo
conv3_block2_2_bn (BatchNormali ck2_2_conv[0][0])	(None, 28, 28, 128)	512	conv3_blo
conv3_block2_2_relu (Activation ck2_2_bn[0][0])	(None, 28, 28, 128)	0	conv3_blo
conv3_block2_3_conv (Conv2D) ck2_2_relu[0][0])	(None, 28, 28, 512)	66048	conv3_blo

conv3_block2_3_bn (BatchNormali ck2_3_conv[0][0])	(None, 28, 28, 512)	2048	conv3_blo
conv3_block2_add (Add) ck1_out[0][0]	(None, 28, 28, 512)	0	conv3_blo
ck2_3_bn[0][0]			conv3_blo
conv3_block2_out (Activation) ck2_add[0][0]	(None, 28, 28, 512)	0	conv3_blo
conv3_block3_1_conv (Conv2D) ck2_out[0][0]	(None, 28, 28, 128)	65664	conv3_blo
conv3_block3_1_bn (BatchNormali ck3_1_conv[0][0])	(None, 28, 28, 128)	512	conv3_blo
conv3_block3_1_relu (Activation ck3_1_bn[0][0])	(None, 28, 28, 128)	0	conv3_blo
conv3_block3_2_conv (Conv2D) ck3_1_relu[0][0]	(None, 28, 28, 128)	147584	conv3_blo
conv3_block3_2_bn (BatchNormali ck3_2_conv[0][0])	(None, 28, 28, 128)	512	conv3_blo
conv3_block3_2_relu (Activation ck3_2_bn[0][0])	(None, 28, 28, 128)	0	conv3_blo
conv3_block3_3_conv (Conv2D) ck3_2_relu[0][0]	(None, 28, 28, 512)	66048	conv3_blo
conv3_block3_3_bn (BatchNormali ck3_3_conv[0][0])	(None, 28, 28, 512)	2048	conv3_blo
conv3_block3_add (Add) ck2_out[0][0]	(None, 28, 28, 512)	0	conv3_blo
ck3_3_bn[0][0]			conv3_blo
conv3_block3_out (Activation) ck3_add[0][0]	(None, 28, 28, 512)	0	conv3_blo
conv3_block4_1_conv (Conv2D) ck3_out[0][0]	(None, 28, 28, 128)	65664	conv3_blo

conv3_block4_1_bn (BatchNormali ck4_1_conv[0][0])	(None, 28, 28, 128)	512	conv3_blo
conv3_block4_1_relu (Activation ck4_1_bn[0][0])	(None, 28, 28, 128)	0	conv3_blo
conv3_block4_2_conv (Conv2D) ck4_1_relu[0][0])	(None, 28, 28, 128)	147584	conv3_blo
conv3_block4_2_bn (BatchNormali ck4_2_conv[0][0])	(None, 28, 28, 128)	512	conv3_blo
conv3_block4_2_relu (Activation ck4_2_bn[0][0])	(None, 28, 28, 128)	0	conv3_blo
conv3_block4_3_conv (Conv2D) ck4_2_relu[0][0])	(None, 28, 28, 512)	66048	conv3_blo
conv3_block4_3_bn (BatchNormali ck4_3_conv[0][0])	(None, 28, 28, 512)	2048	conv3_blo
conv3_block4_add (Add) ck3_out[0][0])	(None, 28, 28, 512)	0	conv3_blo
ck4_3_bn[0][0])			conv3_blo
conv3_block4_out (Activation) ck4_add[0][0])	(None, 28, 28, 512)	0	conv3_blo
conv4_block1_1_conv (Conv2D) ck4_out[0][0])	(None, 14, 14, 256)	131328	conv3_blo
conv4_block1_1_bn (BatchNormali ck1_1_conv[0][0])	(None, 14, 14, 256)	1024	conv4_blo
conv4_block1_1_relu (Activation ck1_1_bn[0][0])	(None, 14, 14, 256)	0	conv4_blo
conv4_block1_2_conv (Conv2D) ck1_1_relu[0][0])	(None, 14, 14, 256)	590080	conv4_blo
conv4_block1_2_bn (BatchNormali ck1_2_conv[0][0])	(None, 14, 14, 256)	1024	conv4_blo
conv4_block1_2_relu (Activation ck1_2_bn[0][0])	(None, 14, 14, 256)	0	conv4_blo

conv4_block1_0_conv (Conv2D)	(None, 14, 14, 1024)	525312	conv3_block4_out[0][0]
conv4_block1_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_block1_2_relu[0][0]
conv4_block1_0_bn (BatchNormali	(None, 14, 14, 1024)	4096	conv4_block1_0_conv[0][0]
conv4_block1_3_bn (BatchNormali	(None, 14, 14, 1024)	4096	conv4_block1_3_conv[0][0]
conv4_block1_add (Add)	(None, 14, 14, 1024)	0	conv4_block1_0_bn[0][0]
			conv4_block1_3_bn[0][0]
conv4_block1_out (Activation)	(None, 14, 14, 1024)	0	conv4_block1_add[0][0]
conv4_block2_1_conv (Conv2D)	(None, 14, 14, 256)	262400	conv4_block1_out[0][0]
conv4_block2_1_bn (BatchNormali	(None, 14, 14, 256)	1024	conv4_block2_1_conv[0][0]
conv4_block2_1_relu (Activation)	(None, 14, 14, 256)	0	conv4_block2_1_bn[0][0]
conv4_block2_2_conv (Conv2D)	(None, 14, 14, 256)	590080	conv4_block2_1_relu[0][0]
conv4_block2_2_bn (BatchNormali	(None, 14, 14, 256)	1024	conv4_block2_2_conv[0][0]
conv4_block2_2_relu (Activation)	(None, 14, 14, 256)	0	conv4_block2_2_bn[0][0]
conv4_block2_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_block2_2_relu[0][0]
conv4_block2_3_bn (BatchNormali	(None, 14, 14, 1024)	4096	conv4_block2_3_conv[0][0]
conv4_block2_add (Add)	(None, 14, 14, 1024)	0	conv4_block2_3_bn[0][0]

