

```
In [1]: import tensorflow as tf
from tensorflow.keras.applications import InceptionV3
from tensorflow.keras.models import Model
from tensorflow.keras.layers import Dropout, Input, Flatten, Dense, MaxPooling2D
from tensorflow.keras.optimizers import Adam
from tensorflow.keras.preprocessing.image import ImageDataGenerator # Data
```

```
In [2]: tf.test.is_gpu_available()
```

WARNING:tensorflow:From C:\Users\ARIHANT\AppData\Local\Temp\ipykernel\_20024\337460670.py:1: is\_gpu\_available (from tensorflow.python.framework.test\_util) is deprecated and will be removed in a future version.  
Instructions for updating:  
Use `tf.config.list\_physical\_devices('GPU')` instead.

```
Out[2]: False
```

```
In [3]: batchsize=8
```

```
In [4]: train_datagen= ImageDataGenerator(rescale=1./255, rotation_range=0.2, shear_range=0.2,
zoom_range=0.2, width_shift_range=0.2,
height_shift_range=0.2, validation_split=0.2)
```

```
train_data= train_datagen.flow_from_directory(r'C:\Users\ARIHANT\Desktop\driver dro
target_size=(80,80), batch_size=batchsize, class_mode='binary')
```

```
validation_data= train_datagen.flow_from_directory(r'C:\Users\ARIHANT\Desktop\drive
target_size=(80,80), batch_size=batchsize, class_mode='binary')
```

Found 61178 images belonging to 2 classes.  
Found 15294 images belonging to 2 classes.

```
In [5]: test_datagen = ImageDataGenerator(rescale=1./255)
```

```
test_data = test_datagen.flow_from_directory(r'C:\Users\ARIHANT\Desktop\driver dro
target_size=(80,80), batch_size=batchsize, class_mode='binary')
```

Found 5184 images belonging to 2 classes.

```
In [6]: bmodel = InceptionV3(include_top=False, weights='imagenet', input_tensor=Input(shape=(224, 224, 3)))
hmodel = bmodel.output
hmodel = Flatten()(hmodel)
hmodel = Dense(64, activation='relu')(hmodel)
hmodel = Dropout(0.5)(hmodel)
hmodel = Dense(2, activation='softmax')(hmodel)
```

```
model = Model(inputs=bmodel.input, outputs=hmodel)
for layer in bmodel.layers:
    layer.trainable = False
```

```
In [7]: model.summary()
```

Model: "model"

Layer (type)	Output Shape	Param #	Connected to
=====			
input_1 (InputLayer)	[(None, 80, 80, 3)]	0	[]
conv2d (Conv2D)	(None, 39, 39, 32)	864	['input_1[0][0]']
batch_normalization (BatchNormalization)	(None, 39, 39, 32)	96	['conv2d[0][0]']
activation (Activation)	(None, 39, 39, 32)	0	['batch_normalization[0][0]']
conv2d_1 (Conv2D)	(None, 37, 37, 32)	9216	['activation[0][0]']
batch_normalization_1 (BatchNormalization)	(None, 37, 37, 32)	96	['conv2d_1[0][0]']
activation_1 (Activation)	(None, 37, 37, 32)	0	['batch_normalization_1[0][0]']
conv2d_2 (Conv2D)	(None, 37, 37, 64)	18432	['activation_1[0][0]']
batch_normalization_2 (BatchNormalization)	(None, 37, 37, 64)	192	['conv2d_2[0][0]']
activation_2 (Activation)	(None, 37, 37, 64)	0	['batch_normalization_2[0][0]']
max_pooling2d (MaxPooling2D)	(None, 18, 18, 64)	0	['activation_2[0][0]']
conv2d_3 (Conv2D)	(None, 18, 18, 80)	5120	['max_pooling2d[0][0]']
batch_normalization_3 (BatchNormalization)	(None, 18, 18, 80)	240	['conv2d_3[0][0]']
activation_3 (Activation)	(None, 18, 18, 80)	0	['batch_normalization_3[0][0]']
conv2d_4 (Conv2D)	(None, 16, 16, 192)	138240	['activation_3[0][0]']
batch_normalization_4 (BatchNormalization)	(None, 16, 16, 192)	576	['conv2d_4[0][0]']
activation_4 (Activation)	(None, 16, 16, 192)	0	['batch_normalization_4[0][0]']
max_pooling2d_1 (MaxPooling2D)	(None, 7, 7, 192)	0	['activation_4[0][0]']
conv2d_8 (Conv2D)	(None, 7, 7, 64)	12288	['max_pooling2d_1[0][0]']

