VGG16:

Epoch 1/200

97/97 [==============================] - 40s 304ms/step - loss: 2.9882 - sparse_categorical_accuracy: 0.1301 - val_loss: 2.3229 - val_sparse_categorical_accuracy: 0.1000

Epoch 2/200

97/97 [==============================] - 28s 286ms/step - loss: 2.1860 - sparse_categorical_accuracy: 0.1746 - val_loss: 2.3485 - val_sparse_categorical_accuracy: 0.1000

Epoch 3/200

97/97 [==============================] - 27s 281ms/step - loss: 2.0836 - sparse_categorical_accuracy: 0.2056 - val_loss: 2.3245 - val_sparse_categorical_accuracy: 0.1180

Epoch 4/200

97/97 [==============================] - 28s 286ms/step - loss: 2.0539 - sparse_categorical_accuracy: 0.2240 - val_loss: 2.1767 - val_sparse_categorical_accuracy: 0.1859

Epoch 5/200

97/97 [==============================] - 28s 286ms/step - loss: 2.0102 - sparse_categorical_accuracy: 0.2405 - val_loss: 2.3630 - val_sparse_categorical_accuracy: 0.1234

Epoch 6/200

97/97 [==============================] - 28s 286ms/step - loss: 1.9173 - sparse_categorical_accuracy: 0.2951 - val_loss: 2.7636 - val_sparse_categorical_accuracy: 0.1000

Epoch 7/200

97/97 [==============================] - 28s 285ms/step - loss: 1.7484 - sparse_categorical_accuracy: 0.3794 - val_loss: 2.5681 - val_sparse_categorical_accuracy: 0.2047

Epoch 8/200

97/97 [==============================] - 28s 285ms/step - loss: 1.6657 - sparse_categorical_accuracy: 0.4097 - val_loss: 2.1539 - val_sparse_categorical_accuracy: 0.2492

Epoch 9/200

97/97 [==============================] - 28s 287ms/step - loss: 1.5795 - sparse_categorical_accuracy: 0.4408 - val_loss: 1.9619 - val_sparse_categorical_accuracy: 0.3375

Epoch 10/200

97/97 [==============================] - 28s 286ms/step - loss: 1.4971 - sparse_categorical_accuracy: 0.4812 - val_loss: 1.9535 - val_sparse_categorical_accuracy: 0.3484

Epoch 11/200

97/97 [==============================] - 27s 281ms/step - loss: 1.4161 - sparse_categorical_accuracy: 0.5078 - val_loss: 2.6352 - val_sparse_categorical_accuracy: 0.2945

Epoch 12/200

97/97 [==============================] - 28s 286ms/step - loss: 1.3498 - sparse_categorical_accuracy: 0.5318 - val_loss: 2.0744 - val_sparse_categorical_accuracy: 0.3812

Epoch 13/200

97/97 [==============================] - 28s 286ms/step - loss: 1.2942 - sparse_categorical_accuracy: 0.5569 - val_loss: 1.5112 - val_sparse_categorical_accuracy: 0.4742

Epoch 14/200

97/97 [==============================] - 27s 282ms/step - loss: 1.2259 - sparse_categorical_accuracy: 0.5833 - val_loss: 1.5876 - val_sparse_categorical_accuracy: 0.4586

Epoch 15/200
97/97 [==============================] - 28s 286ms/step - loss: 1.1758 - sparse_categorical_accuracy: 0.6074 - val_loss: 1.6576 - val_sparse_categorical_accuracy: 0.4719
Epoch 16/200
97/97 [==============================] - 27s 281ms/step - loss: 1.1185 - sparse_categorical_accuracy: 0.6262 - val_loss: 1.9514 - val_sparse_categorical_accuracy: 0.4445
Epoch 17/200
97/97 [==============================] - 28s 286ms/step - loss: 1.0616 - sparse_categorical_accuracy: 0.6441 - val_loss: 1.3711 - val_sparse_categorical_accuracy: 0.5273
Epoch 18/200
97/97 [==============================] - 28s 286ms/step - loss: 1.0104 - sparse_categorical_accuracy: 0.6593 - val_loss: 1.5962 - val_sparse_categorical_accuracy: 0.4922
Epoch 19/200
97/97 [==============================] - 28s 286ms/step - loss: 0.9799 - sparse_categorical_accuracy: 0.6712 - val_loss: 1.2129 - val_sparse_categorical_accuracy: 0.5891
Epoch 20/200
97/97 [==============================] - 28s 286ms/step - loss: 0.9102 - sparse_categorical_accuracy: 0.6929 - val_loss: 1.1857 - val_sparse_categorical_accuracy: 0.6156
Epoch 21/200
97/97 [==============================] - 27s 281ms/step - loss: 0.8624 - sparse_categorical_accuracy: 0.7099 - val_loss: 1.3807 - val_sparse_categorical_accuracy: 0.5016
Epoch 22/200
97/97 [==============================] - 28s 286ms/step - loss: 0.8200 - sparse_categorical_accuracy: 0.7270 - val_loss: 1.4969 - val_sparse_categorical_accuracy: 0.5383
Epoch 23/200
97/97 [==============================] - 27s 282ms/step - loss: 0.7621 - sparse_categorical_accuracy: 0.7414 - val_loss: 1.0055 - val_sparse_categorical_accuracy: 0.6844
Epoch 24/200
97/97 [==============================] - 28s 286ms/step - loss: 0.7353 - sparse_categorical_accuracy: 0.7498 - val_loss: 1.2339 - val_sparse_categorical_accuracy: 0.6008
Epoch 25/200
97/97 [==============================] - 27s 281ms/step - loss: 0.6794 - sparse_categorical_accuracy: 0.7685 - val_loss: 1.3683 - val_sparse_categorical_accuracy: 0.6016
Epoch 26/200
97/97 [==============================] - 27s 281ms/step - loss: 0.6631 - sparse_categorical_accuracy: 0.7752 - val_loss: 2.1071 - val_sparse_categorical_accuracy: 0.4938
Epoch 27/200
97/97 [==============================] - 28s 286ms/step - loss: 0.6229 - sparse_categorical_accuracy: 0.7852 - val_loss: 1.5231 - val_sparse_categorical_accuracy: 0.5648
Epoch 28/200
97/97 [==============================] - 27s 281ms/step - loss: 0.5689 - sparse_categorical_accuracy: 0.8047 - val_loss: 0.9323 - val_sparse_categorical_accuracy: 0.6945
Epoch 29/200
97/97 [==============================] - 28s 286ms/step - loss: 0.5355 - sparse_categorical_accuracy:

0.8166 - val_loss: 1.5451 - val_sparse_categorical_accuracy: 0.5992

Epoch 30/200

97/97 [==============================] - 27s 281ms/step - loss: 0.5144 - sparse_categorical_accuracy: 0.8256 - val_loss: 1.2214 - val_sparse_categorical_accuracy: 0.6484

Epoch 31/200

97/97 [==============================] - 27s 281ms/step - loss: 0.4643 - sparse_categorical_accuracy: 0.8404 - val_loss: 1.7050 - val_sparse_categorical_accuracy: 0.5547

Epoch 32/200

97/97 [==============================] - 28s 286ms/step - loss: 0.4420 - sparse_categorical_accuracy: 0.8491 - val_loss: 0.9427 - val_sparse_categorical_accuracy: 0.7047

Epoch 33/200

97/97 [==============================] - 28s 286ms/step - loss: 0.4329 - sparse_categorical_accuracy: 0.8524 - val_loss: 1.1206 - val_sparse_categorical_accuracy: 0.7000

Epoch 34/200

97/97 [==============================] - 28s 286ms/step - loss: 0.3844 - sparse_categorical_accuracy: 0.8679 - val_loss: 1.0675 - val_sparse_categorical_accuracy: 0.7039

Epoch 35/200

97/97 [==============================] - 27s 281ms/step - loss: 0.3598 - sparse_categorical_accuracy: 0.8755 - val_loss: 1.0306 - val_sparse_categorical_accuracy: 0.7141

Epoch 36/200

97/97 [==============================] - 28s 285ms/step - loss: 0.3490 - sparse_categorical_accuracy: 0.8786 - val_loss: 1.2369 - val_sparse_categorical_accuracy: 0.7156

Epoch 37/200

97/97 [==============================] - 28s 286ms/step - loss: 0.3085 - sparse_categorical_accuracy: 0.8926 - val_loss: 0.9538 - val_sparse_categorical_accuracy: 0.7477

Epoch 38/200

97/97 [==============================] - 28s 286ms/step - loss: 0.3020 - sparse_categorical_accuracy: 0.8959 - val_loss: 1.1019 - val_sparse_categorical_accuracy: 0.7312

Epoch 39/200

97/97 [==============================] - 28s 286ms/step - loss: 0.2950 - sparse_categorical_accuracy: 0.8977 - val_loss: 0.8224 - val_sparse_categorical_accuracy: 0.7750

Epoch 40/200

97/97 [==============================] - 27s 281ms/step - loss: 0.2619 - sparse_categorical_accuracy: 0.9075 - val_loss: 1.1085 - val_sparse_categorical_accuracy: 0.7203

Epoch 41/200

97/97 [==============================] - 27s 281ms/step - loss: 0.2483 - sparse_categorical_accuracy: 0.9151 - val_loss: 1.1658 - val_sparse_categorical_accuracy: 0.7195

Epoch 42/200

97/97 [==============================] - 28s 286ms/step - loss: 0.2020 - sparse_categorical_accuracy: 0.9296 - val_loss: 0.9385 - val_sparse_categorical_accuracy: 0.7727

Epoch 43/200

97/97 [==============================] - 28s 286ms/step - loss: 0.2171 - sparse_categorical_accuracy: 0.9259 - val_loss: 1.1849 - val_sparse_categorical_accuracy: 0.7281