ck1_out[0][0]			conv4_blo
ck2_3_bn[0][0]			
conv4_block2_out (Activation)	(None, 14, 14, 1024) 0		conv4_blo
ck2_add[0][0]			
conv4_block3_1_conv (Conv2D)	(None, 14, 14, 256) 262400		conv4_blo
ck2_out[0][0]			
conv4_block3_1_bn (BatchNormali	(None, 14, 14, 256) 1024		conv4_blo
ck3_1_conv[0][0]			
conv4_block3_1_relu (Activation	(None, 14, 14, 256) 0		conv4_blo
ck3_1_bn[0][0]			
conv4_block3_2_conv (Conv2D)	(None, 14, 14, 256) 590080		conv4_blo
ck3_1_relu[0][0]			
conv4_block3_2_bn (BatchNormali	(None, 14, 14, 256) 1024		conv4_blo
ck3_2_conv[0][0]			
conv4_block3_2_relu (Activation	(None, 14, 14, 256) 0		conv4_blo
ck3_2_bn[0][0]			
conv4_block3_3_conv (Conv2D)	(None, 14, 14, 1024) 263168		conv4_blo
ck3_2_relu[0][0]			
conv4_block3_3_bn (BatchNormali	(None, 14, 14, 1024) 4096		conv4_blo
ck3_3_conv[0][0]			
conv4_block3_add (Add)	(None, 14, 14, 1024) 0		conv4_blo
ck2_out[0][0]			conv4_blo
ck3_3_bn[0][0]			
conv4_block3_out (Activation)	(None, 14, 14, 1024) 0		conv4_blo
ck3_add[0][0]			
conv4_block4_1_conv (Conv2D)	(None, 14, 14, 256) 262400		conv4_blo
ck3_out[0][0]			
conv4_block4_1_bn (BatchNormali	(None, 14, 14, 256) 1024		conv4_blo
ck4_1_conv[0][0]			
conv4_block4_1_relu (Activation	(None, 14, 14, 256) 0		conv4_blo
ck4_1_bn[0][0]			

conv4_block4_2_conv (Conv2D)	(None, 14, 14, 256)	590080	conv4_block4_1_relu[0][0]
conv4_block4_2_bn (BatchNormali	(None, 14, 14, 256)	1024	conv4_block4_2_conv[0][0]
conv4_block4_2_relu (Activation	(None, 14, 14, 256)	0	conv4_block4_2_bn[0][0]
conv4_block4_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_block4_2_relu[0][0]
conv4_block4_3_bn (BatchNormali	(None, 14, 14, 1024)	4096	conv4_block4_3_conv[0][0]
conv4_block4_add (Add)	(None, 14, 14, 1024)	0	conv4_block3_out[0][0]
			conv4_block4_3_bn[0][0]
conv4_block4_out (Activation)	(None, 14, 14, 1024)	0	conv4_block4_add[0][0]
conv4_block5_1_conv (Conv2D)	(None, 14, 14, 256)	262400	conv4_block4_out[0][0]
conv4_block5_1_bn (BatchNormali	(None, 14, 14, 256)	1024	conv4_block5_1_conv[0][0]
conv4_block5_1_relu (Activation	(None, 14, 14, 256)	0	conv4_block5_1_bn[0][0]
conv4_block5_2_conv (Conv2D)	(None, 14, 14, 256)	590080	conv4_block5_1_relu[0][0]
conv4_block5_2_bn (BatchNormali	(None, 14, 14, 256)	1024	conv4_block5_2_conv[0][0]
conv4_block5_2_relu (Activation	(None, 14, 14, 256)	0	conv4_block5_2_bn[0][0]
conv4_block5_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_block5_2_relu[0][0]
conv4_block5_3_bn (BatchNormali	(None, 14, 14, 1024)	4096	conv4_block5_3_conv[0][0]

ck5_3_conv[0][0]

conv4_block5_add (Add)	(None, 14, 14, 1024) 0	conv4_blo
ck4_out[0][0]		conv4_blo
ck5_3_bn[0][0]		

conv4_block5_out (Activation)	(None, 14, 14, 1024) 0	conv4_blo
ck5_add[0][0]		

conv4_block6_1_conv (Conv2D)	(None, 14, 14, 256) 262400	conv4_blo
ck5_out[0][0]		

conv4_block6_1_bn (BatchNormali	(None, 14, 14, 256) 1024	conv4_blo
ck6_1_conv[0][0]		

conv4_block6_1_relu (Activation	(None, 14, 14, 256) 0	conv4_blo
ck6_1_bn[0][0]		

conv4_block6_2_conv (Conv2D)	(None, 14, 14, 256) 590080	conv4_blo
ck6_1_relu[0][0]		

conv4_block6_2_bn (BatchNormali	(None, 14, 14, 256) 1024	conv4_blo
ck6_2_conv[0][0]		

conv4_block6_2_relu (Activation	(None, 14, 14, 256) 0	conv4_blo
ck6_2_bn[0][0]		

conv4_block6_3_conv (Conv2D)	(None, 14, 14, 1024) 263168	conv4_blo
ck6_2_relu[0][0]		

conv4_block6_3_bn (BatchNormali	(None, 14, 14, 1024) 4096	conv4_blo
ck6_3_conv[0][0]		

conv4_block6_add (Add)	(None, 14, 14, 1024) 0	conv4_blo
ck5_out[0][0]		conv4_blo
ck6_3_bn[0][0]		

conv4_block6_out (Activation)	(None, 14, 14, 1024) 0	conv4_blo
ck6_add[0][0]		

conv4_block7_1_conv (Conv2D)	(None, 14, 14, 256) 262400	conv4_blo
ck6_out[0][0]		

conv4_block7_1_bn (BatchNormali	(None, 14, 14, 256) 1024	conv4_blo
ck7_1_conv[0][0]		

conv4_block7_1_relu (Activation (None, 14, 14, 256) 0	conv4_block7_1_bn[0][0]
conv4_block7_2_conv (Conv2D) (None, 14, 14, 256) 590080	conv4_block7_2_relu[0][0]
conv4_block7_2_bn (BatchNormali (None, 14, 14, 256) 1024	conv4_block7_2_conv[0][0]
conv4_block7_2_relu (Activation (None, 14, 14, 256) 0	conv4_block7_2_bn[0][0]
conv4_block7_3_conv (Conv2D) (None, 14, 14, 1024) 263168	conv4_block7_2_relu[0][0]
conv4_block7_3_bn (BatchNormali (None, 14, 14, 1024) 4096	conv4_block7_3_conv[0][0]
conv4_block7_add (Add) (None, 14, 14, 1024) 0	conv4_block7_3_bn[0][0]
conv4_block7_out (Activation) (None, 14, 14, 1024) 0	conv4_block7_add[0][0]
conv4_block8_1_conv (Conv2D) (None, 14, 14, 256) 262400	conv4_block8_1_conv[0][0]
conv4_block8_1_bn (BatchNormali (None, 14, 14, 256) 1024	conv4_block8_1_conv[0][0]
conv4_block8_1_relu (Activation (None, 14, 14, 256) 0	conv4_block8_1_bn[0][0]
conv4_block8_2_conv (Conv2D) (None, 14, 14, 256) 590080	conv4_block8_1_relu[0][0]
conv4_block8_2_bn (BatchNormali (None, 14, 14, 256) 1024	conv4_block8_2_conv[0][0]
conv4_block8_2_relu (Activation (None, 14, 14, 256) 0	conv4_block8_2_bn[0][0]
conv4_block8_3_conv (Conv2D) (None, 14, 14, 1024) 263168	conv4_block8_2_relu[0][0]

ck8_2_relu[0][0]

conv4_block8_3_bn (BatchNormali	(None, 14, 14, 1024)	4096	conv4_blo
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ck8_3_conv[0][0]

conv4_block8_add (Add)	(None, 14, 14, 1024)	0	conv4_blo
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ck7_out[0][0]

ck8_3_bn[0][0]