batch_normalization_8 (BatchNormal ization)	(None, 7, 7, 64)	192	['conv2d_8[0] [0]']
activation_8 (Activation)	(None, 7, 7, 64)	0	['batch_normaliza tion_8[0][0]']
conv2d_6 (Conv2D)	(None, 7, 7, 48)	9216	['max_pooling2d_1 [0][0]']
conv2d_9 (Conv2D)	(None, 7, 7, 96)	55296	['activation_8[0] [0]']
batch_normalization_6 (BatchNo rmalization)	(None, 7, 7, 48)	144	['conv2d_6[0] [0]']
batch_normalization_9 (BatchNo rmalization)	(None, 7, 7, 96)	288	['conv2d_9[0] [0]']
activation_6 (Activation)	(None, 7, 7, 48)	0	['batch_normaliza tion_6[0][0]']
activation_9 (Activation)	(None, 7, 7, 96)	0	['batch_normaliza tion_9[0][0]']
average_pooling2d (AveragePool ing2D)	(None, 7, 7, 192)	0	['max_pooling2d_1 [0][0]']
conv2d_5 (Conv2D)	(None, 7, 7, 64)	12288	['max_pooling2d_1 [0][0]']
conv2d_7 (Conv2D)	(None, 7, 7, 64)	76800	['activation_6[0] [0]']
conv2d_10 (Conv2D)	(None, 7, 7, 96)	82944	['activation_9[0] [0]']
conv2d_11 (Conv2D)	(None, 7, 7, 32)	6144	['average_pooling 2d[0][0]']
batch_normalization_5 (BatchNo rmalization)	(None, 7, 7, 64)	192	['conv2d_5[0] [0]']
batch_normalization_7 (BatchNo rmalization)	(None, 7, 7, 64)	192	['conv2d_7[0] [0]']
batch_normalization_10 (BatchN ormalization)	(None, 7, 7, 96)	288	['conv2d_10[0] [0]']
batch_normalization_11 (BatchN ormalization)	(None, 7, 7, 32)	96	['conv2d_11[0] [0]']
activation_5 (Activation)	(None, 7, 7, 64)	0	['batch_normaliza tion_5[0][0]']
activation_7 (Activation)	(None, 7, 7, 64)	0	['batch_normaliza tion_7[0][0]']

tion_7[0][0]'			
activation_10 (Activation) tion_10[0][0]'	(None, 7, 7, 96)	0	['batch_normaliza
activation_11 (Activation) tion_11[0][0]'	(None, 7, 7, 32)	0	['batch_normaliza
mixed0 (Concatenate) [0]', [0]', [0][0]', [0][0]'	(None, 7, 7, 256)	0	['activation_5[0]  'activation_7[0]  'activation_10  'activation_11
conv2d_15 (Conv2D)	(None, 7, 7, 64)	16384	['mixed0[0][0]']
batch_normalization_15 (BatchN [0]') ormalization)	(None, 7, 7, 64)	192	['conv2d_15[0]
activation_15 (Activation) tion_15[0][0]'	(None, 7, 7, 64)	0	['batch_normaliza
conv2d_13 (Conv2D)	(None, 7, 7, 48)	12288	['mixed0[0][0]']
conv2d_16 (Conv2D) [0][0]'	(None, 7, 7, 96)	55296	['activation_15
batch_normalization_13 (BatchN [0]') ormalization)	(None, 7, 7, 48)	144	['conv2d_13[0]
batch_normalization_16 (BatchN [0]') ormalization)	(None, 7, 7, 96)	288	['conv2d_16[0]
activation_13 (Activation) tion_13[0][0]'	(None, 7, 7, 48)	0	['batch_normaliza
activation_16 (Activation) tion_16[0][0]'	(None, 7, 7, 96)	0	['batch_normaliza
average_pooling2d_1 (AveragePo oling2D)	(None, 7, 7, 256)	0	['mixed0[0][0]']
conv2d_12 (Conv2D)	(None, 7, 7, 64)	16384	['mixed0[0][0]']
conv2d_14 (Conv2D) [0][0]'	(None, 7, 7, 64)	76800	['activation_13
conv2d_17 (Conv2D) [0][0]'	(None, 7, 7, 96)	82944	['activation_16
conv2d_18 (Conv2D) 2d_1[0][0]'	(None, 7, 7, 64)	16384	['average_pooling
batch_normalization_12 (BatchN [0]') ormalization)	(None, 7, 7, 64)	192	['conv2d_12[0]
batch_normalization_14 (BatchN	(None, 7, 7, 64)	192	['conv2d_14[0]