Epoch 44/200

97/97 [==============================] - 28s 287ms/step - loss: 0.1835 - sparse_categorical_accuracy: 0.9367 - val_loss: 1.3979 - val_sparse_categorical_accuracy: 0.7039
Epoch 45/200
97/97 [==============================] - 28s 288ms/step - loss: 0.1700 - sparse_categorical_accuracy: 0.9420 - val_loss: 1.1949 - val_sparse_categorical_accuracy: 0.7391
Epoch 46/200
97/97 [==============================] - 28s 286ms/step - loss: 0.2186 - sparse_categorical_accuracy: 0.9277 - val_loss: 1.2688 - val_sparse_categorical_accuracy: 0.7102
Epoch 47/200
97/97 [==============================] - 27s 281ms/step - loss: 0.1700 - sparse_categorical_accuracy: 0.9435 - val_loss: 1.5205 - val_sparse_categorical_accuracy: 0.6992
Epoch 48/200
97/97 [==============================] - 27s 281ms/step - loss: 0.1717 - sparse_categorical_accuracy: 0.9411 - val_loss: 1.1781 - val_sparse_categorical_accuracy: 0.7242
Epoch 49/200
97/97 [==============================] - 28s 286ms/step - loss: 0.1639 - sparse_categorical_accuracy: 0.9446 - val_loss: 1.0106 - val_sparse_categorical_accuracy: 0.7773
Epoch 50/200
97/97 [==============================] - 28s 286ms/step - loss: 0.1488 - sparse_categorical_accuracy: 0.9499 - val_loss: 2.0555 - val_sparse_categorical_accuracy: 0.6836
Epoch 51/200
97/97 [==============================] - 27s 281ms/step - loss: 0.1270 - sparse_categorical_accuracy: 0.9588 - val_loss: 0.8843 - val_sparse_categorical_accuracy: 0.8039
Epoch 52/200
97/97 [==============================] - 28s 286ms/step - loss: 0.1364 - sparse_categorical_accuracy: 0.9546 - val_loss: 0.9730 - val_sparse_categorical_accuracy: 0.7727
Epoch 53/200
97/97 [==============================] - 28s 285ms/step - loss: 0.0955 - sparse_categorical_accuracy: 0.9668 - val_loss: 1.4696 - val_sparse_categorical_accuracy: 0.7008
Epoch 54/200
97/97 [==============================] - 27s 281ms/step - loss: 0.1113 - sparse_categorical_accuracy: 0.9636 - val_loss: 2.6753 - val_sparse_categorical_accuracy: 0.6375
Epoch 55/200
97/97 [==============================] - 28s 286ms/step - loss: 0.1301 - sparse_categorical_accuracy: 0.9580 - val_loss: 1.1663 - val_sparse_categorical_accuracy: 0.7188
Epoch 56/200
97/97 [==============================] - 28s 285ms/step - loss: 0.0880 - sparse_categorical_accuracy: 0.9707 - val_loss: 1.1779 - val_sparse_categorical_accuracy: 0.7656
Epoch 57/200
97/97 [==============================] - 27s 282ms/step - loss: 0.0973 - sparse_categorical_accuracy: 0.9689 - val_loss: 1.3476 - val_sparse_categorical_accuracy: 0.7227
Epoch 58/200
97/97 [==============================] - 28s 285ms/step - loss: 0.0970 - sparse_categorical_accuracy: 0.9688 - val_loss: 1.2883 - val_sparse_categorical_accuracy: 0.7484

Epoch 59/200
97/97 [==============================] - 28s 286ms/step - loss: 0.1009 - sparse_categorical_accuracy: 0.9670 - val_loss: 1.9721 - val_sparse_categorical_accuracy: 0.6805
Epoch 60/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0899 - sparse_categorical_accuracy: 0.9718 - val_loss: 0.9870 - val_sparse_categorical_accuracy: 0.7883
Epoch 61/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0965 - sparse_categorical_accuracy: 0.9674 - val_loss: 1.1741 - val_sparse_categorical_accuracy: 0.7625
Epoch 62/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0800 - sparse_categorical_accuracy: 0.9753 - val_loss: 1.3310 - val_sparse_categorical_accuracy: 0.7500
Epoch 63/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0788 - sparse_categorical_accuracy: 0.9743 - val_loss: 0.9606 - val_sparse_categorical_accuracy: 0.7906
Epoch 64/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0699 - sparse_categorical_accuracy: 0.9763 - val_loss: 1.5188 - val_sparse_categorical_accuracy: 0.7211
Epoch 65/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0736 - sparse_categorical_accuracy: 0.9768 - val_loss: 1.2772 - val_sparse_categorical_accuracy: 0.7469
Epoch 66/200
97/97 [==============================] - 28s 285ms/step - loss: 0.0951 - sparse_categorical_accuracy: 0.9701 - val_loss: 1.3090 - val_sparse_categorical_accuracy: 0.7414
Epoch 67/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0683 - sparse_categorical_accuracy: 0.9769 - val_loss: 1.6674 - val_sparse_categorical_accuracy: 0.7383
Epoch 68/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0604 - sparse_categorical_accuracy: 0.9805 - val_loss: 1.2468 - val_sparse_categorical_accuracy: 0.7688
Epoch 69/200
97/97 [==============================] - 28s 287ms/step - loss: 0.0738 - sparse_categorical_accuracy: 0.9774 - val_loss: 1.1332 - val_sparse_categorical_accuracy: 0.7586
Epoch 70/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0782 - sparse_categorical_accuracy: 0.9752 - val_loss: 1.1792 - val_sparse_categorical_accuracy: 0.7797
Epoch 71/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0945 - sparse_categorical_accuracy: 0.9702 - val_loss: 1.3223 - val_sparse_categorical_accuracy: 0.7672
Epoch 72/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0667 - sparse_categorical_accuracy: 0.9768 - val_loss: 1.1542 - val_sparse_categorical_accuracy: 0.7742
Epoch 73/200
97/97 [==============================] - 27s 282ms/step - loss: 0.0614 - sparse_categorical_accuracy:

0.9806 - val_loss: 1.0607 - val_sparse_categorical_accuracy: 0.7836

Epoch 74/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0536 - sparse_categorical_accuracy: 0.9836 - val_loss: 1.3725 - val_sparse_categorical_accuracy: 0.7625

Epoch 75/200

97/97 [==============================] - 28s 286ms/step - loss: 0.0633 - sparse_categorical_accuracy: 0.9791 - val_loss: 1.6687 - val_sparse_categorical_accuracy: 0.7094

Epoch 76/200

97/97 [==============================] - 28s 286ms/step - loss: 0.0676 - sparse_categorical_accuracy: 0.9775 - val_loss: 1.2781 - val_sparse_categorical_accuracy: 0.7625

Epoch 77/200

97/97 [==============================] - 27s 282ms/step - loss: 0.0613 - sparse_categorical_accuracy: 0.9799 - val_loss: 1.2325 - val_sparse_categorical_accuracy: 0.7703

Epoch 78/200

97/97 [==============================] - 28s 286ms/step - loss: 0.0528 - sparse_categorical_accuracy: 0.9822 - val_loss: 1.0749 - val_sparse_categorical_accuracy: 0.7906

Epoch 79/200

97/97 [==============================] - 28s 285ms/step - loss: 0.0522 - sparse_categorical_accuracy: 0.9832 - val_loss: 1.2701 - val_sparse_categorical_accuracy: 0.7555

Epoch 80/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0621 - sparse_categorical_accuracy: 0.9806 - val_loss: 1.1108 - val_sparse_categorical_accuracy: 0.7945

Epoch 81/200

97/97 [==============================] - 27s 282ms/step - loss: 0.0644 - sparse_categorical_accuracy: 0.9795 - val_loss: 1.0354 - val_sparse_categorical_accuracy: 0.7844

Epoch 82/200

97/97 [==============================] - 28s 286ms/step - loss: 0.0374 - sparse_categorical_accuracy: 0.9877 - val_loss: 1.4891 - val_sparse_categorical_accuracy: 0.7383

Epoch 83/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0576 - sparse_categorical_accuracy: 0.9826 - val_loss: 1.6916 - val_sparse_categorical_accuracy: 0.7336

Epoch 84/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0526 - sparse_categorical_accuracy: 0.9845 - val_loss: 1.8693 - val_sparse_categorical_accuracy: 0.6875

Epoch 85/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0507 - sparse_categorical_accuracy: 0.9840 - val_loss: 1.4100 - val_sparse_categorical_accuracy: 0.7703

Epoch 86/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0677 - sparse_categorical_accuracy: 0.9770 - val_loss: 1.2690 - val_sparse_categorical_accuracy: 0.7656

Epoch 87/200

97/97 [==============================] - 28s 285ms/step - loss: 0.0409 - sparse_categorical_accuracy: 0.9868 - val_loss: 1.2526 - val_sparse_categorical_accuracy: 0.7703

Epoch 88/200

97/97 [==============================] - 28s 287ms/step - loss: 0.0531 - sparse_categorical_accuracy: 0.9823 - val_loss: 1.5170 - val_sparse_categorical_accuracy: 0.7453
Epoch 89/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0472 - sparse_categorical_accuracy: 0.9850 - val_loss: 1.1743 - val_sparse_categorical_accuracy: 0.7633
Epoch 90/200
97/97 [==============================] - 28s 285ms/step - loss: 0.0548 - sparse_categorical_accuracy: 0.9818 - val_loss: 1.1022 - val_sparse_categorical_accuracy: 0.7898
Epoch 91/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0392 - sparse_categorical_accuracy: 0.9879 - val_loss: 1.2450 - val_sparse_categorical_accuracy: 0.7734
Epoch 92/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0474 - sparse_categorical_accuracy: 0.9849 - val_loss: 1.3150 - val_sparse_categorical_accuracy: 0.7766
Epoch 93/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0709 - sparse_categorical_accuracy: 0.9773 - val_loss: 1.1853 - val_sparse_categorical_accuracy: 0.7742
Epoch 94/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0492 - sparse_categorical_accuracy: 0.9839 - val_loss: 1.6332 - val_sparse_categorical_accuracy: 0.7188
Epoch 95/200
97/97 [==============================] - 27s 282ms/step - loss: 0.0523 - sparse_categorical_accuracy: 0.9836 - val_loss: 1.1384 - val_sparse_categorical_accuracy: 0.7875
Epoch 96/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0481 - sparse_categorical_accuracy: 0.9860 - val_loss: 1.1103 - val_sparse_categorical_accuracy: 0.7906
Epoch 97/200
97/97 [==============================] - 27s 282ms/step - loss: 0.0421 - sparse_categorical_accuracy: 0.9875 - val_loss: 1.2135 - val_sparse_categorical_accuracy: 0.7578
Epoch 98/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0434 - sparse_categorical_accuracy: 0.9860 - val_loss: 1.5372 - val_sparse_categorical_accuracy: 0.7469
Epoch 99/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0429 - sparse_categorical_accuracy: 0.9869 - val_loss: 1.0886 - val_sparse_categorical_accuracy: 0.7930
Epoch 100/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0358 - sparse_categorical_accuracy: 0.9887 - val_loss: 1.3428 - val_sparse_categorical_accuracy: 0.7469
Epoch 101/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0326 - sparse_categorical_accuracy: 0.9898 - val_loss: 1.8773 - val_sparse_categorical_accuracy: 0.7203
Epoch 102/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0471 - sparse_categorical_accuracy: 0.9847 - val_loss: 1.3576 - val_sparse_categorical_accuracy: 0.7758

