```
from tensorflow.keras.layers import Dense, Flatten, Input
from tensorflow.keras.models import Model
from tensorflow.keras.preprocessing import image
from keras.preprocessing.image import  ImageDataGenerator,load_img
from keras.applications.vgg16 import VGG16, preprocess_input
from glob import glob
import numpy as np
import matplotlib.pyplot as plt
from tensorflow.keras import layers, models
```

```
WARNING:tensorflow:From c:\Users\heman\AppData\Local\Programs\Python\
Python311\Lib\site-packages\keras\src\losses.py:2976: The name
tf.losses.sparse_softmax_cross_entropy is deprecated. Please use
tf.compat.v1.losses.sparse_softmax_cross_entropy instead.
```

```
vgg=VGG16(weights="imagenet",include_top=False,input_shape=(224, 224,
3))
```

```
2023-11-25 15:53:39.194393: W
tensorflow/core/common_runtime/gpu/gpu_device.cc:2256] Cannot dlopen
some GPU libraries. Please make sure the missing libraries mentioned
above are installed properly if you would like to use GPU. Follow the
guide at https://www.tensorflow.org/install/gpu for how to download
and setup the required libraries for your platform.
Skipping registering GPU devices...
```

```
for layer in vgg.layers:
    layer.trainable=False

# x=Flatten()(vgg.output)

model = models.Sequential()
model.add(vgg)
# model.add
model.add(layers.Flatten())
model.add(layers.Dense(256, activation='relu'))
model.add(layers.Dense(100, activation='softmax'))

model.compile(
    loss="categorical_crossentropy",
    optimizer="adam",
    metrics=["accuracy"],run_eagerly=True
)

from tensorflow.keras.preprocessing.image import ImageDataGenerator

train_datagen=ImageDataGenerator(rescale = 1./255,
                                 shear_range =0.2,
                                 zoom_range = 0.2,
                                 horizontal_flip = True)
```

```
test_datagen = ImageDataGenerator(rescale = 1./255)

# val_datagen=ImageDataGenerator(rescale = 1./255,
#                                shear_range =0.2,
#                                zoom_range = 0.2,
#                                horizontal_flip = True)

training_set=train_datagen.flow_from_directory(r"/home/tihan/Desktop/
hemanth/archive/
train/",target_size=(224,224),batch_size=10,shuffle=True,class_mode="c
ategorical")
test_set=test_datagen.flow_from_directory(r"/home/tihan/Desktop/hemant
h/archive/
test/",target_size=(224,224),batch_size=10,class_mode="categorical")
# valid_set = val_datagen.flow_from_directory(
#     directory=r"/home/tihan/Desktop/hemanth/archive/valid/",
#     target_size=(224, 224),
#     batch_size=10,
#     class_mode="categorical",
#     shuffle=True,
# )
```

```
Found 13492 images belonging to 100 classes.
Found 500 images belonging to 100 classes.
```

```
import sys
# fit the mdel
r=model.fit_generator(training_set,
validation_data=test_set,
epochs=200,
steps_per_epoch=len(training_set)//3,
validation_steps=len(test_set)//3
)
```

```
Epoch 1/200

/tmp/ipykernel_21375/2596593733.py:3: UserWarning:
`Model.fit_generator` is deprecated and will be removed in a future
version. Please use `Model.fit`, which supports generators.
  r=model.fit_generator(training_set,

450/450 [==============================] - 437s 970ms/step - loss:
4.2676 - accuracy: 0.0591 - val_loss: 3.6382 - val_accuracy: 0.0875
Epoch 2/200
450/450 [==============================] - 447s 994ms/step - loss:
3.2785 - accuracy: 0.1822 - val_loss: 2.6735 - val_accuracy: 0.2625
Epoch 3/200
450/450 [==============================] - 445s 989ms/step - loss:
2.7061 - accuracy: 0.2832 - val_loss: 2.2210 - val_accuracy: 0.3063
Epoch 4/200
450/450 [==============================] - 446s 991ms/step - loss:
```

```
2.4545 - accuracy: 0.3253 - val_loss: 2.1669 - val_accuracy: 0.4250
Epoch 5/200
450/450 [==============================] - 445s 990ms/step - loss:
2.2925 - accuracy: 0.3740 - val_loss: 1.9237 - val_accuracy: 0.4938
Epoch 6/200
450/450 [==============================] - 445s 989ms/step - loss:
2.1676 - accuracy: 0.3927 - val_loss: 1.8678 - val_accuracy: 0.4688
Epoch 7/200
450/450 [==============================] - 445s 988ms/step - loss:
2.0998 - accuracy: 0.4067 - val_loss: 1.8781 - val_accuracy: 0.4437
Epoch 8/200
450/450 [==============================] - 446s 990ms/step - loss:
1.9946 - accuracy: 0.4402 - val_loss: 1.9555 - val_accuracy: 0.4750
Epoch 9/200
450/450 [==============================] - 447s 993ms/step - loss:
1.8953 - accuracy: 0.4378 - val_loss: 1.8748 - val_accuracy: 0.4563