[0]'] ormalization)				
batch_normalization_17 (BatchN [0]'] ormalization)	(None, 7, 7, 96)	288	['conv2d_17[0]	
batch_normalization_18 (BatchN [0]'] ormalization)	(None, 7, 7, 64)	192	['conv2d_18[0]	
activation_12 (Activation) tion_12[0][0]']	(None, 7, 7, 64)	0	['batch_normaliza	
activation_14 (Activation) tion_14[0][0]']	(None, 7, 7, 64)	0	['batch_normaliza	
activation_17 (Activation) tion_17[0][0]']	(None, 7, 7, 96)	0	['batch_normaliza	
activation_18 (Activation) tion_18[0][0]']	(None, 7, 7, 64)	0	['batch_normaliza	
mixed1 (Concatenate) [0][0]',  [0][0]',  [0][0]',  [0][0]']	(None, 7, 7, 288)	0	['activation_12	
			'activation_14	
			'activation_17	
			'activation_18	
			['mixed1[0][0]']	
conv2d_22 (Conv2D)	(None, 7, 7, 64)	18432	['mixed1[0][0]']	
batch_normalization_22 (BatchN [0]'] ormalization)	(None, 7, 7, 64)	192	['conv2d_22[0]	
activation_22 (Activation) tion_22[0][0]']	(None, 7, 7, 64)	0	['batch_normaliza	
conv2d_20 (Conv2D)	(None, 7, 7, 48)	13824	['mixed1[0][0]']	
conv2d_23 (Conv2D) [0][0]']	(None, 7, 7, 96)	55296	['activation_22	
batch_normalization_20 (BatchN [0]'] ormalization)	(None, 7, 7, 48)	144	['conv2d_20[0]	
batch_normalization_23 (BatchN [0]'] ormalization)	(None, 7, 7, 96)	288	['conv2d_23[0]	
activation_20 (Activation) tion_20[0][0]']	(None, 7, 7, 48)	0	['batch_normaliza	
activation_23 (Activation) tion_23[0][0]']	(None, 7, 7, 96)	0	['batch_normaliza	
average_pooling2d_2 (AveragePo oling2D)	(None, 7, 7, 288)	0	['mixed1[0][0]']	
conv2d_19 (Conv2D)	(None, 7, 7, 64)	18432	['mixed1[0][0]']	

conv2d_21 (Conv2D) [0][0]'	(None, 7, 7, 64)	76800	['activation_20
conv2d_24 (Conv2D) [0][0]'	(None, 7, 7, 96)	82944	['activation_23
conv2d_25 (Conv2D) 2d_2[0][0]'	(None, 7, 7, 64)	18432	['average_pooling
batch_normalization_19 (BatchN [0]') ormalization)	(None, 7, 7, 64)	192	['conv2d_19[0]
batch_normalization_21 (BatchN [0]') ormalization)	(None, 7, 7, 64)	192	['conv2d_21[0]
batch_normalization_24 (BatchN [0]') ormalization)	(None, 7, 7, 96)	288	['conv2d_24[0]
batch_normalization_25 (BatchN [0]') ormalization)	(None, 7, 7, 64)	192	['conv2d_25[0]
activation_19 (Activation) tion_19[0][0]'	(None, 7, 7, 64)	0	['batch_normaliza
activation_21 (Activation) tion_21[0][0]'	(None, 7, 7, 64)	0	['batch_normaliza
activation_24 (Activation) tion_24[0][0]'	(None, 7, 7, 96)	0	['batch_normaliza
activation_25 (Activation) tion_25[0][0]'	(None, 7, 7, 64)	0	['batch_normaliza
mixed2 (Concatenate) [0][0]', [0][0]', [0][0]', [0][0]'	(None, 7, 7, 288)	0	['activation_19 'activation_21 'activation_24 'activation_25
conv2d_27 (Conv2D)	(None, 7, 7, 64)	18432	['mixed2[0][0]']
batch_normalization_27 (BatchN [0]') ormalization)	(None, 7, 7, 64)	192	['conv2d_27[0]
activation_27 (Activation) tion_27[0][0]'	(None, 7, 7, 64)	0	['batch_normaliza
conv2d_28 (Conv2D) [0][0]'	(None, 7, 7, 96)	55296	['activation_27
batch_normalization_28 (BatchN [0]') ormalization)	(None, 7, 7, 96)	288	['conv2d_28[0]
activation_28 (Activation)	(None, 7, 7, 96)	0	['batch_normaliza

tion_28[0][0]'				
conv2d_26 (Conv2D)	(None, 3, 3, 384)	995328	['mixed2[0][0]']	
conv2d_29 (Conv2D)	(None, 3, 3, 96)	82944	['activation_28[0][0]']	
batch_normalization_26 (Batch Normalization)	(None, 3, 3, 384)	1152	['conv2d_26[0][0]']	
batch_normalization_29 (Batch Normalization)	(None, 3, 3, 96)	288	['conv2d_29[0][0]']	
activation_26 (Activation)	(None, 3, 3, 384)	0	['batch_normalization_26[0][0]']	
activation_29 (Activation)	(None, 3, 3, 96)	0	['batch_normalization_29[0][0]']	
max_pooling2d_2 (MaxPooling2D)	(None, 3, 3, 288)	0	['mixed2[0][0]']	
mixed3 (Concatenate)	(None, 3, 3, 768)	0	['activation_26[0][0]',	
			'activation_29[0][0]',	
			'max_pooling2d_2[0][0]']	
conv2d_34 (Conv2D)	(None, 3, 3, 128)	98304	['mixed3[0][0]']	
batch_normalization_34 (Batch Normalization)	(None, 3, 3, 128)	384	['conv2d_34[0][0]']	
activation_34 (Activation)	(None, 3, 3, 128)	0	['batch_normalization_34[0][0]']	
conv2d_35 (Conv2D)	(None, 3, 3, 128)	114688	['activation_34[0][0]']	
batch_normalization_35 (Batch Normalization)	(None, 3, 3, 128)	384	['conv2d_35[0][0]']	
activation_35 (Activation)	(None, 3, 3, 128)	0	['batch_normalization_35[0][0]']	
conv2d_31 (Conv2D)	(None, 3, 3, 128)	98304	['mixed3[0][0]']	
conv2d_36 (Conv2D)	(None, 3, 3, 128)	114688	['activation_35[0][0]']	
batch_normalization_31 (Batch Normalization)	(None, 3, 3, 128)	384	['conv2d_31[0][0]']	
batch_normalization_36 (Batch Normalization)	(None, 3, 3, 128)	384	['conv2d_36[0][0]']	
activation_31 (Activation)	(None, 3, 3, 128)	0	['batch_normalization_31[0][0]']	