conv4_block8_out (Activation)	(None, 14, 14, 1024)	0	conv4_blo
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ck8_add[0][0]

conv4_block9_1_conv (Conv2D)	(None, 14, 14, 256)	262400	conv4_blo
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ck8_out[0][0]

conv4_block9_1_bn (BatchNormali	(None, 14, 14, 256)	1024	conv4_blo
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ck9_1_conv[0][0]

conv4_block9_1_relu (Activation	(None, 14, 14, 256)	0	conv4_blo
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ck9_1_bn[0][0]

conv4_block9_2_conv (Conv2D)	(None, 14, 14, 256)	590080	conv4_blo
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ck9_1_relu[0][0]

conv4_block9_2_bn (BatchNormali	(None, 14, 14, 256)	1024	conv4_blo
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ck9_2_conv[0][0]

conv4_block9_2_relu (Activation	(None, 14, 14, 256)	0	conv4_blo
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ck9_2_bn[0][0]

conv4_block9_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_blo
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ck9_2_relu[0][0]

conv4_block9_3_bn (BatchNormali	(None, 14, 14, 1024)	4096	conv4_blo
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ck9_3_conv[0][0]

conv4_block9_add (Add)	(None, 14, 14, 1024)	0	conv4_blo
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ck8_out[0][0]

ck9_3_bn[0][0]

conv4_block9_out (Activation)	(None, 14, 14, 1024)	0	conv4_blo
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ck9_add[0][0]

conv4_block10_1_conv (Conv2D)	(None, 14, 14, 256)	262400	conv4_blo
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ck9_out[0][0]

conv4_block10_1_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_block10_1_conv[0][0]
conv4_block10_1_relu (Activatio	(None, 14, 14, 256)	0	conv4_block10_1_bn[0][0]
conv4_block10_2_conv (Conv2D)	(None, 14, 14, 256)	590080	conv4_block10_1_relu[0][0]
conv4_block10_2_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_block10_2_conv[0][0]
conv4_block10_2_relu (Activatio	(None, 14, 14, 256)	0	conv4_block10_2_bn[0][0]
conv4_block10_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_block10_2_relu[0][0]
conv4_block10_3_bn (BatchNormal	(None, 14, 14, 1024)	4096	conv4_block10_3_conv[0][0]
conv4_block10_add (Add)	(None, 14, 14, 1024)	0	conv4_block9_out[0][0]
			conv4_block10_3_bn[0][0]
conv4_block10_out (Activation)	(None, 14, 14, 1024)	0	conv4_block10_add[0][0]
conv4_block11_1_conv (Conv2D)	(None, 14, 14, 256)	262400	conv4_block10_out[0][0]
conv4_block11_1_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_block11_1_conv[0][0]
conv4_block11_1_relu (Activatio	(None, 14, 14, 256)	0	conv4_block11_1_bn[0][0]
conv4_block11_2_conv (Conv2D)	(None, 14, 14, 256)	590080	conv4_block11_1_relu[0][0]
conv4_block11_2_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_block11_2_conv[0][0]
conv4_block11_2_relu (Activatio	(None, 14, 14, 256)	0	conv4_block11_2_bn[0][0]

ck11_2_bn[0][0]

conv4_block11_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_block11_2_relu[0][0]
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conv4_block11_3_bn (BatchNormal	(None, 14, 14, 1024)	4096	conv4_block11_3_conv[0][0]
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conv4_block11_add (Add)	(None, 14, 14, 1024)	0	conv4_block10_out[0][0]
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conv4_block11_3_bn[0][0]

conv4_block11_out (Activation)	(None, 14, 14, 1024)	0	conv4_block11_add[0][0]
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conv4_block12_1_conv (Conv2D)	(None, 14, 14, 256)	262400	conv4_block11_out[0][0]
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conv4_block12_1_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_block12_1_conv[0][0]
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conv4_block12_1_relu (Activation)	(None, 14, 14, 256)	0	conv4_block12_1_bn[0][0]
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conv4_block12_2_conv (Conv2D)	(None, 14, 14, 256)	590080	conv4_block12_1_relu[0][0]
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conv4_block12_2_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_block12_2_conv[0][0]
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conv4_block12_2_relu (Activation)	(None, 14, 14, 256)	0	conv4_block12_2_bn[0][0]
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conv4_block12_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_block12_2_relu[0][0]
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conv4_block12_3_bn (BatchNormal	(None, 14, 14, 1024)	4096	conv4_block12_3_conv[0][0]
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conv4_block12_add (Add)	(None, 14, 14, 1024)	0	conv4_block12_3_bn[0][0]
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conv4_block12_3_bn[0][0]

conv4_block12_out (Activation)	(None, 14, 14, 1024)	0	conv4_block12_add[0][0]
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conv4_block13_1_conv (Conv2D)	(None, 14, 14, 256)	262400	conv4_block12_out[0][0]
conv4_block13_1_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_block13_1_conv[0][0]
conv4_block13_1_relu (Activatio	(None, 14, 14, 256)	0	conv4_block13_1_bn[0][0]
conv4_block13_2_conv (Conv2D)	(None, 14, 14, 256)	590080	conv4_block13_1_relu[0][0]
conv4_block13_2_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_block13_2_conv[0][0]
conv4_block13_2_relu (Activatio	(None, 14, 14, 256)	0	conv4_block13_2_bn[0][0]
conv4_block13_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_block13_2_relu[0][0]
conv4_block13_3_bn (BatchNormal	(None, 14, 14, 1024)	4096	conv4_block13_3_conv[0][0]
conv4_block13_add (Add)	(None, 14, 14, 1024)	0	conv4_block12_out[0][0]
conv4_block13_out (Activation)	(None, 14, 14, 1024)	0	conv4_block13_3_bn[0][0]
conv4_block14_1_conv (Conv2D)	(None, 14, 14, 256)	262400	conv4_block13_out[0][0]
conv4_block14_1_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_block14_1_conv[0][0]
conv4_block14_1_relu (Activatio	(None, 14, 14, 256)	0	conv4_block14_1_bn[0][0]
conv4_block14_2_conv (Conv2D)	(None, 14, 14, 256)	590080	conv4_block14_1_relu[0][0]
conv4_block14_2_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_block14_2_conv[0][0]

ck14_2_conv[0][0]