Epoch 10/200
450/450 [==============================] - 446s 990ms/step - loss:
1.8659 - accuracy: 0.4607 - val_loss: 1.7351 - val_accuracy: 0.4812
Epoch 11/200
450/450 [==============================] - 443s 984ms/step - loss:
1.8378 - accuracy: 0.4735 - val_loss: 1.7104 - val_accuracy: 0.4938
Epoch 12/200
450/450 [==============================] - 443s 984ms/step - loss:
1.7520 - accuracy: 0.4918 - val_loss: 1.6310 - val_accuracy: 0.5312
Epoch 13/200
450/450 [==============================] - 447s 993ms/step - loss:
1.7618 - accuracy: 0.4929 - val_loss: 1.6747 - val_accuracy: 0.4688
Epoch 14/200
450/450 [==============================] - 452s 1s/step - loss: 1.6795
- accuracy: 0.5087 - val_loss: 1.7295 - val_accuracy: 0.4688
Epoch 15/200
450/450 [==============================] - 444s 987ms/step - loss:
1.6510 - accuracy: 0.5118 - val_loss: 1.6426 - val_accuracy: 0.4938
Epoch 16/200
450/450 [==============================] - 445s 990ms/step - loss:
1.6200 - accuracy: 0.5200 - val_loss: 1.6795 - val_accuracy: 0.4812
Epoch 17/200
450/450 [==============================] - 444s 988ms/step - loss:
1.6064 - accuracy: 0.5169 - val_loss: 1.7931 - val_accuracy: 0.5125
Epoch 18/200
450/450 [==============================] - 444s 986ms/step - loss:
1.5628 - accuracy: 0.5452 - val_loss: 1.5617 - val_accuracy: 0.4938
Epoch 19/200
450/450 [==============================] - 456s 1s/step - loss: 1.5495
- accuracy: 0.5387 - val_loss: 1.8110 - val_accuracy: 0.4688
Epoch 20/200
450/450 [==============================] - 445s 989ms/step - loss:
1.5755 - accuracy: 0.5376 - val_loss: 1.8329 - val_accuracy: 0.4688
```

```
Epoch 21/200
450/450 [==============================] - 443s 985ms/step - loss:
1.5092 - accuracy: 0.5528 - val_loss: 1.6329 - val_accuracy: 0.5375
Epoch 22/200
450/450 [==============================] - 442s 983ms/step - loss:
1.4891 - accuracy: 0.5569 - val_loss: 1.5821 - val_accuracy: 0.5750
Epoch 23/200
450/450 [==============================] - 442s 982ms/step - loss:
1.4685 - accuracy: 0.5536 - val_loss: 1.6719 - val_accuracy: 0.5250
Epoch 24/200
450/450 [==============================] - 442s 983ms/step - loss:
1.4457 - accuracy: 0.5764 - val_loss: 1.6311 - val_accuracy: 0.5250
Epoch 25/200
450/450 [==============================] - 440s 978ms/step - loss:
1.4168 - accuracy: 0.5749 - val_loss: 1.7612 - val_accuracy: 0.5188
Epoch 26/200
450/450 [==============================] - 440s 977ms/step - loss:
1.4085 - accuracy: 0.5731 - val_loss: 1.6913 - val_accuracy: 0.5562
Epoch 27/200
450/450 [==============================] - 442s 981ms/step - loss:
1.4027 - accuracy: 0.5730 - val_loss: 1.8899 - val_accuracy: 0.5312
Epoch 28/200
450/450 [==============================] - 440s 978ms/step - loss:
1.4064 - accuracy: 0.5808 - val_loss: 1.4493 - val_accuracy: 0.5375
Epoch 29/200
450/450 [==============================] - 442s 981ms/step - loss:
1.3695 - accuracy: 0.5869 - val_loss: 1.7067 - val_accuracy: 0.5562
Epoch 30/200
450/450 [==============================] - 442s 981ms/step - loss:
1.3462 - accuracy: 0.5882 - val_loss: 1.6785 - val_accuracy: 0.5625
Epoch 31/200
450/450 [==============================] - 442s 981ms/step - loss:
1.3327 - accuracy: 0.6087 - val_loss: 1.4835 - val_accuracy: 0.5375
Epoch 32/200
450/450 [==============================] - 441s 980ms/step - loss:
1.3021 - accuracy: 0.6069 - val_loss: 1.6307 - val_accuracy: 0.5688
Epoch 33/200
450/450 [==============================] - 443s 985ms/step - loss:
1.3019 - accuracy: 0.6020 - val_loss: 1.5952 - val_accuracy: 0.5500
Epoch 34/200
450/450 [==============================] - 442s 982ms/step - loss:
1.3199 - accuracy: 0.6040 - val_loss: 1.8691 - val_accuracy: 0.4938
Epoch 35/200
450/450 [==============================] - 443s 984ms/step - loss:
1.2809 - accuracy: 0.6187 - val_loss: 1.4842 - val_accuracy: 0.5750
Epoch 36/200
450/450 [==============================] - 444s 985ms/step - loss:
1.2732 - accuracy: 0.6084 - val_loss: 1.3189 - val_accuracy: 0.5813
Epoch 37/200
```

```
450/450 [==============================] - 442s 983ms/step - loss:
1.3066 - accuracy: 0.6042 - val_loss: 1.6952 - val_accuracy: 0.5938
Epoch 38/200
450/450 [==============================] - 442s 983ms/step - loss:
1.2204 - accuracy: 0.6262 - val_loss: 1.5685 - val_accuracy: 0.5375
Epoch 39/200
450/450 [==============================] - 440s 977ms/step - loss:
1.2159 - accuracy: 0.6391 - val_loss: 2.1266 - val_accuracy: 0.4625
Epoch 40/200