activation_36 (Activation)	(None, 3, 3, 128)	0	['batch_normaliza tion_36[0][0]']
conv2d_32 (Conv2D)	(None, 3, 3, 128)	114688	['activation_31 [0][0]']
conv2d_37 (Conv2D)	(None, 3, 3, 128)	114688	['activation_36 [0][0]']
batch_normalization_32 (BatchN ormalization)	(None, 3, 3, 128)	384	['conv2d_32[0]
batch_normalization_37 (BatchN ormalization)	(None, 3, 3, 128)	384	['conv2d_37[0]
activation_32 (Activation)	(None, 3, 3, 128)	0	['batch_normaliza tion_32[0][0]']
activation_37 (Activation)	(None, 3, 3, 128)	0	['batch_normaliza tion_37[0][0]']
average_pooling2d_3 (AveragePo oling2D)	(None, 3, 3, 768)	0	['mixed3[0][0]']
conv2d_30 (Conv2D)	(None, 3, 3, 192)	147456	['mixed3[0][0]']
conv2d_33 (Conv2D)	(None, 3, 3, 192)	172032	['activation_32 [0][0]']
conv2d_38 (Conv2D)	(None, 3, 3, 192)	172032	['activation_37 [0][0]']
conv2d_39 (Conv2D)	(None, 3, 3, 192)	147456	['average_pooling 2d_3[0][0]']
batch_normalization_30 (BatchN ormalization)	(None, 3, 3, 192)	576	['conv2d_30[0]
batch_normalization_33 (BatchN ormalization)	(None, 3, 3, 192)	576	['conv2d_33[0]
batch_normalization_38 (BatchN ormalization)	(None, 3, 3, 192)	576	['conv2d_38[0]
batch_normalization_39 (BatchN ormalization)	(None, 3, 3, 192)	576	['conv2d_39[0]
activation_30 (Activation)	(None, 3, 3, 192)	0	['batch_normaliza tion_30[0][0]']
activation_33 (Activation)	(None, 3, 3, 192)	0	['batch_normaliza tion_33[0][0]']
activation_38 (Activation)	(None, 3, 3, 192)	0	['batch_normaliza tion_38[0][0]']
activation_39 (Activation)	(None, 3, 3, 192)	0	['batch_normaliza



tion_39[0][0]']			
mixed4 (Concatenate) [0][0]', [0][0]', [0][0]', [0][0]']	(None, 3, 3, 768)	0	['activation_30  'activation_33  'activation_38  'activation_39
conv2d_44 (Conv2D)	(None, 3, 3, 160)	122880	['mixed4[0][0]']
batch_normalization_44 (BatchN [0]'] ormalization)	(None, 3, 3, 160)	480	['conv2d_44[0]
activation_44 (Activation) tion_44[0][0]']	(None, 3, 3, 160)	0	['batch_normaliza
conv2d_45 (Conv2D) [0][0]']	(None, 3, 3, 160)	179200	['activation_44
batch_normalization_45 (BatchN [0]'] ormalization)	(None, 3, 3, 160)	480	['conv2d_45[0]
activation_45 (Activation) tion_45[0][0]']	(None, 3, 3, 160)	0	['batch_normaliza
conv2d_41 (Conv2D)	(None, 3, 3, 160)	122880	['mixed4[0][0]']
conv2d_46 (Conv2D) [0][0]']	(None, 3, 3, 160)	179200	['activation_45
batch_normalization_41 (BatchN [0]'] ormalization)	(None, 3, 3, 160)	480	['conv2d_41[0]
batch_normalization_46 (BatchN [0]'] ormalization)	(None, 3, 3, 160)	480	['conv2d_46[0]
activation_41 (Activation) tion_41[0][0]']	(None, 3, 3, 160)	0	['batch_normaliza
activation_46 (Activation) tion_46[0][0]']	(None, 3, 3, 160)	0	['batch_normaliza
conv2d_42 (Conv2D) [0][0]']	(None, 3, 3, 160)	179200	['activation_41
conv2d_47 (Conv2D) [0][0]']	(None, 3, 3, 160)	179200	['activation_46
batch_normalization_42 (BatchN [0]'] ormalization)	(None, 3, 3, 160)	480	['conv2d_42[0]
batch_normalization_47 (BatchN [0]'] ormalization)	(None, 3, 3, 160)	480	['conv2d_47[0]
activation_42 (Activation)	(None, 3, 3, 160)	0	['batch_normaliza