conv4_block14_2_relu (Activation)	(None, 14, 14, 256)	0	conv4_block14_2_bn[0][0]
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conv4_block14_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_block14_2_relu[0][0]
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conv4_block14_3_bn (Batch Normalization)	(None, 14, 14, 1024)	4096	conv4_block14_3_conv[0][0]
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conv4_block14_add (Add)	(None, 14, 14, 1024)	0	conv4_block13_out[0][0]
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			conv4_block14_3_bn[0][0]
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conv4_block14_out (Activation)	(None, 14, 14, 1024)	0	conv4_block14_add[0][0]
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conv4_block15_1_conv (Conv2D)	(None, 14, 14, 256)	262400	conv4_block14_out[0][0]
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conv4_block15_1_bn (Batch Normalization)	(None, 14, 14, 256)	1024	conv4_block15_1_conv[0][0]
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conv4_block15_1_relu (Activation)	(None, 14, 14, 256)	0	conv4_block15_1_bn[0][0]
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conv4_block15_2_conv (Conv2D)	(None, 14, 14, 256)	590080	conv4_block15_1_relu[0][0]
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conv4_block15_2_bn (Batch Normalization)	(None, 14, 14, 256)	1024	conv4_block15_2_conv[0][0]
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conv4_block15_2_relu (Activation)	(None, 14, 14, 256)	0	conv4_block15_2_bn[0][0]
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conv4_block15_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_block15_2_relu[0][0]
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conv4_block15_3_bn (Batch Normalization)	(None, 14, 14, 1024)	4096	conv4_block15_3_conv[0][0]
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conv4_block15_add (Add)	(None, 14, 14, 1024)	0	conv4_block14_out[0][0]
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			conv4_block15_3_bn[0][0]
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conv4_block15_out (Activation)	(None, 14, 14, 1024)	0	conv4_block15_add[0][0]
conv4_block16_1_conv (Conv2D)	(None, 14, 14, 256)	262400	conv4_block15_out[0][0]
conv4_block16_1_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_block16_1_conv[0][0]
conv4_block16_1_relu (Activatio	(None, 14, 14, 256)	0	conv4_block16_1_bn[0][0]
conv4_block16_2_conv (Conv2D)	(None, 14, 14, 256)	590080	conv4_block16_1_relu[0][0]
conv4_block16_2_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_block16_2_conv[0][0]
conv4_block16_2_relu (Activatio	(None, 14, 14, 256)	0	conv4_block16_2_bn[0][0]
conv4_block16_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_block16_2_relu[0][0]
conv4_block16_3_bn (BatchNormal	(None, 14, 14, 1024)	4096	conv4_block16_3_conv[0][0]
conv4_block16_add (Add)	(None, 14, 14, 1024)	0	conv4_block15_out[0][0]
conv4_block16_out (Activation)	(None, 14, 14, 1024)	0	conv4_block16_3_bn[0][0]
conv4_block17_1_conv (Conv2D)	(None, 14, 14, 256)	262400	conv4_block16_out[0][0]
conv4_block17_1_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_block17_1_conv[0][0]
conv4_block17_1_relu (Activatio	(None, 14, 14, 256)	0	conv4_block17_1_bn[0][0]
conv4_block17_2_conv (Conv2D)	(None, 14, 14, 256)	590080	conv4_block17_1_relu[0][0]

ck17_1_relu[0][0]

conv4_block17_2_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_blo
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ck17_2_conv[0][0]

conv4_block17_2_relu (Activatio	(None, 14, 14, 256)	0	conv4_blo
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ck17_2_bn[0][0]

conv4_block17_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_blo
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ck17_2_relu[0][0]

conv4_block17_3_bn (BatchNormal	(None, 14, 14, 1024)	4096	conv4_blo
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ck17_3_conv[0][0]

conv4_block17_add (Add)	(None, 14, 14, 1024)	0	conv4_blo
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ck16_out[0][0]

ck17_3_bn[0][0]

conv4_block17_out (Activation)	(None, 14, 14, 1024)	0	conv4_blo
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ck17_add[0][0]

conv4_block18_1_conv (Conv2D)	(None, 14, 14, 256)	262400	conv4_blo
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ck17_out[0][0]

conv4_block18_1_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_blo
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ck18_1_conv[0][0]

conv4_block18_1_relu (Activatio	(None, 14, 14, 256)	0	conv4_blo
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ck18_1_bn[0][0]

conv4_block18_2_conv (Conv2D)	(None, 14, 14, 256)	590080	conv4_blo
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ck18_1_relu[0][0]

conv4_block18_2_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_blo
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ck18_2_conv[0][0]

conv4_block18_2_relu (Activatio	(None, 14, 14, 256)	0	conv4_blo
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ck18_2_bn[0][0]

conv4_block18_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_blo
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ck18_2_relu[0][0]

conv4_block18_3_bn (BatchNormal	(None, 14, 14, 1024)	4096	conv4_blo
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ck18_3_conv[0][0]

conv4_block18_add (Add)	(None, 14, 14, 1024) 0	conv4_blo
ck17_out[0][0]		conv4_blo
ck18_3_bn[0][0]		
conv4_block18_out (Activation)	(None, 14, 14, 1024) 0	conv4_blo
ck18_add[0][0]		
conv4_block19_1_conv (Conv2D)	(None, 14, 14, 256) 262400	conv4_blo
ck18_out[0][0]		
conv4_block19_1_bn (BatchNormal	(None, 14, 14, 256) 1024	conv4_blo
ck19_1_conv[0][0]		
conv4_block19_1_relu (Activatio	(None, 14, 14, 256) 0	conv4_blo
ck19_1_bn[0][0]		
conv4_block19_2_conv (Conv2D)	(None, 14, 14, 256) 590080	conv4_blo
ck19_1_relu[0][0]		
conv4_block19_2_bn (BatchNormal	(None, 14, 14, 256) 1024	conv4_blo
ck19_2_conv[0][0]		
conv4_block19_2_relu (Activatio	(None, 14, 14, 256) 0	conv4_blo
ck19_2_bn[0][0]		
conv4_block19_3_conv (Conv2D)	(None, 14, 14, 1024) 263168	conv4_blo
ck19_2_relu[0][0]		
conv4_block19_3_bn (BatchNormal	(None, 14, 14, 1024) 4096	conv4_blo
ck19_3_conv[0][0]		
conv4_block19_add (Add)	(None, 14, 14, 1024) 0	conv4_blo
ck18_out[0][0]		conv4_blo
ck19_3_bn[0][0]		
conv4_block19_out (Activation)	(None, 14, 14, 1024) 0	conv4_blo
ck19_add[0][0]		
conv4_block20_1_conv (Conv2D)	(None, 14, 14, 256) 262400	conv4_blo
ck19_out[0][0]		
conv4_block20_1_bn (BatchNormal	(None, 14, 14, 256) 1024	conv4_blo
ck20_1_conv[0][0]		
conv4_block20_1_relu (Activatio	(None, 14, 14, 256) 0	conv4_blo

ck20_1_bn[0][0]