Epoch 103/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0410 - sparse_categorical_accuracy: 0.9870 - val_loss: 1.1682 - val_sparse_categorical_accuracy: 0.7719
Epoch 104/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0484 - sparse_categorical_accuracy: 0.9834 - val_loss: 1.5030 - val_sparse_categorical_accuracy: 0.7539
Epoch 105/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0376 - sparse_categorical_accuracy: 0.9878 - val_loss: 1.2174 - val_sparse_categorical_accuracy: 0.7930
Epoch 106/200
97/97 [==============================] - 27s 282ms/step - loss: 0.0538 - sparse_categorical_accuracy: 0.9835 - val_loss: 1.5445 - val_sparse_categorical_accuracy: 0.7453
Epoch 107/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0461 - sparse_categorical_accuracy: 0.9845 - val_loss: 1.2139 - val_sparse_categorical_accuracy: 0.7805
Epoch 108/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0433 - sparse_categorical_accuracy: 0.9855 - val_loss: 1.4273 - val_sparse_categorical_accuracy: 0.7914
Epoch 109/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0493 - sparse_categorical_accuracy: 0.9843 - val_loss: 1.4490 - val_sparse_categorical_accuracy: 0.7672
Epoch 110/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0345 - sparse_categorical_accuracy: 0.9884 - val_loss: 1.3106 - val_sparse_categorical_accuracy: 0.7578
Epoch 111/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0355 - sparse_categorical_accuracy: 0.9891 - val_loss: 1.0746 - val_sparse_categorical_accuracy: 0.7859
Epoch 112/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0445 - sparse_categorical_accuracy: 0.9870 - val_loss: 1.1646 - val_sparse_categorical_accuracy: 0.7859
Epoch 113/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0320 - sparse_categorical_accuracy: 0.9891 - val_loss: 1.4371 - val_sparse_categorical_accuracy: 0.7781
Epoch 114/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0373 - sparse_categorical_accuracy: 0.9875 - val_loss: 1.2472 - val_sparse_categorical_accuracy: 0.7867
Epoch 115/200
97/97 [==============================] - 28s 285ms/step - loss: 0.0468 - sparse_categorical_accuracy: 0.9868 - val_loss: 2.1343 - val_sparse_categorical_accuracy: 0.7266
Epoch 116/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0298 - sparse_categorical_accuracy: 0.9907 - val_loss: 1.1501 - val_sparse_categorical_accuracy: 0.8172
Epoch 117/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0357 - sparse_categorical_accuracy:

0.9890 - val_loss: 1.3602 - val_sparse_categorical_accuracy: 0.7828

Epoch 118/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0377 - sparse_categorical_accuracy: 0.9892 - val_loss: 1.2193 - val_sparse_categorical_accuracy: 0.8000

Epoch 119/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0251 - sparse_categorical_accuracy: 0.9911 - val_loss: 1.4240 - val_sparse_categorical_accuracy: 0.7992

Epoch 120/200

97/97 [==============================] - 28s 286ms/step - loss: 0.0398 - sparse_categorical_accuracy: 0.9895 - val_loss: 1.3290 - val_sparse_categorical_accuracy: 0.7930

Epoch 121/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0502 - sparse_categorical_accuracy: 0.9834 - val_loss: 1.1982 - val_sparse_categorical_accuracy: 0.7875

Epoch 122/200

97/97 [==============================] - 28s 286ms/step - loss: 0.0421 - sparse_categorical_accuracy: 0.9873 - val_loss: 2.4656 - val_sparse_categorical_accuracy: 0.6430

Epoch 123/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0380 - sparse_categorical_accuracy: 0.9885 - val_loss: 1.1601 - val_sparse_categorical_accuracy: 0.7969

Epoch 124/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0301 - sparse_categorical_accuracy: 0.9913 - val_loss: 1.9882 - val_sparse_categorical_accuracy: 0.7141

Epoch 125/200

97/97 [==============================] - 28s 286ms/step - loss: 0.0431 - sparse_categorical_accuracy: 0.9864 - val_loss: 1.8073 - val_sparse_categorical_accuracy: 0.7070

Epoch 126/200

97/97 [==============================] - 28s 286ms/step - loss: 0.0331 - sparse_categorical_accuracy: 0.9886 - val_loss: 1.4368 - val_sparse_categorical_accuracy: 0.7812

Epoch 127/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0269 - sparse_categorical_accuracy: 0.9904 - val_loss: 1.4525 - val_sparse_categorical_accuracy: 0.7531

Epoch 128/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0301 - sparse_categorical_accuracy: 0.9906 - val_loss: 1.4879 - val_sparse_categorical_accuracy: 0.7641

Epoch 129/200

97/97 [==============================] - 28s 286ms/step - loss: 0.0274 - sparse_categorical_accuracy: 0.9916 - val_loss: 1.3972 - val_sparse_categorical_accuracy: 0.7492

Epoch 130/200

97/97 [==============================] - 28s 285ms/step - loss: 0.0285 - sparse_categorical_accuracy: 0.9907 - val_loss: 1.4524 - val_sparse_categorical_accuracy: 0.7820