tion_42[0][0]'				
activation_47 (Activation) tion_47[0][0]'	(None, 3, 3, 160)	0		['batch_normaliza
average_pooling2d_4 (AveragePo oling2D)	(None, 3, 3, 768)	0		['mixed4[0][0]']
conv2d_40 (Conv2D)	(None, 3, 3, 192)	147456		['mixed4[0][0]']
conv2d_43 (Conv2D) [0][0]'	(None, 3, 3, 192)	215040		['activation_42
conv2d_48 (Conv2D) [0][0]'	(None, 3, 3, 192)	215040		['activation_47
conv2d_49 (Conv2D) 2d_4[0][0]'	(None, 3, 3, 192)	147456		['average_pooling
batch_normalization_40 (BatchN [0]') ormalization)	(None, 3, 3, 192)	576		['conv2d_40[0]
batch_normalization_43 (BatchN [0]') ormalization)	(None, 3, 3, 192)	576		['conv2d_43[0]
batch_normalization_48 (BatchN [0]') ormalization)	(None, 3, 3, 192)	576		['conv2d_48[0]
batch_normalization_49 (BatchN [0]') ormalization)	(None, 3, 3, 192)	576		['conv2d_49[0]
activation_40 (Activation) tion_40[0][0]'	(None, 3, 3, 192)	0		['batch_normaliza
activation_43 (Activation) tion_43[0][0]'	(None, 3, 3, 192)	0		['batch_normaliza
activation_48 (Activation) tion_48[0][0]'	(None, 3, 3, 192)	0		['batch_normaliza
activation_49 (Activation) tion_49[0][0]'	(None, 3, 3, 192)	0		['batch_normaliza
mixed5 (Concatenate) [0][0]', [0][0]', [0][0]', [0][0]'	(None, 3, 3, 768)	0		['activation_40 'activation_43 'activation_48 'activation_49
conv2d_54 (Conv2D)	(None, 3, 3, 160)	122880		['mixed5[0][0]']
batch_normalization_54 (BatchN [0]') ormalization)	(None, 3, 3, 160)	480		['conv2d_54[0]
activation_54 (Activation) tion_54[0][0]'	(None, 3, 3, 160)	0		['batch_normaliza

conv2d_55 (Conv2D) [0][0]'	(None, 3, 3, 160)	179200	['activation_54
batch_normalization_55 (Batch Normalization) [0]'	(None, 3, 3, 160)	480	['conv2d_55[0]
activation_55 (Activation) tion_55[0][0]'	(None, 3, 3, 160)	0	['batch_normaliza
conv2d_51 (Conv2D)	(None, 3, 3, 160)	122880	['mixed5[0][0]']
conv2d_56 (Conv2D) [0][0]'	(None, 3, 3, 160)	179200	['activation_55
batch_normalization_51 (Batch Normalization) [0]'	(None, 3, 3, 160)	480	['conv2d_51[0]
batch_normalization_56 (Batch Normalization) [0]'	(None, 3, 3, 160)	480	['conv2d_56[0]
activation_51 (Activation) tion_51[0][0]'	(None, 3, 3, 160)	0	['batch_normaliza
activation_56 (Activation) tion_56[0][0]'	(None, 3, 3, 160)	0	['batch_normaliza
conv2d_52 (Conv2D) [0][0]'	(None, 3, 3, 160)	179200	['activation_51
conv2d_57 (Conv2D) [0][0]'	(None, 3, 3, 160)	179200	['activation_56
batch_normalization_52 (Batch Normalization) [0]'	(None, 3, 3, 160)	480	['conv2d_52[0]
batch_normalization_57 (Batch Normalization) [0]'	(None, 3, 3, 160)	480	['conv2d_57[0]
activation_52 (Activation) tion_52[0][0]'	(None, 3, 3, 160)	0	['batch_normaliza
activation_57 (Activation) tion_57[0][0]'	(None, 3, 3, 160)	0	['batch_normaliza
average_pooling2d_5 (Average Pooling2D)	(None, 3, 3, 768)	0	['mixed5[0][0]']
conv2d_50 (Conv2D)	(None, 3, 3, 192)	147456	['mixed5[0][0]']
conv2d_53 (Conv2D) [0][0]'	(None, 3, 3, 192)	215040	['activation_52
conv2d_58 (Conv2D) [0][0]'	(None, 3, 3, 192)	215040	['activation_57
conv2d_59 (Conv2D) 2d_5[0][0]'	(None, 3, 3, 192)	147456	['average_pooling