conv4_block20_2_conv (Conv2D)	(None, 14, 14, 256)	590080	conv4_block20_1_relu[0][0]
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conv4_block20_2_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_block20_2_conv[0][0]
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conv4_block20_2_relu (Activatio	(None, 14, 14, 256)	0	conv4_block20_2_bn[0][0]
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conv4_block20_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_block20_2_relu[0][0]
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conv4_block20_3_bn (BatchNormal	(None, 14, 14, 1024)	4096	conv4_block20_3_conv[0][0]
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conv4_block20_add (Add)	(None, 14, 14, 1024)	0	conv4_block19_out[0][0]
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ck20_3_bn[0][0]			conv4_block20_add[0][0]
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conv4_block20_out (Activation)	(None, 14, 14, 1024)	0	conv4_block20_3_bn[0][0]
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conv4_block21_1_conv (Conv2D)	(None, 14, 14, 256)	262400	conv4_block20_out[0][0]
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conv4_block21_1_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_block21_1_conv[0][0]
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conv4_block21_1_relu (Activatio	(None, 14, 14, 256)	0	conv4_block21_1_bn[0][0]
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conv4_block21_2_conv (Conv2D)	(None, 14, 14, 256)	590080	conv4_block21_1_relu[0][0]
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conv4_block21_2_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_block21_2_conv[0][0]
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conv4_block21_2_relu (Activatio	(None, 14, 14, 256)	0	conv4_block21_2_bn[0][0]
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conv4_block21_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_block21_2_relu[0][0]
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conv4_block21_3_bn (BatchNormal	(None, 14, 14, 1024)	4096	conv4_blo
ck21_3_conv[0][0]			
<hr/>			
conv4_block21_add (Add)	(None, 14, 14, 1024)	0	conv4_blo
ck20_out[0][0]			
			conv4_blo
ck21_3_bn[0][0]			
<hr/>			
conv4_block21_out (Activation)	(None, 14, 14, 1024)	0	conv4_blo
ck21_add[0][0]			
<hr/>			
conv4_block22_1_conv (Conv2D)	(None, 14, 14, 256)	262400	conv4_blo
ck21_out[0][0]			
<hr/>			
conv4_block22_1_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_blo
ck22_1_conv[0][0]			
<hr/>			
conv4_block22_1_relu (Activatio	(None, 14, 14, 256)	0	conv4_blo
ck22_1_bn[0][0]			
<hr/>			
conv4_block22_2_conv (Conv2D)	(None, 14, 14, 256)	590080	conv4_blo
ck22_1_relu[0][0]			
<hr/>			
conv4_block22_2_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_blo
ck22_2_conv[0][0]			
<hr/>			
conv4_block22_2_relu (Activatio	(None, 14, 14, 256)	0	conv4_blo
ck22_2_bn[0][0]			
<hr/>			
conv4_block22_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_blo
ck22_2_relu[0][0]			
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conv4_block22_3_bn (BatchNormal	(None, 14, 14, 1024)	4096	conv4_blo
ck22_3_conv[0][0]			
<hr/>			
conv4_block22_add (Add)	(None, 14, 14, 1024)	0	conv4_blo
ck21_out[0][0]			
			conv4_blo
ck22_3_bn[0][0]			
<hr/>			
conv4_block22_out (Activation)	(None, 14, 14, 1024)	0	conv4_blo
ck22_add[0][0]			
<hr/>			
conv4_block23_1_conv (Conv2D)	(None, 14, 14, 256)	262400	conv4_blo
ck22_out[0][0]			
<hr/>			
conv4_block23_1_bn (BatchNormal	(None, 14, 14, 256)	1024	conv4_blo

ck23_1_conv[0][0]

conv4_block23_1_relu (Activation)	(None, 14, 14, 256)	0	conv4_block23_1_bn[0][0]
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conv4_block23_2_conv (Conv2D)	(None, 14, 14, 256)	590080	conv4_block23_1_relu[0][0]
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conv4_block23_2_bn (Batch Normalization)	(None, 14, 14, 256)	1024	conv4_block23_2_conv[0][0]
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conv4_block23_2_relu (Activation)	(None, 14, 14, 256)	0	conv4_block23_2_bn[0][0]
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conv4_block23_3_conv (Conv2D)	(None, 14, 14, 1024)	263168	conv4_block23_2_relu[0][0]
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conv4_block23_3_bn (Batch Normalization)	(None, 14, 14, 1024)	4096	conv4_block23_3_conv[0][0]
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conv4_block23_add (Add)	(None, 14, 14, 1024)	0	conv4_block23_3_bn[0][0]
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ck23_3_bn[0][0]

conv4_block23_out (Activation)	(None, 14, 14, 1024)	0	conv4_block23_add[0][0]
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conv5_block1_1_conv (Conv2D)	(None, 7, 7, 512)	524800	conv4_block23_out[0][0]
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conv5_block1_1_bn (Batch Normalization)	(None, 7, 7, 512)	2048	conv5_block1_1_conv[0][0]
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conv5_block1_1_relu (Activation)	(None, 7, 7, 512)	0	conv5_block1_1_bn[0][0]
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conv5_block1_2_conv (Conv2D)	(None, 7, 7, 512)	2359808	conv5_block1_1_relu[0][0]
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conv5_block1_2_bn (Batch Normalization)	(None, 7, 7, 512)	2048	conv5_block1_2_conv[0][0]
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conv5_block1_2_relu (Activation)	(None, 7, 7, 512)	0	conv5_block1_2_bn[0][0]
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conv5_block1_0_conv (Conv2D)	(None, 7, 7, 2048)	2099200	conv4_block23_out[0][0]
<hr/>			
conv5_block1_3_conv (Conv2D)	(None, 7, 7, 2048)	1050624	conv5_block1_2_relu[0][0]
<hr/>			
conv5_block1_0_bn (Batch Normalization)	(None, 7, 7, 2048)	8192	conv5_block1_0_conv[0][0]
<hr/>			
conv5_block1_3_bn (Batch Normalization)	(None, 7, 7, 2048)	8192	conv5_block1_3_conv[0][0]
<hr/>			
conv5_block1_add (Add)	(None, 7, 7, 2048)	0	conv5_block1_0_bn[0][0]
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			conv5_block1_3_bn[0][0]
<hr/>			
conv5_block1_out (Activation)	(None, 7, 7, 2048)	0	conv5_block1_add[0][0]
<hr/>			
conv5_block2_1_conv (Conv2D)	(None, 7, 7, 512)	1049088	conv5_block1_out[0][0]
<hr/>			
conv5_block2_1_bn (Batch Normalization)	(None, 7, 7, 512)	2048	conv5_block2_1_conv[0][0]
<hr/>			
conv5_block2_1_relu (Activation)	(None, 7, 7, 512)	0	conv5_block2_1_bn[0][0]
<hr/>			
conv5_block2_2_conv (Conv2D)	(None, 7, 7, 512)	2359808	conv5_block2_1_relu[0][0]
<hr/>			
conv5_block2_2_bn (Batch Normalization)	(None, 7, 7, 512)	2048	conv5_block2_2_conv[0][0]
<hr/>			
conv5_block2_2_relu (Activation)	(None, 7, 7, 512)	0	conv5_block2_2_bn[0][0]
<hr/>			
conv5_block2_3_conv (Conv2D)	(None, 7, 7, 2048)	1050624	conv5_block2_2_relu[0][0]
<hr/>			
conv5_block2_3_bn (Batch Normalization)	(None, 7, 7, 2048)	8192	conv5_block2_3_conv[0][0]
<hr/>			
conv5_block2_add (Add)	(None, 7, 7, 2048)	0	conv5_block2_3_bn[0][0]
<hr/>			
			conv5_block2_add[0][0]
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ck2_3_bn[0][0]