Epoch 131/200

97/97 [==============================] - 28s 285ms/step - loss: 0.0270 - sparse_categorical_accuracy: 0.9917 - val_loss: 1.2534 - val_sparse_categorical_accuracy: 0.8039

Epoch 132/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0481 - sparse_categorical_accuracy: 0.9847 - val_loss: 1.7647 - val_sparse_categorical_accuracy: 0.7242
Epoch 133/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0278 - sparse_categorical_accuracy: 0.9916 - val_loss: 1.2857 - val_sparse_categorical_accuracy: 0.7648
Epoch 134/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0306 - sparse_categorical_accuracy: 0.9912 - val_loss: 1.6108 - val_sparse_categorical_accuracy: 0.7398
Epoch 135/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0346 - sparse_categorical_accuracy: 0.9891 - val_loss: 1.7469 - val_sparse_categorical_accuracy: 0.7703
Epoch 136/200
97/97 [==============================] - 28s 285ms/step - loss: 0.0574 - sparse_categorical_accuracy: 0.9823 - val_loss: 1.3222 - val_sparse_categorical_accuracy: 0.7937
Epoch 137/200
97/97 [==============================] - 28s 285ms/step - loss: 0.0213 - sparse_categorical_accuracy: 0.9926 - val_loss: 1.2642 - val_sparse_categorical_accuracy: 0.8008
Epoch 138/200
97/97 [==============================] - 27s 280ms/step - loss: 0.0282 - sparse_categorical_accuracy: 0.9912 - val_loss: 1.1372 - val_sparse_categorical_accuracy: 0.7836
Epoch 139/200
97/97 [==============================] - 28s 285ms/step - loss: 0.0430 - sparse_categorical_accuracy: 0.9856 - val_loss: 1.0892 - val_sparse_categorical_accuracy: 0.7656
Epoch 140/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0427 - sparse_categorical_accuracy: 0.9869 - val_loss: 1.5929 - val_sparse_categorical_accuracy: 0.7625
Epoch 141/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0274 - sparse_categorical_accuracy: 0.9907 - val_loss: 1.2663 - val_sparse_categorical_accuracy: 0.7914
Epoch 142/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0259 - sparse_categorical_accuracy: 0.9913 - val_loss: 1.4513 - val_sparse_categorical_accuracy: 0.7672
Epoch 143/200
97/97 [==============================] - 28s 285ms/step - loss: 0.0174 - sparse_categorical_accuracy: 0.9942 - val_loss: 1.4870 - val_sparse_categorical_accuracy: 0.8031
Epoch 144/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0342 - sparse_categorical_accuracy: 0.9891 - val_loss: 1.3110 - val_sparse_categorical_accuracy: 0.7734
Epoch 145/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0400 - sparse_categorical_accuracy: 0.9874 - val_loss: 1.6885 - val_sparse_categorical_accuracy: 0.7125
Epoch 146/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0804 - sparse_categorical_accuracy: 0.9772 - val_loss: 1.4650 - val_sparse_categorical_accuracy: 0.7531

Epoch 147/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0305 - sparse_categorical_accuracy: 0.9898 - val_loss: 0.9893 - val_sparse_categorical_accuracy: 0.8047
Epoch 148/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0288 - sparse_categorical_accuracy: 0.9907 - val_loss: 1.3617 - val_sparse_categorical_accuracy: 0.7703
Epoch 149/200
97/97 [==============================] - 28s 285ms/step - loss: 0.0241 - sparse_categorical_accuracy: 0.9926 - val_loss: 1.2795 - val_sparse_categorical_accuracy: 0.7883
Epoch 150/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0152 - sparse_categorical_accuracy: 0.9949 - val_loss: 1.3156 - val_sparse_categorical_accuracy: 0.8109
Epoch 151/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0158 - sparse_categorical_accuracy: 0.9943 - val_loss: 1.5731 - val_sparse_categorical_accuracy: 0.7719
Epoch 152/200
97/97 [==============================] - 28s 285ms/step - loss: 0.0377 - sparse_categorical_accuracy: 0.9890 - val_loss: 1.1460 - val_sparse_categorical_accuracy: 0.8055
Epoch 153/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0244 - sparse_categorical_accuracy: 0.9925 - val_loss: 1.4519 - val_sparse_categorical_accuracy: 0.7719
Epoch 154/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0174 - sparse_categorical_accuracy: 0.9935 - val_loss: 1.5343 - val_sparse_categorical_accuracy: 0.7914
Epoch 155/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0240 - sparse_categorical_accuracy: 0.9930 - val_loss: 1.4977 - val_sparse_categorical_accuracy: 0.7727
Epoch 156/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0230 - sparse_categorical_accuracy: 0.9921 - val_loss: 1.7435 - val_sparse_categorical_accuracy: 0.7563
Epoch 157/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0174 - sparse_categorical_accuracy: 0.9940 - val_loss: 1.4932 - val_sparse_categorical_accuracy: 0.8078
Epoch 158/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0351 - sparse_categorical_accuracy: 0.9890 - val_loss: 1.6310 - val_sparse_categorical_accuracy: 0.6945
Epoch 159/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0302 - sparse_categorical_accuracy: 0.9902 - val_loss: 1.2530 - val_sparse_categorical_accuracy: 0.7844
Epoch 160/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0218 - sparse_categorical_accuracy: 0.9938 - val_loss: 1.3831 - val_sparse_categorical_accuracy: 0.8102
Epoch 161/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0277 - sparse_categorical_accuracy:

0.9916 - val_loss: 1.1585 - val_sparse_categorical_accuracy: 0.7875

Epoch 162/200

97/97 [==============================] - 28s 285ms/step - loss: 0.0267 - sparse_categorical_accuracy: 0.9919 - val_loss: 1.2164 - val_sparse_categorical_accuracy: 0.7758

Epoch 163/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0303 - sparse_categorical_accuracy: 0.9902 - val_loss: 1.2798 - val_sparse_categorical_accuracy: 0.7984

Epoch 164/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0294 - sparse_categorical_accuracy: 0.9905 - val_loss: 1.6371 - val_sparse_categorical_accuracy: 0.7523

Epoch 165/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0266 - sparse_categorical_accuracy: 0.9913 - val_loss: 1.4005 - val_sparse_categorical_accuracy: 0.7969

Epoch 166/200

97/97 [==============================] - 28s 286ms/step - loss: 0.0250 - sparse_categorical_accuracy: 0.9920 - val_loss: 1.5131 - val_sparse_categorical_accuracy: 0.7727

Epoch 167/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0221 - sparse_categorical_accuracy: 0.9931 - val_loss: 1.2616 - val_sparse_categorical_accuracy: 0.7812

Epoch 168/200

97/97 [==============================] - 28s 286ms/step - loss: 0.0243 - sparse_categorical_accuracy: 0.9920 - val_loss: 1.6302 - val_sparse_categorical_accuracy: 0.7617

Epoch 169/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0361 - sparse_categorical_accuracy: 0.9894 - val_loss: 4.2190 - val_sparse_categorical_accuracy: 0.5867

Epoch 170/200

97/97 [==============================] - 28s 285ms/step - loss: 0.0253 - sparse_categorical_accuracy: 0.9907 - val_loss: 2.0113 - val_sparse_categorical_accuracy: 0.7492

Epoch 171/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0221 - sparse_categorical_accuracy: 0.9920 - val_loss: 1.6424 - val_sparse_categorical_accuracy: 0.7383

Epoch 172/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0386 - sparse_categorical_accuracy: 0.9883 - val_loss: 1.6833 - val_sparse_categorical_accuracy: 0.7336

Epoch 173/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0246 - sparse_categorical_accuracy: 0.9925 - val_loss: 1.4050 - val_sparse_categorical_accuracy: 0.7695

Epoch 174/200

97/97 [==============================] - 28s 286ms/step - loss: 0.0208 - sparse_categorical_accuracy: 0.9936 - val_loss: 1.4592 - val_sparse_categorical_accuracy: 0.7844

Epoch 175/200

97/97 [==============================] - 27s 281ms/step - loss: 0.0228 - sparse_categorical_accuracy: 0.9929 - val_loss: 1.1327 - val_sparse_categorical_accuracy: 0.7969

Epoch 176/200

97/97 [==============================] - 28s 286ms/step - loss: 0.0210 - sparse_categorical_accuracy: 0.9931 - val_loss: 1.8079 - val_sparse_categorical_accuracy: 0.7508
Epoch 177/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0194 - sparse_categorical_accuracy: 0.9940 - val_loss: 1.3634 - val_sparse_categorical_accuracy: 0.7937
Epoch 178/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0269 - sparse_categorical_accuracy: 0.9913 - val_loss: 1.3514 - val_sparse_categorical_accuracy: 0.7711
Epoch 179/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0249 - sparse_categorical_accuracy: 0.9920 - val_loss: 1.6927 - val_sparse_categorical_accuracy: 0.7750
Epoch 180/200
97/97 [==============================] - 27s 282ms/step - loss: 0.0229 - sparse_categorical_accuracy: 0.9921 - val_loss: 1.1133 - val_sparse_categorical_accuracy: 0.7930
Epoch 181/200
97/97 [==============================] - 27s 282ms/step - loss: 0.0200 - sparse_categorical_accuracy: 0.9934 - val_loss: 1.2874 - val_sparse_categorical_accuracy: 0.8031
Epoch 182/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0184 - sparse_categorical_accuracy: 0.9935 - val_loss: 1.7439 - val_sparse_categorical_accuracy: 0.7563
Epoch 183/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0277 - sparse_categorical_accuracy: 0.9916 - val_loss: 1.2865 - val_sparse_categorical_accuracy: 0.7789
Epoch 184/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0198 - sparse_categorical_accuracy: 0.9933 - val_loss: 1.3502 - val_sparse_categorical_accuracy: 0.8109
Epoch 185/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0252 - sparse_categorical_accuracy: 0.9912 - val_loss: 1.4047 - val_sparse_categorical_accuracy: 0.7695
Epoch 186/200
97/97 [==============================] - 27s 280ms/step - loss: 0.0211 - sparse_categorical_accuracy: 0.9934 - val_loss: 1.4874 - val_sparse_categorical_accuracy: 0.7891
Epoch 187/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0251 - sparse_categorical_accuracy: 0.9912 - val_loss: 1.2099 - val_sparse_categorical_accuracy: 0.8031
Epoch 188/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0322 - sparse_categorical_accuracy: 0.9902 - val_loss: 1.8395 - val_sparse_categorical_accuracy: 0.7734
Epoch 189/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0314 - sparse_categorical_accuracy: 0.9902 - val_loss: 1.6441 - val_sparse_categorical_accuracy: 0.7016
Epoch 190/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0185 - sparse_categorical_accuracy: 0.9930 - val_loss: 1.3158 - val_sparse_categorical_accuracy: 0.7992