batch_normalization_50 (Batch Normalization)	(None, 3, 3, 192)	576	['conv2d_50[0][0]']
batch_normalization_53 (Batch Normalization)	(None, 3, 3, 192)	576	['conv2d_53[0][0]']
batch_normalization_58 (Batch Normalization)	(None, 3, 3, 192)	576	['conv2d_58[0][0]']
batch_normalization_59 (Batch Normalization)	(None, 3, 3, 192)	576	['conv2d_59[0][0]']
activation_50 (Activation)	(None, 3, 3, 192)	0	['batch_normalization_50[0][0]']
activation_53 (Activation)	(None, 3, 3, 192)	0	['batch_normalization_53[0][0]']
activation_58 (Activation)	(None, 3, 3, 192)	0	['batch_normalization_58[0][0]']
activation_59 (Activation)	(None, 3, 3, 192)	0	['batch_normalization_59[0][0]']
mixed6 (Concatenate)	(None, 3, 3, 768)	0	['activation_50[0][0]', 'activation_53[0][0]', 'activation_58[0][0]', 'activation_59[0][0]']
conv2d_64 (Conv2D)	(None, 3, 3, 192)	147456	['mixed6[0][0]']
batch_normalization_64 (Batch Normalization)	(None, 3, 3, 192)	576	['conv2d_64[0][0]']
activation_64 (Activation)	(None, 3, 3, 192)	0	['batch_normalization_64[0][0]']
conv2d_65 (Conv2D)	(None, 3, 3, 192)	258048	['activation_64[0][0]']
batch_normalization_65 (Batch Normalization)	(None, 3, 3, 192)	576	['conv2d_65[0][0]']
activation_65 (Activation)	(None, 3, 3, 192)	0	['batch_normalization_65[0][0]']
conv2d_61 (Conv2D)	(None, 3, 3, 192)	147456	['mixed6[0][0]']
conv2d_66 (Conv2D)	(None, 3, 3, 192)	258048	['activation_65[0][0]']
batch_normalization_61 (Batch Normalization)	(None, 3, 3, 192)	576	['conv2d_61[0][0]']

batch_normalization_66 (Batch Normalization)	(None, 3, 3, 192)	576	['conv2d_66[0][0]']
activation_61 (Activation)	(None, 3, 3, 192)	0	['batch_normalization_61[0][0]']
activation_66 (Activation)	(None, 3, 3, 192)	0	['batch_normalization_66[0][0]']
conv2d_62 (Conv2D)	(None, 3, 3, 192)	258048	['activation_61[0][0]']
conv2d_67 (Conv2D)	(None, 3, 3, 192)	258048	['activation_66[0][0]']
batch_normalization_62 (Batch Normalization)	(None, 3, 3, 192)	576	['conv2d_62[0][0]']
batch_normalization_67 (Batch Normalization)	(None, 3, 3, 192)	576	['conv2d_67[0][0]']
activation_62 (Activation)	(None, 3, 3, 192)	0	['batch_normalization_62[0][0]']
activation_67 (Activation)	(None, 3, 3, 192)	0	['batch_normalization_67[0][0]']
average_pooling2d_6 (Average Pooling2D)	(None, 3, 3, 768)	0	['mixed6[0][0]']
conv2d_60 (Conv2D)	(None, 3, 3, 192)	147456	['mixed6[0][0]']
conv2d_63 (Conv2D)	(None, 3, 3, 192)	258048	['activation_62[0][0]']
conv2d_68 (Conv2D)	(None, 3, 3, 192)	258048	['activation_67[0][0]']
conv2d_69 (Conv2D)	(None, 3, 3, 192)	147456	['average_pooling2d_6[0][0]']
batch_normalization_60 (Batch Normalization)	(None, 3, 3, 192)	576	['conv2d_60[0][0]']
batch_normalization_63 (Batch Normalization)	(None, 3, 3, 192)	576	['conv2d_63[0][0]']
batch_normalization_68 (Batch Normalization)	(None, 3, 3, 192)	576	['conv2d_68[0][0]']
batch_normalization_69 (Batch Normalization)	(None, 3, 3, 192)	576	['conv2d_69[0][0]']
activation_60 (Activation)	(None, 3, 3, 192)	0	['batch_normalization_60[0][0]']

	model		
activation_63 (Activation) activation_63[0][0]'	(None, 3, 3, 192)	0	['batch_normaliza
activation_68 (Activation) activation_68[0][0]'	(None, 3, 3, 192)	0	['batch_normaliza
activation_69 (Activation) activation_69[0][0]'	(None, 3, 3, 192)	0	['batch_normaliza
mixed7 (Concatenate) [0][0]', [0][0]', [0][0]', [0][0]']	(None, 3, 3, 768)	0	['activation_60 'activation_63 'activation_68 'activation_69
conv2d_72 (Conv2D)	(None, 3, 3, 192)	147456	['mixed7[0][0]']
batch_normalization_72 (BatchN [0]'] ormalization)	(None, 3, 3, 192)	576	['conv2d_72[0]
activation_72 (Activation) activation_72[0][0]']	(None, 3, 3, 192)	0	['batch_normaliza
conv2d_73 (Conv2D) [0][0]']	(None, 3, 3, 192)	258048	['activation_72
batch_normalization_73 (BatchN [0]'] ormalization)	(None, 3, 3, 192)	576	['conv2d_73[0]
activation_73 (Activation) activation_73[0][0]']	(None, 3, 3, 192)	0	['batch_normaliza
conv2d_70 (Conv2D)	(None, 3, 3, 192)	147456	['mixed7[0][0]']
conv2d_74 (Conv2D) [0][0]']	(None, 3, 3, 192)	258048	['activation_73
batch_normalization_70 (BatchN [0]'] ormalization)	(None, 3, 3, 192)	576	['conv2d_70[0]
batch_normalization_74 (BatchN [0]'] ormalization)	(None, 3, 3, 192)	576	['conv2d_74[0]
activation_70 (Activation) activation_70[0][0]']	(None, 3, 3, 192)	0	['batch_normaliza
activation_74 (Activation) activation_74[0][0]']	(None, 3, 3, 192)	0	['batch_normaliza
conv2d_71 (Conv2D) [0][0]']	(None, 1, 1, 320)	552960	['activation_70
conv2d_75 (Conv2D) [0][0]']	(None, 1, 1, 192)	331776	['activation_74
batch_normalization_71 (BatchN [0]']	(None, 1, 1, 320)	960	['conv2d_71[0]