conv5_block2_out (Activation)	(None, 7, 7, 2048)	0	conv5_block2_add[0][0]
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conv5_block3_1_conv (Conv2D)	(None, 7, 7, 512)	1049088	conv5_block3_1_conv[0][0]
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conv5_block3_1_bn (Batch Normalization)	(None, 7, 7, 512)	2048	conv5_block3_1_bn[0][0]
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conv5_block3_1_relu (Activation)	(None, 7, 7, 512)	0	conv5_block3_1_relu[0][0]
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conv5_block3_2_conv (Conv2D)	(None, 7, 7, 512)	2359808	conv5_block3_2_conv[0][0]
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conv5_block3_2_bn (Batch Normalization)	(None, 7, 7, 512)	2048	conv5_block3_2_bn[0][0]
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conv5_block3_2_relu (Activation)	(None, 7, 7, 512)	0	conv5_block3_2_relu[0][0]
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conv5_block3_3_conv (Conv2D)	(None, 7, 7, 2048)	1050624	conv5_block3_3_conv[0][0]
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conv5_block3_3_bn (Batch Normalization)	(None, 7, 7, 2048)	8192	conv5_block3_3_bn[0][0]
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conv5_block3_add (Add)	(None, 7, 7, 2048)	0	conv5_block3_add[0][0]
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ck3_3_bn[0][0]

conv5_block3_out (Activation)	(None, 7, 7, 2048)	0	conv5_block3_out[0][0]
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global_average_pooling2d_1 (Global Average Pooling)	(None, 2048)	0	conv5_block3_out[0][0]
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dropout_1 (Dropout)	(None, 2048)	0	global_average_pooling2d_1[0][0]
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dense_1 (Dense)	(None, 3)	6147	dropout_1[0][0]
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Total params: 42,664,323
Trainable params: 42,558,979
Non-trainable params: 105,344

In []:

```
import pickle
X = pickle.load(open("/content/drive/My Drive/Skin Cancer DATA/equal/X_equal.pickle",
"rb"))
y = pickle.load(open("/content/drive/My Drive/Skin Cancer DATA/equal/y_equal.pickle",
"rb"))
```

In []:

```
history_mob = model.fit(X, y, epochs = 100, batch_size = 32, validation_split = 0.2)

from keras.models import model_from_json
from keras.models import load_model
model_json = model.to_json()
with open("/content/drive/My Drive/Skin Cancer DATA/modelresnet50imgSkin.json", "w") as json_file :
    json_file.write(model_json)

model.save_weights("/content/drive/My Drive/Skin Cancer DATA/modelresnet50imgSkin.h5")
print("Saved model to disk")

model.save('/content/drive/My Drive/Skin Cancer DATA/CNNResNest50imgSkin.model')

import matplotlib.pyplot as plt

print(history_mob.history.keys())
plt.figure(1)
plt.plot(history_mob.history['accuracy'])
plt.plot(history_mob.history['val_accuracy'])
plt.title('ResNet101 accuracy')
plt.ylabel('accuracy')
plt.xlabel('epoch')
plt.legend(['Train', 'Validation'], loc='upper left')
plt.show()

print(history_mob.history.keys())
plt.figure(2)
plt.plot(history_mob.history['loss'])
plt.plot(history_mob.history['val_loss'])
plt.title('ResNet101 loss')
plt.ylabel('loss')
plt.xlabel('epoch')
plt.legend(['Train', 'Validation'], loc='upper left')
plt.show()
```

Train on 8516 samples, validate on 2129 samples

Epoch 1/100

8516/8516 [=====] - 209s 25ms/step - loss: 0.3571
- accuracy: 0.8734 - val_loss: 0.2396 - val_accuracy: 0.9234

Epoch 2/100

8516/8516 [=====] - 160s 19ms/step - loss: 0.1382
- accuracy: 0.9523 - val_loss: 0.4229 - val_accuracy: 0.8849

Epoch 3/100

8516/8516 [=====] - 161s 19ms/step - loss: 0.0876
- accuracy: 0.9712 - val_loss: 0.2752 - val_accuracy: 0.9037

Epoch 4/100

8516/8516 [=====] - 160s 19ms/step - loss: 0.0587
- accuracy: 0.9803 - val_loss: 0.6433 - val_accuracy: 0.8159

Epoch 5/100

8516/8516 [=====] - 160s 19ms/step - loss: 0.0962
- accuracy: 0.9675 - val_loss: 0.4770 - val_accuracy: 0.8727

Epoch 6/100

8516/8516 [=====] - 159s 19ms/step - loss: 0.0422
- accuracy: 0.9863 - val_loss: 0.2488 - val_accuracy: 0.9380

Epoch 7/100

8516/8516 [=====] - 160s 19ms/step - loss: 0.0645
- accuracy: 0.9800 - val_loss: 0.2335 - val_accuracy: 0.9394

Epoch 8/100

8516/8516 [=====] - 160s 19ms/step - loss: 0.0221
- accuracy: 0.9925 - val_loss: 0.2000 - val_accuracy: 0.9521

Epoch 9/100

8516/8516 [=====] - 160s 19ms/step - loss: 0.0618
- accuracy: 0.9791 - val_loss: 0.2347 - val_accuracy: 0.9408

Epoch 10/100

8516/8516 [=====] - 160s 19ms/step - loss: 0.0413
- accuracy: 0.9873 - val_loss: 0.2213 - val_accuracy: 0.9460

Epoch 11/100

8516/8516 [=====] - 160s 19ms/step - loss: 0.0230
- accuracy: 0.9928 - val_loss: 0.2059 - val_accuracy: 0.9507

Epoch 12/100

8516/8516 [=====] - 160s 19ms/step - loss: 0.0216
- accuracy: 0.9937 - val_loss: 0.3403 - val_accuracy: 0.9178

Epoch 13/100

8516/8516 [=====] - 160s 19ms/step - loss: 0.0959
- accuracy: 0.9728 - val_loss: 0.2432 - val_accuracy: 0.9267

Epoch 14/100

8516/8516 [=====] - 160s 19ms/step - loss: 0.0141
- accuracy: 0.9953 - val_loss: 0.1568 - val_accuracy: 0.9615

Epoch 15/100

8516/8516 [=====] - 160s 19ms/step - loss: 0.0066
- accuracy: 0.9978 - val_loss: 0.2259 - val_accuracy: 0.9526

Epoch 16/100

8516/8516 [=====] - 160s 19ms/step - loss: 0.0199
- accuracy: 0.9933 - val_loss: 0.1592 - val_accuracy: 0.9610

Epoch 17/100

8516/8516 [=====] - 160s 19ms/step - loss: 0.0352
- accuracy: 0.9888 - val_loss: 0.1921 - val_accuracy: 0.9469

Epoch 18/100

8516/8516 [=====] - 161s 19ms/step - loss: 0.0371
- accuracy: 0.9890 - val_loss: 0.2256 - val_accuracy: 0.9549