Epoch 191/200
97/97 [==============================] - 28s 287ms/step - loss: 0.0169 - sparse_categorical_accuracy: 0.9950 - val_loss: 1.5629 - val_sparse_categorical_accuracy: 0.7984
Epoch 192/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0145 - sparse_categorical_accuracy: 0.9948 - val_loss: 1.3061 - val_sparse_categorical_accuracy: 0.8172
Epoch 193/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0325 - sparse_categorical_accuracy: 0.9899 - val_loss: 1.4670 - val_sparse_categorical_accuracy: 0.7563
Epoch 194/200
97/97 [==============================] - 28s 286ms/step - loss: 0.0170 - sparse_categorical_accuracy: 0.9941 - val_loss: 1.4147 - val_sparse_categorical_accuracy: 0.8039
Epoch 195/200
97/97 [==============================] - 28s 287ms/step - loss: 0.0215 - sparse_categorical_accuracy: 0.9930 - val_loss: 1.3987 - val_sparse_categorical_accuracy: 0.7789
Epoch 196/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0252 - sparse_categorical_accuracy: 0.9922 - val_loss: 1.6092 - val_sparse_categorical_accuracy: 0.7422
Epoch 197/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0176 - sparse_categorical_accuracy: 0.9939 - val_loss: 1.6747 - val_sparse_categorical_accuracy: 0.7820
Epoch 198/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0241 - sparse_categorical_accuracy: 0.9923 - val_loss: 1.5395 - val_sparse_categorical_accuracy: 0.7633
Epoch 199/200
97/97 [==============================] - 27s 281ms/step - loss: 0.0135 - sparse_categorical_accuracy: 0.9950 - val_loss: 1.6193 - val_sparse_categorical_accuracy: 0.7789
Epoch 200/200
97/97 [==============================] - 28s 285ms/step - loss: 0.0195 - sparse_categorical_accuracy: 0.9938 - val_loss: 1.4355 - val_sparse_categorical_accuracy: 0.7836
Model: "vg_g16"

Layer (type)	Output Shape	Param #
conv2d_7 (Conv2D)	multiple	1792
batch_normalization_3 (Batch	multiple	256
activation_3 (Activation)	multiple	0
conv2d_8 (Conv2D)	multiple	36928
batch_normalization_4 (Batch	multiple	256

activation_4 (Activation)	multiple	0
max_pooling2d_5 (MaxPooling2	multiple	0
dropout_2 (Dropout)	multiple	0
conv2d_9 (Conv2D)	multiple	73856
batch_normalization_5 (Batch	multiple	512
activation_5 (Activation)	multiple	0
conv2d_10 (Conv2D)	multiple	147584
batch_normalization_6 (Batch	multiple	512
activation_6 (Activation)	multiple	0
max_pooling2d_6 (MaxPooling2	multiple	0
dropout_3 (Dropout)	multiple	0
conv2d_11 (Conv2D)	multiple	295168
batch_normalization_7 (Batch	multiple	1024
activation_7 (Activation)	multiple	0
conv2d_12 (Conv2D)	multiple	590080
batch_normalization_8 (Batch	multiple	1024
activation_8 (Activation)	multiple	0
conv2d_13 (Conv2D)	multiple	590080
batch_normalization_9 (Batch	multiple	1024
activation_9 (Activation)	multiple	0
max_pooling2d_7 (MaxPooling2	multiple	0
dropout_4 (Dropout)	multiple	0

conv2d_14 (Conv2D)	multiple	1180160
batch_normalization_10 (Batc	multiple	2048
activation_10 (Activation)	multiple	0
conv2d_15 (Conv2D)	multiple	2359808
batch_normalization_11 (Batc	multiple	2048
activation_11 (Activation)	multiple	0
conv2d_16 (Conv2D)	multiple	2359808
batch_normalization_12 (Batc	multiple	2048
activation_12 (Activation)	multiple	0
max_pooling2d_8 (MaxPooling2	multiple	0
dropout_5 (Dropout)	multiple	0
conv2d_17 (Conv2D)	multiple	2359808
batch_normalization_13 (Batc	multiple	2048
activation_13 (Activation)	multiple	0
conv2d_18 (Conv2D)	multiple	2359808
batch_normalization_14 (Batc	multiple	2048
activation_14 (Activation)	multiple	0
conv2d_19 (Conv2D)	multiple	2359808
batch_normalization_15 (Batc	multiple	2048
activation_15 (Activation)	multiple	0
max_pooling2d_9 (MaxPooling2	multiple	0
dropout_6 (Dropout)	multiple	0

flatten_2 (Flatten)	multiple	0
dense_6 (Dense)	multiple	18878464
dropout_7 (Dropout)	multiple	0
dense_7 (Dense)	multiple	4195328
dropout_8 (Dropout)	multiple	0
dense_8 (Dense)	multiple	10250

Total params: 37,815,626

Trainable params: 37,807,178

Non-trainable params: 8,448