450/450 [==============================] - 441s 979ms/step - loss:
1.1925 - accuracy: 0.6416 - val_loss: 1.8459 - val_accuracy: 0.4938
Epoch 41/200
450/450 [==============================] - 439s 975ms/step - loss:
1.2578 - accuracy: 0.6189 - val_loss: 1.6531 - val_accuracy: 0.5625
Epoch 42/200
450/450 [==============================] - 440s 978ms/step - loss:
1.2284 - accuracy: 0.6218 - val_loss: 1.7149 - val_accuracy: 0.5625
Epoch 43/200
450/450 [==============================] - 440s 977ms/step - loss:
1.1561 - accuracy: 0.6376 - val_loss: 1.3801 - val_accuracy: 0.6062
Epoch 44/200
450/450 [==============================] - 439s 976ms/step - loss:
1.1926 - accuracy: 0.6369 - val_loss: 1.5008 - val_accuracy: 0.6250
Epoch 45/200
450/450 [==============================] - 442s 982ms/step - loss:
1.1962 - accuracy: 0.6356 - val_loss: 1.7175 - val_accuracy: 0.5125
Epoch 46/200
450/450 [==============================] - 450s 999ms/step - loss:
1.1418 - accuracy: 0.6512 - val_loss: 1.8064 - val_accuracy: 0.4875
Epoch 47/200
450/450 [==============================] - 445s 988ms/step - loss:
1.2331 - accuracy: 0.6322 - val_loss: 1.6999 - val_accuracy: 0.5562
Epoch 48/200
450/450 [==============================] - 443s 984ms/step - loss:
1.1844 - accuracy: 0.6371 - val_loss: 1.6218 - val_accuracy: 0.5750
Epoch 49/200
450/450 [==============================] - 441s 980ms/step - loss:
1.1040 - accuracy: 0.6598 - val_loss: 1.5878 - val_accuracy: 0.5875
Epoch 50/200
450/450 [==============================] - 441s 981ms/step - loss:
1.2055 - accuracy: 0.6329 - val_loss: 1.6383 - val_accuracy: 0.5562
Epoch 51/200
450/450 [==============================] - 442s 982ms/step - loss:
1.0758 - accuracy: 0.6691 - val_loss: 1.9525 - val_accuracy: 0.5437
Epoch 52/200
450/450 [==============================] - 441s 980ms/step - loss:
1.1245 - accuracy: 0.6578 - val_loss: 1.7306 - val_accuracy: 0.5500
Epoch 53/200
450/450 [==============================] - 442s 982ms/step - loss:
```

```
1.1119 - accuracy: 0.6600 - val_loss: 1.4806 - val_accuracy: 0.5688
Epoch 54/200
450/450 [==============================] - 441s 980ms/step - loss:
1.1263 - accuracy: 0.6533 - val_loss: 1.5374 - val_accuracy: 0.5875
Epoch 55/200
450/450 [==============================] - 439s 976ms/step - loss:
1.1167 - accuracy: 0.6592 - val_loss: 1.7258 - val_accuracy: 0.5938
Epoch 56/200
450/450 [==============================] - 440s 978ms/step - loss:
1.1193 - accuracy: 0.6602 - val_loss: 1.7258 - val_accuracy: 0.4750
Epoch 57/200
450/450 [==============================] - 440s 978ms/step - loss:
1.0639 - accuracy: 0.6802 - val_loss: 1.8347 - val_accuracy: 0.5312
Epoch 58/200
450/450 [==============================] - 441s 979ms/step - loss:
1.0880 - accuracy: 0.6609 - val_loss: 1.5999 - val_accuracy: 0.5437
Epoch 59/200
450/450 [==============================] - 446s 991ms/step - loss:
1.0641 - accuracy: 0.6684 - val_loss: 1.9036 - val_accuracy: 0.5875
Epoch 60/200
450/450 [==============================] - 447s 993ms/step - loss:
1.0832 - accuracy: 0.6673 - val_loss: 1.8469 - val_accuracy: 0.5562
Epoch 61/200
450/450 [==============================] - 442s 982ms/step - loss:
1.0805 - accuracy: 0.6691 - val_loss: 1.8139 - val_accuracy: 0.5312
Epoch 62/200
450/450 [==============================] - 440s 977ms/step - loss:
1.0718 - accuracy: 0.6672 - val_loss: 1.8753 - val_accuracy: 0.5250
Epoch 63/200
450/450 [==============================] - 440s 978ms/step - loss:
1.0302 - accuracy: 0.6773 - val_loss: 1.6175 - val_accuracy: 0.5875
Epoch 64/200
450/450 [==============================] - 440s 977ms/step - loss:
1.0705 - accuracy: 0.6719 - val_loss: 1.7144 - val_accuracy: 0.5625
Epoch 65/200
450/450 [==============================] - 440s 977ms/step - loss:
1.0408 - accuracy: 0.6800 - val_loss: 1.5280 - val_accuracy: 0.6125
Epoch 66/200
450/450 [==============================] - 444s 987ms/step - loss:
1.0393 - accuracy: 0.6812 - val_loss: 1.8137 - val_accuracy: 0.5437
Epoch 67/200
450/450 [==============================] - 446s 990ms/step - loss:
1.0379 - accuracy: 0.6740 - val_loss: 1.8723 - val_accuracy: 0.5250
Epoch 68/200
450/450 [==============================] - 440s 977ms/step - loss:
1.0789 - accuracy: 0.6692 - val_loss: 1.9918 - val_accuracy: 0.5000
Epoch 69/200
450/450 [==============================] - 441s 979ms/step - loss:
1.0057 - accuracy: 0.6853 - val_loss: 1.6071 - val_accuracy: 0.5875
```

```
Epoch 70/200
450/450 [==============================] - 439s 976ms/step - loss:
0.9980 - accuracy: 0.6858 - val_loss: 1.4434 - val_accuracy: 0.5562
Epoch 71/200
450/450 [==============================] - 439s 976ms/step - loss:
0.9931 - accuracy: 0.6903 - val_loss: 1.8019 - val_accuracy: 0.5250
Epoch 72/200
450/450 [==============================] - 440s 978ms/step - loss:
1.0229 - accuracy: 0.6871 - val_loss: 1.9035 - val_accuracy: 0.5625
Epoch 73/200
450/450 [==============================] - 440s 978ms/step - loss:
1.0715 - accuracy: 0.6671 - val_loss: 2.0968 - val_accuracy: 0.5063
Epoch 74/200
450/450 [==============================] - 441s 979ms/step - loss:
1.0121 - accuracy: 0.6848 - val_loss: 1.8226 - val_accuracy: 0.5312
Epoch 75/200
450/450 [==============================] - 441s 979ms/step - loss:
1.0093 - accuracy: 0.6759 - val_loss: 2.3606 - val_accuracy: 0.4062
Epoch 76/200
450/450 [==============================] - 440s 978ms/step - loss:
0.9445 - accuracy: 0.7044 - val_loss: 1.7714 - val_accuracy: 0.5312
Epoch 77/200
450/450 [==============================] - 440s 978ms/step - loss:
0.9525 - accuracy: 0.7046 - val_loss: 2.0103 - val_accuracy: 0.5188
Epoch 78/200
450/450 [==============================] - 440s 977ms/step - loss:
1.0001 - accuracy: 0.6929 - val_loss: 1.7192 - val_accuracy: 0.6187
Epoch 79/200
450/450 [==============================] - 440s 978ms/step - loss:
1.0065 - accuracy: 0.6827 - val_loss: 1.8685 - val_accuracy: 0.5938
Epoch 80/200
450/450 [==============================] - 439s 975ms/step - loss:
0.9656 - accuracy: 0.6979 - val_loss: 1.4279 - val_accuracy: 0.5750
Epoch 81/200
450/450 [==============================] - 441s 979ms/step - loss:
0.9863 - accuracy: 0.6929 - val_loss: 2.0428 - val_accuracy: 0.5625
Epoch 82/200
450/450 [==============================] - 440s 977ms/step - loss:
0.9740 - accuracy: 0.6946 - val_loss: 2.1676 - val_accuracy: 0.5437
Epoch 83/200
450/450 [==============================] - 439s 976ms/step - loss:
0.9736 - accuracy: 0.6886 - val_loss: 1.8462 - val_accuracy: 0.5437
Epoch 84/200
450/450 [==============================] - 440s 978ms/step - loss:
0.9579 - accuracy: 0.7082 - val_loss: 1.9613 - val_accuracy: 0.5437
Epoch 85/200
450/450 [==============================] - 439s 976ms/step - loss:
0.9732 - accuracy: 0.7001 - val_loss: 2.2883 - val_accuracy: 0.4812
Epoch 86/200
```

```
450/450 [==============================] - 439s 975ms/step - loss:
0.9761 - accuracy: 0.6932 - val_loss: 1.9391 - val_accuracy: 0.5875
Epoch 87/200
450/450 [==============================] - 440s 978ms/step - loss:
0.9640 - accuracy: 0.7022 - val_loss: 1.5999 - val_accuracy: 0.6125
Epoch 88/200
450/450 [==============================] - 440s 978ms/step - loss:
0.9399 - accuracy: 0.7087 - val_loss: 2.1144 - val_accuracy: 0.4938
Epoch 89/200
450/450 [==============================] - 440s 977ms/step - loss:
0.9249 - accuracy: 0.7087 - val_loss: 1.9723 - val_accuracy: 0.5500
Epoch 90/200
450/450 [==============================] - 439s 975ms/step - loss:
0.9337 - accuracy: 0.7178 - val_loss: 1.5982 - val_accuracy: 0.5688
Epoch 91/200
450/450 [==============================] - 439s 976ms/step - loss:
0.9429 - accuracy: 0.7069 - val_loss: 2.0088 - val_accuracy: 0.5250
Epoch 92/200
450/450 [==============================] - 440s 978ms/step - loss:
0.9469 - accuracy: 0.6991 - val_loss: 2.2691 - val_accuracy: 0.5063
Epoch 93/200
450/450 [==============================] - 441s 979ms/step - loss:
0.9538 - accuracy: 0.6997 - val_loss: 1.7305 - val_accuracy: 0.5500
Epoch 94/200
450/450 [==============================] - 439s 976ms/step - loss:
0.9154 - accuracy: 0.7084 - val_loss: 1.7469 - val_accuracy: 0.5625
Epoch 95/200
450/450 [==============================] - 437s 971ms/step - loss:
0.9229 - accuracy: 0.7064 - val_loss: 1.9126 - val_accuracy: 0.5250
Epoch 96/200
450/450 [==============================] - 438s 973ms/step - loss:
0.9156 - accuracy: 0.7171 - val_loss: 1.9309 - val_accuracy: 0.5813
Epoch 97/200
450/450 [==============================] - 437s 972ms/step - loss:
0.9107 - accuracy: 0.7173 - val_loss: 1.7972 - val_accuracy: 0.5000
Epoch 98/200
450/450 [==============================] - 438s 973ms/step - loss:
0.9163 - accuracy: 0.7120 - val_loss: 2.0139 - val_accuracy: 0.5500
Epoch 99/200
450/450 [==============================] - 436s 968ms/step - loss:
0.8535 - accuracy: 0.7275 - val_loss: 2.2656 - val_accuracy: 0.5125
Epoch 100/200
450/450 [==============================] - 438s 973ms/step - loss:
0.8714 - accuracy: 0.7264 - val_loss: 2.0573 - val_accuracy: 0.5375
Epoch 101/200
450/450 [==============================] - 438s 973ms/step - loss:
0.9073 - accuracy: 0.7197 - val_loss: 1.5998 - val_accuracy: 0.5500
Epoch 102/200
450/450 [==============================] - 436s 969ms/step - loss:
```

```
0.9121 - accuracy: 0.7095 - val_loss: 2.2167 - val_accuracy: 0.5813
Epoch 103/200
450/450 [==============================] - 439s 974ms/step - loss:
0.8696 - accuracy: 0.7173 - val_loss: 1.8655 - val_accuracy: 0.5938
Epoch 104/200
450/450 [==============================] - 438s 973ms/step - loss:
0.9181 - accuracy: 0.7131 - val_loss: 2.1975 - val_accuracy: 0.5625
Epoch 105/200
450/450 [==============================] - 438s 972ms/step - loss:
0.9115 - accuracy: 0.7150 - val_loss: 1.9594 - val_accuracy: 0.5750
Epoch 106/200
450/450 [==============================] - 437s 971ms/step - loss:
0.9150 - accuracy: 0.7064 - val_loss: 2.1357 - val_accuracy: 0.5312
Epoch 107/200
450/450 [==============================] - 437s 970ms/step - loss:
0.8889 - accuracy: 0.7242 - val_loss: 1.8028 - val_accuracy: 0.5188
Epoch 108/200
450/450 [==============================] - 437s 972ms/step - loss:
0.9078 - accuracy: 0.7220 - val_loss: 1.7124 - val_accuracy: 0.5938
Epoch 109/200
450/450 [==============================] - 438s 973ms/step - loss:
0.8633 - accuracy: 0.7222 - val_loss: 2.0086 - val_accuracy: 0.5312
Epoch 110/200
450/450 [==============================] - 437s 972ms/step - loss:
0.8704 - accuracy: 0.7224 - val_loss: 1.9382 - val_accuracy: 0.5375
Epoch 111/200
450/450 [==============================] - 438s 973ms/step - loss:
0.8876 - accuracy: 0.7180 - val_loss: 2.2552 - val_accuracy: 0.5312
Epoch 112/200
450/450 [==============================] - 437s 972ms/step - loss:
0.9183 - accuracy: 0.7027 - val_loss: 1.9243 - val_accuracy: 0.5813
Epoch 113/200
450/450 [==============================] - 438s 972ms/step - loss:
0.8474 - accuracy: 0.7409 - val_loss: 1.9919 - val_accuracy: 0.5625
Epoch 114/200
450/450 [==============================] - 437s 971ms/step - loss:
0.8554 - accuracy: 0.7373 - val_loss: 1.7321 - val_accuracy: 0.5938
Epoch 115/200
450/450 [==============================] - 439s 974ms/step - loss:
0.8757 - accuracy: 0.7198 - val_loss: 2.3421 - val_accuracy: 0.5813
Epoch 116/200
450/450 [==============================] - 437s 971ms/step - loss:
0.8611 - accuracy: 0.7324 - val_loss: 1.8934 - val_accuracy: 0.6062
Epoch 117/200
450/450 [==============================] - 437s 970ms/step - loss:
0.8399 - accuracy: 0.7331 - val_loss: 1.8726 - val_accuracy: 0.5875
Epoch 118/200
450/450 [==============================] - 437s 972ms/step - loss:
0.8810 - accuracy: 0.7287 - val_loss: 2.0049 - val_accuracy: 0.5562
```

```
Epoch 119/200
450/450 [==============================] - 439s 976ms/step - loss:
0.8692 - accuracy: 0.7317 - val_loss: 1.4585 - val_accuracy: 0.6438
Epoch 120/200
450/450 [==============================] - 439s 975ms/step - loss:
0.8260 - accuracy: 0.7320 - val_loss: 2.0452 - val_accuracy: 0.5500
Epoch 121/200
450/450 [==============================] - 436s 968ms/step - loss:
0.8732 - accuracy: 0.7237 - val_loss: 2.3288 - val_accuracy: 0.5813
Epoch 122/200
450/450 [==============================] - 438s 973ms/step - loss:
0.8592 - accuracy: 0.7320 - val_loss: 1.9264 - val_accuracy: 0.5625
Epoch 123/200
450/450 [==============================] - 436s 970ms/step - loss:
0.8476 - accuracy: 0.7346 - val_loss: 1.9989 - val_accuracy: 0.5312
Epoch 124/200
450/450 [==============================] - 435s 968ms/step - loss:
0.9137 - accuracy: 0.7248 - val_loss: 2.0361 - val_accuracy: 0.5813
Epoch 125/200
450/450 [==============================] - 436s 968ms/step - loss:
0.8092 - accuracy: 0.7438 - val_loss: 2.1395 - val_accuracy: 0.5750
Epoch 126/200
450/450 [==============================] - 436s 968ms/step - loss:
0.8508 - accuracy: 0.7329 - val_loss: 1.9098 - val_accuracy: 0.5437
Epoch 127/200
450/450 [==============================] - 436s 968ms/step - loss:
0.8431 - accuracy: 0.7396 - val_loss: 1.6813 - val_accuracy: 0.6250
Epoch 128/200
450/450 [==============================] - 436s 969ms/step - loss:
0.8297 - accuracy: 0.7420 - val_loss: 2.2508 - val_accuracy: 0.4875
Epoch 129/200
450/450 [==============================] - 436s 969ms/step - loss:
0.8524 - accuracy: 0.7298 - val_loss: 2.2537 - val_accuracy: 0.5625
Epoch 130/200
450/450 [==============================] - 435s 967ms/step - loss:
0.8306 - accuracy: 0.7349 - val_loss: 2.1398 - val_accuracy: 0.5437
Epoch 131/200
450/450 [==============================] - 437s 970ms/step - loss:
0.8320 - accuracy: 0.7349 - val_loss: 2.0287 - val_accuracy: 0.6000
Epoch 132/200
450/450 [==============================] - 436s 970ms/step - loss:
0.8167 - accuracy: 0.7400 - val_loss: 1.9116 - val_accuracy: 0.6125
Epoch 133/200
450/450 [==============================] - 437s 972ms/step - loss:
0.8310 - accuracy: 0.7304 - val_loss: 2.0843 - val_accuracy: 0.6125
Epoch 134/200
450/450 [==============================] - 436s 969ms/step - loss:
0.8422 - accuracy: 0.7358 - val_loss: 2.4390 - val_accuracy: 0.5125
Epoch 135/200
```

```
450/450 [==============================] - 438s 973ms/step - loss:
0.8120 - accuracy: 0.7542 - val_loss: 2.2188 - val_accuracy: 0.5250
Epoch 136/200
450/450 [==============================] - 437s 970ms/step - loss:
0.8120 - accuracy: 0.7507 - val_loss: 1.9734 - val_accuracy: 0.5688
Epoch 137/200
450/450 [==============================] - 436s 969ms/step - loss:
0.8084 - accuracy: 0.7471 - val_loss: 1.8624 - val_accuracy: 0.6250
Epoch 138/200
450/450 [==============================] - 437s 972ms/step - loss:
0.8181 - accuracy: 0.7449 - val_loss: 1.8841 - val_accuracy: 0.5813
Epoch 139/200
450/450 [==============================] - 437s 970ms/step - loss:
0.8412 - accuracy: 0.7369 - val_loss: 2.1582 - val_accuracy: 0.5312
Epoch 140/200
450/450 [==============================] - 438s 972ms/step - loss:
0.8295 - accuracy: 0.7453 - val_loss: 1.9972 - val_accuracy: 0.5562
Epoch 141/200
450/450 [==============================] - 437s 971ms/step - loss:
0.8022 - accuracy: 0.7487 - val_loss: 1.7588 - val_accuracy: 0.5688
Epoch 142/200
450/450 [==============================] - 437s 972ms/step - loss:
0.7810 - accuracy: 0.7540 - val_loss: 2.2691 - val_accuracy: 0.6000
Epoch 143/200
450/450 [==============================] - 437s 971ms/step - loss:
0.8121 - accuracy: 0.7469 - val_loss: 1.9227 - val_accuracy: 0.5813
Epoch 144/200
450/450 [==============================] - 438s 973ms/step - loss:
0.7797 - accuracy: 0.7493 - val_loss: 2.1357 - val_accuracy: 0.5188
Epoch 145/200
450/450 [==============================] - 437s 972ms/step - loss:
0.8582 - accuracy: 0.7344 - val_loss: 1.7512 - val_accuracy: 0.6438
Epoch 146/200
450/450 [==============================] - 438s 972ms/step - loss:
0.7995 - accuracy: 0.7562 - val_loss: 1.9515 - val_accuracy: 0.5688
Epoch 147/200
450/450 [==============================] - 439s 976ms/step - loss:
0.7953 - accuracy: 0.7518 - val_loss: 2.0580 - val_accuracy: 0.5562
Epoch 148/200
450/450 [==============================] - 441s 979ms/step - loss:
0.8006 - accuracy: 0.7444 - val_loss: 2.1643 - val_accuracy: 0.5375
Epoch 149/200
450/450 [==============================] - 440s 977ms/step - loss:
0.8021 - accuracy: 0.7429 - val_loss: 2.6053 - val_accuracy: 0.5437
Epoch 150/200
450/450 [==============================] - 439s 976ms/step - loss:
0.8254 - accuracy: 0.7440 - val_loss: 1.8205 - val_accuracy: 0.6000
Epoch 151/200
450/450 [==============================] - 439s 976ms/step - loss:
```

```
0.8014 - accuracy: 0.7460 - val_loss: 1.9444 - val_accuracy: 0.5688
Epoch 152/200
450/450 [==============================] - 441s 979ms/step - loss:
0.7900 - accuracy: 0.7644 - val_loss: 2.1073 - val_accuracy: 0.5813
Epoch 153/200
450/450 [==============================] - 441s 979ms/step - loss:
0.7639 - accuracy: 0.7524 - val_loss: 2.0046 - val_accuracy: 0.5938
Epoch 154/200
450/450 [==============================] - 441s 980ms/step - loss:
0.7821 - accuracy: 0.7516 - val_loss: 2.2472 - val_accuracy: 0.5312
Epoch 155/200
450/450 [==============================] - 441s 981ms/step - loss:
0.7668 - accuracy: 0.7502 - val_loss: 2.2663 - val_accuracy: 0.5250
Epoch 156/200
450/450 [==============================] - 441s 980ms/step - loss:
0.7881 - accuracy: 0.7500 - val_loss: 2.1956 - val_accuracy: 0.5500
Epoch 157/200
450/450 [==============================] - 442s 982ms/step - loss:
0.8074 - accuracy: 0.7547 - val_loss: 2.4630 - val_accuracy: 0.5437
Epoch 158/200
450/450 [==============================] - 443s 984ms/step - loss:
0.7959 - accuracy: 0.7549 - val_loss: 2.0413 - val_accuracy: 0.5437
Epoch 159/200
450/450 [==============================] - 442s 982ms/step - loss:
0.7948 - accuracy: 0.7545 - val_loss: 2.7265 - val_accuracy: 0.4812
Epoch 160/200
450/450 [==============================] - 442s 982ms/step - loss:
0.7903 - accuracy: 0.7542 - val_loss: 2.5283 - val_accuracy: 0.5125
Epoch 161/200
450/450 [==============================] - 444s 986ms/step - loss:
0.8058 - accuracy: 0.7442 - val_loss: 2.1723 - val_accuracy: 0.5375
Epoch 162/200
450/450 [==============================] - 444s 986ms/step - loss:
0.7452 - accuracy: 0.7593 - val_loss: 2.2589 - val_accuracy: 0.5125
Epoch 163/200
450/450 [==============================] - 442s 982ms/step - loss:
0.7563 - accuracy: 0.7687 - val_loss: 1.5125 - val_accuracy: 0.6375
Epoch 164/200
450/450 [==============================] - 443s 985ms/step - loss:
0.8114 - accuracy: 0.7500 - val_loss: 2.2069 - val_accuracy: 0.5875
Epoch 165/200
450/450 [==============================] - 444s 987ms/step - loss:
0.7719 - accuracy: 0.7580 - val_loss: 2.2099 - val_accuracy: 0.5688
Epoch 166/200
450/450 [==============================] - 442s 983ms/step - loss:
0.7546 - accuracy: 0.7571 - val_loss: 2.0882 - val_accuracy: 0.5875
Epoch 167/200
450/450 [==============================] - 442s 983ms/step - loss:
0.7763 - accuracy: 0.7596 - val_loss: 2.2692 - val_accuracy: 0.5125
Epoch 168/200
```

```
450/450 [==============================] - 442s 983ms/step - loss:
0.7438 - accuracy: 0.7656 - val_loss: 2.3525 - val_accuracy: 0.5562
Epoch 169/200
450/450 [==============================] - 444s 986ms/step - loss:
0.7844 - accuracy: 0.7427 - val_loss: 2.3148 - val_accuracy: 0.5625
Epoch 170/200
450/450 [==============================] - 444s 986ms/step - loss:
0.7564 - accuracy: 0.7624 - val_loss: 1.9498 - val_accuracy: 0.5875
Epoch 171/200
450/450 [==============================] - 444s 986ms/step - loss:
0.7649 - accuracy: 0.7565 - val_loss: 1.8993 - val_accuracy: 0.5938
Epoch 172/200
450/450 [==============================] - 445s 988ms/step - loss:
0.7632 - accuracy: 0.7567 - val_loss: 2.5805 - val_accuracy: 0.5375
Epoch 173/200
450/450 [==============================] - 446s 992ms/step - loss:
0.7525 - accuracy: 0.7600 - val_loss: 2.5832 - val_accuracy: 0.5125
Epoch 174/200
450/450 [==============================] - 445s 989ms/step - loss:
0.7563 - accuracy: 0.7607 - val_loss: 2.2898 - val_accuracy: 0.5875
Epoch 175/200
450/450 [==============================] - 446s 991ms/step - loss:
0.7712 - accuracy: 0.7569 - val_loss: 2.3997 - val_accuracy: 0.5813
Epoch 176/200
450/450 [==============================] - 446s 990ms/step - loss:
0.7230 - accuracy: 0.7724 - val_loss: 2.2547 - val_accuracy: 0.5375
Epoch 177/200
450/450 [==============================] - 445s 989ms/step - loss:
0.7462 - accuracy: 0.7678 - val_loss: 2.7413 - val_accuracy: 0.5375
Epoch 178/200
450/450 [==============================] - 447s 993ms/step - loss:
0.7319 - accuracy: 0.7636 - val_loss: 2.2247 - val_accuracy: 0.5312
Epoch 179/200
450/450 [==============================] - 447s 994ms/step - loss:
0.7414 - accuracy: 0.7669 - val_loss: 2.0316 - val_accuracy: 0.5625
Epoch 180/200
450/450 [==============================] - 449s 998ms/step - loss:
0.7318 - accuracy: 0.7733 - val_loss: 2.1588 - val_accuracy: 0.6000
Epoch 181/200
450/450 [==============================] - 448s 996ms/step - loss:
0.7297 - accuracy: 0.7698 - val_loss: 1.9641 - val_accuracy: 0.5813
Epoch 182/200
450/450 [==============================] - 448s 995ms/step - loss:
0.7682 - accuracy: 0.7576 - val_loss: 1.9650 - val_accuracy: 0.6438
Epoch 183/200
450/450 [==============================] - 448s 996ms/step - loss:
0.7451 - accuracy: 0.7656 - val_loss: 2.0734 - val_accuracy: 0.6313
Epoch 184/200
450/450 [==============================] - 447s 992ms/step - loss:
```

```
0.7395 - accuracy: 0.7707 - val_loss: 2.1681 - val_accuracy: 0.5813
Epoch 185/200
450/450 [==============================] - 449s 997ms/step - loss:
0.7907 - accuracy: 0.7491 - val_loss: 2.4809 - val_accuracy: 0.5562
Epoch 186/200
450/450 [==============================] - 448s 996ms/step - loss:
0.7165 - accuracy: 0.7604 - val_loss: 2.2217 - val_accuracy: 0.5375
Epoch 187/200
450/450 [==============================] - 448s 996ms/step - loss:
0.7319 - accuracy: 0.7676 - val_loss: 2.5507 - val_accuracy: 0.5125
Epoch 188/200
450/450 [==============================] - 448s 995ms/step - loss:
0.7122 - accuracy: 0.7720 - val_loss: 2.3414 - val_accuracy: 0.5437
Epoch 189/200
450/450 [==============================] - 448s 995ms/step - loss:
0.7354 - accuracy: 0.7700 - val_loss: 2.2924 - val_accuracy: 0.5250
Epoch 190/200