Epoch 19/100

8516/8516 [=====] - 161s 19ms/step - loss: 0.0349
- accuracy: 0.9884 - val_loss: 0.2319 - val_accuracy: 0.9497

Epoch 20/100

8516/8516 [=====] - 161s 19ms/step - loss: 0.0086
- accuracy: 0.9966 - val_loss: 0.2606 - val_accuracy: 0.9422

Epoch 21/100
8516/8516 [=====] - 161s 19ms/step - loss: 0.0208
- accuracy: 0.9937 - val_loss: 0.2337 - val_accuracy: 0.9479

Epoch 22/100
8516/8516 [=====] - 161s 19ms/step - loss: 0.0452
- accuracy: 0.9860 - val_loss: 0.5325 - val_accuracy: 0.8408

Epoch 23/100
8516/8516 [=====] - 161s 19ms/step - loss: 0.0341
- accuracy: 0.9903 - val_loss: 0.4182 - val_accuracy: 0.9258

Epoch 24/100
8516/8516 [=====] - 160s 19ms/step - loss: 0.0055
- accuracy: 0.9980 - val_loss: 0.2057 - val_accuracy: 0.9615

Epoch 25/100
8516/8516 [=====] - 160s 19ms/step - loss: 0.0089
- accuracy: 0.9971 - val_loss: 0.2185 - val_accuracy: 0.9526

Epoch 26/100
8516/8516 [=====] - 160s 19ms/step - loss: 0.0385
- accuracy: 0.9870 - val_loss: 0.3688 - val_accuracy: 0.9159

Epoch 27/100
8516/8516 [=====] - 160s 19ms/step - loss: 0.0214
- accuracy: 0.9927 - val_loss: 0.4774 - val_accuracy: 0.8751

Epoch 28/100
8516/8516 [=====] - 160s 19ms/step - loss: 0.0201
- accuracy: 0.9932 - val_loss: 0.2017 - val_accuracy: 0.9516

Epoch 29/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0304
- accuracy: 0.9920 - val_loss: 0.2111 - val_accuracy: 0.9558

Epoch 30/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0169
- accuracy: 0.9955 - val_loss: 0.2131 - val_accuracy: 0.9507

Epoch 31/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0060
- accuracy: 0.9987 - val_loss: 0.2098 - val_accuracy: 0.9554

Epoch 32/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0035
- accuracy: 0.9985 - val_loss: 0.2029 - val_accuracy: 0.9591

Epoch 33/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0031
- accuracy: 0.9987 - val_loss: 0.2821 - val_accuracy: 0.9488

Epoch 34/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0174
- accuracy: 0.9947 - val_loss: 0.2629 - val_accuracy: 0.9399

Epoch 35/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0178
- accuracy: 0.9944 - val_loss: 0.2805 - val_accuracy: 0.9192

Epoch 36/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0437
- accuracy: 0.9872 - val_loss: 0.2666 - val_accuracy: 0.9295

Epoch 37/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0203
- accuracy: 0.9930 - val_loss: 0.2521 - val_accuracy: 0.9493

Epoch 38/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0188
- accuracy: 0.9942 - val_loss: 0.5041 - val_accuracy: 0.8967

Epoch 39/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0258
- accuracy: 0.9926 - val_loss: 0.2576 - val_accuracy: 0.9418

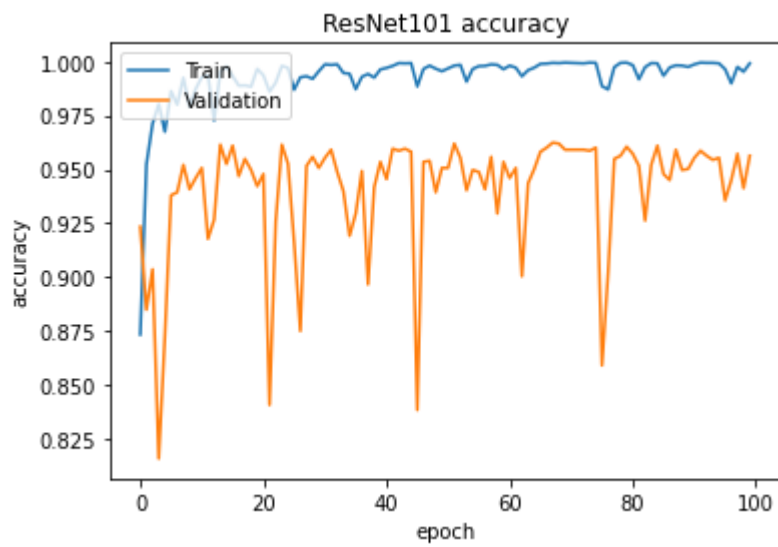
Epoch 40/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0108
- accuracy: 0.9964 - val_loss: 0.2094 - val_accuracy: 0.9535

Epoch 41/100

8516/8516 [=====] - 158s 19ms/step - loss: 0.0104
- accuracy: 0.9971 - val_loss: 0.2334 - val_accuracy: 0.9455
Epoch 42/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0052
- accuracy: 0.9980 - val_loss: 0.2230 - val_accuracy: 0.9596
Epoch 43/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0017
- accuracy: 0.9993 - val_loss: 0.2344 - val_accuracy: 0.9587
Epoch 44/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0015
- accuracy: 0.9992 - val_loss: 0.2250 - val_accuracy: 0.9596
Epoch 45/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0013
- accuracy: 0.9993 - val_loss: 0.2233 - val_accuracy: 0.9582
Epoch 46/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0368
- accuracy: 0.9885 - val_loss: 0.8132 - val_accuracy: 0.8384
Epoch 47/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0118
- accuracy: 0.9966 - val_loss: 0.2319 - val_accuracy: 0.9535
Epoch 48/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0076
- accuracy: 0.9981 - val_loss: 0.2497 - val_accuracy: 0.9540
Epoch 49/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0088
- accuracy: 0.9967 - val_loss: 0.2757 - val_accuracy: 0.9394
Epoch 50/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0126
- accuracy: 0.9955 - val_loss: 0.2387 - val_accuracy: 0.9507
Epoch 51/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0109
- accuracy: 0.9968 - val_loss: 0.2582 - val_accuracy: 0.9507
Epoch 52/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0055
- accuracy: 0.9981 - val_loss: 0.2142 - val_accuracy: 0.9620
Epoch 53/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0039
- accuracy: 0.9985 - val_loss: 0.2212 - val_accuracy: 0.9554
Epoch 54/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0314
- accuracy: 0.9907 - val_loss: 0.2238 - val_accuracy: 0.9403
Epoch 55/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0105
- accuracy: 0.9966 - val_loss: 0.2377 - val_accuracy: 0.9497
Epoch 56/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0070
- accuracy: 0.9979 - val_loss: 0.2528 - val_accuracy: 0.9488
Epoch 57/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0059
- accuracy: 0.9980 - val_loss: 0.2962 - val_accuracy: 0.9408
Epoch 58/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0047
- accuracy: 0.9987 - val_loss: 0.2470 - val_accuracy: 0.9558
Epoch 59/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0032
- accuracy: 0.9985 - val_loss: 0.4221 - val_accuracy: 0.9295
Epoch 60/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0114
- accuracy: 0.9965 - val_loss: 0.2416 - val_accuracy: 0.9535
Epoch 61/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0054