ormalization)			
batch_normalization_75 (BatchN [0]') ormalization)	(None, 1, 1, 192)	576	['conv2d_75[0]
activation_71 (Activation) tion_71[0][0]')	(None, 1, 1, 320)	0	['batch_normaliza
activation_75 (Activation) tion_75[0][0]')	(None, 1, 1, 192)	0	['batch_normaliza
max_pooling2d_3 (MaxPooling2D)	(None, 1, 1, 768)	0	['mixed7[0][0]']
mixed8 (Concatenate) [0][0]', [0][0]', [0][0]')	(None, 1, 1, 1280)	0	['activation_71 'activation_75 'max_pooling2d_3
conv2d_80 (Conv2D)	(None, 1, 1, 448)	573440	['mixed8[0][0]']
batch_normalization_80 (BatchN [0]') ormalization)	(None, 1, 1, 448)	1344	['conv2d_80[0]
activation_80 (Activation) tion_80[0][0]')	(None, 1, 1, 448)	0	['batch_normaliza
conv2d_77 (Conv2D)	(None, 1, 1, 384)	491520	['mixed8[0][0]']
conv2d_81 (Conv2D) [0][0]')	(None, 1, 1, 384)	1548288	['activation_80
batch_normalization_77 (BatchN [0]') ormalization)	(None, 1, 1, 384)	1152	['conv2d_77[0]
batch_normalization_81 (BatchN [0]') ormalization)	(None, 1, 1, 384)	1152	['conv2d_81[0]
activation_77 (Activation) tion_77[0][0]')	(None, 1, 1, 384)	0	['batch_normaliza
activation_81 (Activation) tion_81[0][0]')	(None, 1, 1, 384)	0	['batch_normaliza
conv2d_78 (Conv2D) [0][0]')	(None, 1, 1, 384)	442368	['activation_77
conv2d_79 (Conv2D) [0][0]')	(None, 1, 1, 384)	442368	['activation_77
conv2d_82 (Conv2D) [0][0]')	(None, 1, 1, 384)	442368	['activation_81
conv2d_83 (Conv2D) [0][0]')	(None, 1, 1, 384)	442368	['activation_81
average_pooling2d_7 (AveragePo oling2D)	(None, 1, 1, 1280)	0	['mixed8[0][0]']

	model		
conv2d_76 (Conv2D)	(None, 1, 1, 320)	409600	['mixed8[0][0]']
batch_normalization_78 (Batch Normalization)	(None, 1, 1, 384)	1152	['conv2d_76[0][0]']
batch_normalization_79 (Batch Normalization)	(None, 1, 1, 384)	1152	['conv2d_79[0][0]']
batch_normalization_82 (Batch Normalization)	(None, 1, 1, 384)	1152	['conv2d_82[0][0]']
batch_normalization_83 (Batch Normalization)	(None, 1, 1, 384)	1152	['conv2d_83[0][0]']
conv2d_84 (Conv2D)	(None, 1, 1, 192)	245760	['average_pooling2d_7[0][0]']
batch_normalization_76 (Batch Normalization)	(None, 1, 1, 320)	960	['conv2d_76[0][0]']
activation_78 (Activation)	(None, 1, 1, 384)	0	['batch_normalization_78[0][0]']
activation_79 (Activation)	(None, 1, 1, 384)	0	['batch_normalization_79[0][0]']
activation_82 (Activation)	(None, 1, 1, 384)	0	['batch_normalization_82[0][0]']
activation_83 (Activation)	(None, 1, 1, 384)	0	['batch_normalization_83[0][0]']
batch_normalization_84 (Batch Normalization)	(None, 1, 1, 192)	576	['conv2d_84[0][0]']
activation_76 (Activation)	(None, 1, 1, 320)	0	['batch_normalization_76[0][0]']
mixed9_0 (Concatenate)	(None, 1, 1, 768)	0	['activation_78[0][0]', 'activation_79[0][0]']
concatenate (Concatenate)	(None, 1, 1, 768)	0	['activation_82[0][0]', 'activation_83[0][0]']
activation_84 (Activation)	(None, 1, 1, 192)	0	['batch_normalization_84[0][0]']
mixed9 (Concatenate)	(None, 1, 1, 2048)	0	['activation_76[0][0]', 'mixed9_0[0][0]', 'concatenate[0][0]', 'activation_84[0][0]']