450/450 [==============================] - 448s 995ms/step - loss:
0.7276 - accuracy: 0.7649 - val_loss: 2.3497 - val_accuracy: 0.5688
Epoch 191/200
450/450 [==============================] - 446s 990ms/step - loss:
0.7743 - accuracy: 0.7591 - val_loss: 2.0234 - val_accuracy: 0.5875
Epoch 192/200
450/450 [==============================] - 444s 986ms/step - loss:
0.7446 - accuracy: 0.7711 - val_loss: 2.1069 - val_accuracy: 0.5437
Epoch 193/200
450/450 [==============================] - 445s 989ms/step - loss:
0.7154 - accuracy: 0.7771 - val_loss: 2.7973 - val_accuracy: 0.5125
Epoch 194/200
450/450 [==============================] - 446s 990ms/step - loss:
0.7404 - accuracy: 0.7660 - val_loss: 2.1837 - val_accuracy: 0.5250
Epoch 195/200
450/450 [==============================] - 448s 995ms/step - loss:
0.7174 - accuracy: 0.7731 - val_loss: 2.4318 - val_accuracy: 0.5312
Epoch 196/200
450/450 [==============================] - 446s 991ms/step - loss:
0.7102 - accuracy: 0.7705 - val_loss: 2.3180 - val_accuracy: 0.6500
Epoch 197/200
450/450 [==============================] - 447s 994ms/step - loss:
0.7481 - accuracy: 0.7904 - val_loss: 2.5570 - val_accuracy: 0.7050
Epoch 198/200
450/450 [==============================] - 446s 992ms/step - loss:
0.7135 - accuracy: 0.7867 - val_loss: 2.3970 - val_accuracy: 0.7225
Epoch 199/200
450/450 [==============================] - 448s 995ms/step - loss:
0.7464 - accuracy: 0.8002 - val_loss: 2.4535 - val_accuracy: 0.7537
Epoch 200/200
450/450 [==============================] - 448s 994ms/step - loss:
0.6975 - accuracy: 0.8584 - val_loss: 2.2365 - val_accuracy: 0.8062
```

```
#Save Model
model.save("sports_classification.h5")
```

```
/home/tihan/.local/lib/python3.10/site-packages/keras/src/engine/
training.py:3103: UserWarning: You are saving your model as an HDF5
file via `model.save()`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')`.
  saving_api.save_model(
```

```
from tensorflow.keras.models import load_model
model=load_model("sports_classification.h5")
```

```
WARNING:tensorflow:From c:\Users\heman\AppData\Local\Programs\Python\
Python311\Lib\site-packages\keras\src\backend.py:1398: The name
tf.executing_eagerly_outside_functions is deprecated. Please use
tf.compat.v1.executing_eagerly_outside_functions instead.
```

```
WARNING:tensorflow:From c:\Users\heman\AppData\Local\Programs\Python\
Python311\Lib\site-packages\keras\src\layers\pooling\
max_pooling2d.py:161: The name tf.nn.max_pool is deprecated. Please
use tf.nn.max_pool2d instead.
```

```
img=image.load_img(r"D:\smartbridge data science\project\main\dataset\
test\boxing\2.jpg",target_size=(224,224))
x=image.img_to_array(img)
import numpy as np
x=np.expand_dims(x,axis=0)
img_data=preprocess_input(x)
output=np.argmax(model.predict(img_data),axis=1)
index=['air hockey', 'ampute football', 'archery', 'arm wrestling',
'axe throwing', 'balance beam', 'barell racing', 'baseball',
       'basketball', 'baton twirling', 'bike polo', 'billiards',
'bmx', 'bobsled', 'bowling', 'boxing', 'bull riding', 'bungee
jumping',
       'canoe slamon', 'cheerleading', 'chuckwagon racing', 'cricket',
'croquet', 'curling', 'disc golf', 'fencing', 'field hockey', 'figure
skating men',
       'figure skating pairs', 'figure skating women', 'fly fishing',
'football', 'formula 1 racing', 'frisbee', 'gaga', 'giant slalom',
       'golf', 'hammer throw', 'hang gliding', 'harness racing', 'high
jump', 'hockey', 'horse jumping', 'horse racing', 'horseshoe
pitching',
       'hurdles', 'hydroplane racing', 'ice climbing', 'ice yachting',
'jai alai', 'javelin', 'jousting', 'judo', 'lacrosse', 'log rolling',
       'luge', 'motorcycle racing', 'mushing', 'nascar racing',
'olympic wrestling', 'parallel bar', 'pole climbing', 'pole dancing',
'pole vault',
       'polo', 'pommel horse', 'rings', 'rock climbing', 'roller
```

```
derby', 'rollerblade racing', 'rowing', 'rugby', 'sailboat racing',
'shot put',
       'shuffleboard', 'sidecar racing', 'ski jumping', 'sky surfing',
'skydiving', 'snow boarding', 'snowmobile racing', 'speed skating',
'steer wrestling',
       'sumo wrestling', 'surfing', 'swimming', 'table tennis',
'tennis', 'track bicycle', 'trapeze', 'tug of war', 'ultimate',
'uneven bars', 'volleyball',
       'water cycling', 'water polo', 'weightlifting', 'wheelchair
basketball', 'wheelchair racing', 'wingsuit flying']

result=str(index[output[0]])
result
```

```
1/1 [==============================] - 1s 585ms/step
```

```
'boxing'
```