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- accuracy: 0.9981 - val_loss: 0.2921 - val_accuracy: 0.9460
Epoch 62/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0102
- accuracy: 0.9972 - val_loss: 0.2475 - val_accuracy: 0.9507
Epoch 63/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0247
- accuracy: 0.9932 - val_loss: 0.3920 - val_accuracy: 0.9004
Epoch 64/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0153
- accuracy: 0.9960 - val_loss: 0.2566 - val_accuracy: 0.9436
Epoch 65/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0077
- accuracy: 0.9972 - val_loss: 0.2465 - val_accuracy: 0.9502
Epoch 66/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0029
- accuracy: 0.9989 - val_loss: 0.2257 - val_accuracy: 0.9582
Epoch 67/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0015
- accuracy: 0.9991 - val_loss: 0.2215 - val_accuracy: 0.9601
Epoch 68/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0012
- accuracy: 0.9994 - val_loss: 0.2406 - val_accuracy: 0.9624
Epoch 69/100
8516/8516 [=====] - 158s 19ms/step - loss: 9.6599
e-04 - accuracy: 0.9993 - val_loss: 0.2365 - val_accuracy: 0.9620
Epoch 70/100
8516/8516 [=====] - 158s 19ms/step - loss: 9.5976
e-04 - accuracy: 0.9995 - val_loss: 0.2561 - val_accuracy: 0.9591
Epoch 71/100
8516/8516 [=====] - 158s 19ms/step - loss: 9.1848
e-04 - accuracy: 0.9994 - val_loss: 0.2921 - val_accuracy: 0.9591
Epoch 72/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0011
- accuracy: 0.9993 - val_loss: 0.3054 - val_accuracy: 0.9591
Epoch 73/100
8516/8516 [=====] - 158s 19ms/step - loss: 9.3037
e-04 - accuracy: 0.9992 - val_loss: 0.2650 - val_accuracy: 0.9591
Epoch 74/100
8516/8516 [=====] - 158s 19ms/step - loss: 9.3285
e-04 - accuracy: 0.9995 - val_loss: 0.3048 - val_accuracy: 0.9587
Epoch 75/100
8516/8516 [=====] - 158s 19ms/step - loss: 9.3855
e-04 - accuracy: 0.9994 - val_loss: 0.2926 - val_accuracy: 0.9601
Epoch 76/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0388
- accuracy: 0.9886 - val_loss: 1.3452 - val_accuracy: 0.8591
Epoch 77/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0425
- accuracy: 0.9871 - val_loss: 0.4409 - val_accuracy: 0.9023
Epoch 78/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0071
- accuracy: 0.9974 - val_loss: 0.2258 - val_accuracy: 0.9549
Epoch 79/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0019
- accuracy: 0.9994 - val_loss: 0.2400 - val_accuracy: 0.9563
Epoch 80/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0011
- accuracy: 0.9995 - val_loss: 0.2339 - val_accuracy: 0.9605
Epoch 81/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0031
- accuracy: 0.9984 - val_loss: 0.2763 - val_accuracy: 0.9573
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Epoch 82/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0261
- accuracy: 0.9918 - val_loss: 0.2597 - val_accuracy: 0.9516
Epoch 83/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0089
- accuracy: 0.9974 - val_loss: 0.3321 - val_accuracy: 0.9263
Epoch 84/100
8516/8516 [=====] - 158s 19ms/step - loss: 0.0019
- accuracy: 0.9993 - val_loss: 0.2607 - val_accuracy: 0.9521
Epoch 85/100
8516/8516 [=====] - 159s 19ms/step - loss: 0.0017
- accuracy: 0.9992 - val_loss: 0.2445 - val_accuracy: 0.9610
Epoch 86/100
8516/8516 [=====] - 160s 19ms/step - loss: 0.0221
- accuracy: 0.9934 - val_loss: 0.2709 - val_accuracy: 0.9479
Epoch 87/100
8516/8516 [=====] - 160s 19ms/step - loss: 0.0088
- accuracy: 0.9973 - val_loss: 0.2672 - val_accuracy: 0.9450
Epoch 88/100
8516/8516 [=====] - 161s 19ms/step - loss: 0.0051
- accuracy: 0.9982 - val_loss: 0.2023 - val_accuracy: 0.9591
Epoch 89/100
8516/8516 [=====] - 160s 19ms/step - loss: 0.0039
- accuracy: 0.9981 - val_loss: 0.2827 - val_accuracy: 0.9497
Epoch 90/100
8516/8516 [=====] - 161s 19ms/step - loss: 0.0056
- accuracy: 0.9975 - val_loss: 0.2501 - val_accuracy: 0.9502
Epoch 91/100
8516/8516 [=====] - 160s 19ms/step - loss: 0.0044
- accuracy: 0.9987 - val_loss: 0.2354 - val_accuracy: 0.9554
Epoch 92/100
8516/8516 [=====] - 160s 19ms/step - loss: 0.0013
- accuracy: 0.9995 - val_loss: 0.2459 - val_accuracy: 0.9587
Epoch 93/100
8516/8516 [=====] - 160s 19ms/step - loss: 0.0011
- accuracy: 0.9994 - val_loss: 0.2583 - val_accuracy: 0.9563
Epoch 94/100
8516/8516 [=====] - 160s 19ms/step - loss: 0.0011
- accuracy: 0.9994 - val_loss: 0.2638 - val_accuracy: 0.9544
Epoch 95/100
8516/8516 [=====] - 160s 19ms/step - loss: 0.0010
- accuracy: 0.9992 - val_loss: 0.2714 - val_accuracy: 0.9554
Epoch 96/100
8516/8516 [=====] - 160s 19ms/step - loss: 0.0081
- accuracy: 0.9965 - val_loss: 0.3164 - val_accuracy: 0.9357
Epoch 97/100
8516/8516 [=====] - 161s 19ms/step - loss: 0.0284
- accuracy: 0.9899 - val_loss: 0.2893 - val_accuracy: 0.9450
Epoch 98/100
8516/8516 [=====] - 160s 19ms/step - loss: 0.0065
- accuracy: 0.9975 - val_loss: 0.2485 - val_accuracy: 0.9573
Epoch 99/100
8516/8516 [=====] - 160s 19ms/step - loss: 0.0142
- accuracy: 0.9953 - val_loss: 0.2752 - val_accuracy: 0.9413
Epoch 100/100
8516/8516 [=====] - 160s 19ms/step - loss: 0.0017
- accuracy: 0.9992 - val_loss: 0.2373 - val_accuracy: 0.9563
Saved model to disk
dict_keys(['val_loss', 'val_accuracy', 'loss', 'accuracy'])
```



```
dict_keys(['val_loss', 'val_accuracy', 'loss', 'accuracy'])
```