[0][0]']

conv2d_89 (Conv2D)	(None, 1, 1, 448)	917504	['mixed9[0][0]']
batch_normalization_89 (Batch Normalization)	(None, 1, 1, 448)	1344	['conv2d_89[0][0]']
activation_89 (Activation)	(None, 1, 1, 448)	0	['batch_normalization_89[0][0]']
conv2d_86 (Conv2D)	(None, 1, 1, 384)	786432	['mixed9[0][0]']
conv2d_90 (Conv2D)	(None, 1, 1, 384)	1548288	['activation_89[0][0]']
batch_normalization_86 (Batch Normalization)	(None, 1, 1, 384)	1152	['conv2d_86[0][0]']
batch_normalization_90 (Batch Normalization)	(None, 1, 1, 384)	1152	['conv2d_90[0][0]']
activation_86 (Activation)	(None, 1, 1, 384)	0	['batch_normalization_86[0][0]']
activation_90 (Activation)	(None, 1, 1, 384)	0	['batch_normalization_90[0][0]']
conv2d_87 (Conv2D)	(None, 1, 1, 384)	442368	['activation_86[0][0]']
conv2d_88 (Conv2D)	(None, 1, 1, 384)	442368	['activation_86[0][0]']
conv2d_91 (Conv2D)	(None, 1, 1, 384)	442368	['activation_90[0][0]']
conv2d_92 (Conv2D)	(None, 1, 1, 384)	442368	['activation_90[0][0]']
average_pooling2d_8 (Average Pooling2D)	(None, 1, 1, 2048)	0	['mixed9[0][0]']
conv2d_85 (Conv2D)	(None, 1, 1, 320)	655360	['mixed9[0][0]']
batch_normalization_87 (Batch Normalization)	(None, 1, 1, 384)	1152	['conv2d_87[0][0]']
batch_normalization_88 (Batch Normalization)	(None, 1, 1, 384)	1152	['conv2d_88[0][0]']
batch_normalization_91 (Batch Normalization)	(None, 1, 1, 384)	1152	['conv2d_91[0][0]']
batch_normalization_92 (Batch Normalization)	(None, 1, 1, 384)	1152	['conv2d_92[0][0]']
conv2d_93 (Conv2D)	(None, 1, 1, 192)	393216	['average_pooling2d_8[0][0]']

2d_8[0][0]'			
batch_normalization_85 (Batch Normalization)	(None, 1, 1, 320)	960	['conv2d_85[0][0]']
activation_87 (Activation)	(None, 1, 1, 384)	0	['batch_normalization_87[0][0]']
activation_88 (Activation)	(None, 1, 1, 384)	0	['batch_normalization_88[0][0]']
activation_91 (Activation)	(None, 1, 1, 384)	0	['batch_normalization_91[0][0]']
activation_92 (Activation)	(None, 1, 1, 384)	0	['batch_normalization_92[0][0]']
batch_normalization_93 (Batch Normalization)	(None, 1, 1, 192)	576	['conv2d_93[0][0]']
activation_85 (Activation)	(None, 1, 1, 320)	0	['batch_normalization_85[0][0]']
mixed9_1 (Concatenate)	(None, 1, 1, 768)	0	['activation_87[0][0]', 'activation_88[0][0]']
concatenate_1 (Concatenate)	(None, 1, 1, 768)	0	['activation_91[0][0]', 'activation_92[0][0]']
activation_93 (Activation)	(None, 1, 1, 192)	0	['batch_normalization_93[0][0]']
mixed10 (Concatenate)	(None, 1, 1, 2048)	0	['activation_85[0][0]', 'mixed9_1[0][0]', 'concatenate_1[0][0]', 'activation_93[0][0]']
flatten (Flatten)	(None, 2048)	0	['mixed10[0][0]']
dense (Dense)	(None, 64)	131136	['flatten[0][0]']
dropout (Dropout)	(None, 64)	0	['dense[0][0]']
dense_1 (Dense)	(None, 2)	130	['dropout[0][0]']

```

=====
Total params: 21,934,050
Trainable params: 131,266
Non-trainable params: 21,802,784

```



```
In [8]: from tensorflow.keras.callbacks import ModelCheckpoint, EarlyStopping, ReduceLROnPlateau

In [9]: checkpoint = ModelCheckpoint(r'C:\Users\ARIHANT\Desktop\driver drowsiness\models\model_checkpoint.keras',
                                     monitor='val_loss', save_best_only=True, verbose=3)

        earlystop = EarlyStopping(monitor='val_loss', patience=7, verbose=3, restore_best_weights=True)

        learning_rate = ReduceLROnPlateau(monitor='val_loss', patience=3, verbose=3, )

        callbacks=[checkpoint, earlystop, learning_rate]

In [ ]:

In [ ]: model.compile(optimizer='Adam', loss='categorical_crossentropy', metrics=['accuracy'])

        model.fit_generator(train_data, steps_per_epoch=train_data.samples//batchsize,
                             validation_data=validation_data,
                             validation_steps=validation_data.samples//batchsize,
                             callbacks=callbacks,
                             epochs=20)

In [ ]: acc_tr, loss_tr = model.evaluate_generator(train_data)
        print(acc_tr)
        print(loss_tr)

In [ ]: acc_vr, loss_vr = model.evaluate_generator(validation_data)
        print(acc_vr)
        print(loss_vr)

In [ ]: acc_test, loss_test = model.evaluate_generator(test_data)
        print(acc_test)
        print(loss_test)

In [ ]:
```