

Layer (type)	Output Shape	Param #	Connected to
input_3 (InputLayer)	(None, 224, 224, 3)	0	
conv2d_106 (Conv2D)	(None, 112, 112, 64)	9472	input_3[0][0]
batch_normalization_v1_106 (Batch Normalization)	(None, 112, 112, 64)	256	conv2d_106[0][0]
activation_100 (Activation)	(None, 112, 112, 64)	0	batch_normalization_v1_106[0][0]
max_pooling2d_2 (MaxPooling2D)	(None, 55, 55, 64)	0	activation_100[0][0]
conv2d_108 (Conv2D)	(None, 55, 55, 64)	4160	max_pooling2d_2[0][0]
batch_normalization_v1_108 (Batch Normalization)	(None, 55, 55, 64)	256	conv2d_108[0][0]
activation_101 (Activation)	(None, 55, 55, 64)	0	batch_normalization_v1_108[0][0]
conv2d_109 (Conv2D)	(None, 55, 55, 64)	36928	activation_101[0][0]
batch_normalization_v1_109 (Batch Normalization)	(None, 55, 55, 64)	256	conv2d_109[0][0]
activation_102 (Activation)	(None, 55, 55, 64)	0	batch_normalization_v1_109[0][0]
conv2d_110 (Conv2D)	(None, 55, 55, 256)	16640	activation_102[0][0]
conv2d_107 (Conv2D)	(None, 55, 55, 256)	16640	max_pooling2d_2[0][0]
batch_normalization_v1_110 (Batch Normalization)	(None, 55, 55, 256)	1024	conv2d_110[0][0]
batch_normalization_v1_107 (Batch Normalization)	(None, 55, 55, 256)	1024	conv2d_107[0][0]
add_32 (Add)	(None, 55, 55, 256)	0	batch_normalization_v1_110[0][0] batch_normalization_v1_107[0][0]
activation_103 (Activation)	(None, 55, 55, 256)	0	add_32[0][0]
conv2d_111 (Conv2D)	(None, 55, 55, 64)	16448	activation_103[0][0]
batch_normalization_v1_111 (Batch Normalization)	(None, 55, 55, 64)	256	conv2d_111[0][0]
activation_104 (Activation)	(None, 55, 55, 64)	0	batch_normalization_v1_111[0][0]
conv2d_112 (Conv2D)	(None, 55, 55, 64)	36928	activation_104[0][0]
batch_normalization_v1_112 (Batch Normalization)	(None, 55, 55, 64)	256	conv2d_112[0][0]
activation_105 (Activation)	(None, 55, 55, 64)	0	batch_normalization_v1_112[0][0]
conv2d_113 (Conv2D)	(None, 55, 55, 256)	16640	activation_105[0][0]
batch_normalization_v1_113 (Batch Normalization)	(None, 55, 55, 256)	1024	conv2d_113[0][0]
add_33 (Add)	(None, 55, 55, 256)	0	batch_normalization_v1_113[0][0] activation_103[0][0]
activation_106 (Activation)	(None, 55, 55, 256)	0	add_33[0][0]
conv2d_114 (Conv2D)	(None, 55, 55, 64)	16448	activation_106[0][0]
batch_normalization_v1_114 (Batch Normalization)	(None, 55, 55, 64)	256	conv2d_114[0][0]
activation_107 (Activation)	(None, 55, 55, 64)	0	batch_normalization_v1_114[0][0]
conv2d_115 (Conv2D)	(None, 55, 55, 64)	36928	activation_107[0][0]
batch_normalization_v1_115 (Batch Normalization)	(None, 55, 55, 64)	256	conv2d_115[0][0]
activation_108 (Activation)	(None, 55, 55, 64)	0	batch_normalization_v1_115[0][0]
conv2d_116 (Conv2D)	(None, 55, 55, 256)	16640	activation_108[0][0]
batch_normalization_v1_116 (Batch Normalization)	(None, 55, 55, 256)	1024	conv2d_116[0][0]
add_34 (Add)	(None, 55, 55, 256)	0	batch_normalization_v1_116[0][0] activation_106[0][0]
activation_109 (Activation)	(None, 55, 55, 256)	0	add_34[0][0]
conv2d_118 (Conv2D)	(None, 28, 28, 128)	32896	activation_109[0][0]
batch_normalization_v1_118 (Batch Normalization)	(None, 28, 28, 128)	512	conv2d_118[0][0]
activation_110 (Activation)	(None, 28, 28, 128)	0	batch_normalization_v1_118[0][0]

conv2d_119 (Conv2D)	(None, 28, 28, 128)	147584	activation_110[0][0]
batch_normalization_v1_119 (Bat	(None, 28, 28, 128)	512	conv2d_119[0][0]
activation_111 (Activation)	(None, 28, 28, 128)	0	batch_normalization_v1_119[0][0]
conv2d_120 (Conv2D)	(None, 28, 28, 512)	66048	activation_111[0][0]
conv2d_117 (Conv2D)	(None, 28, 28, 512)	131584	activation_109[0][0]
batch_normalization_v1_120 (Bat	(None, 28, 28, 512)	2048	conv2d_120[0][0]
batch_normalization_v1_117 (Bat	(None, 28, 28, 512)	2048	conv2d_117[0][0]
add_35 (Add)	(None, 28, 28, 512)	0	batch_normalization_v1_120[0][0] batch_normalization_v1_117[0][0]
activation_112 (Activation)	(None, 28, 28, 512)	0	add_35[0][0]
conv2d_121 (Conv2D)	(None, 28, 28, 128)	65664	activation_112[0][0]
batch_normalization_v1_121 (Bat	(None, 28, 28, 128)	512	conv2d_121[0][0]
activation_113 (Activation)	(None, 28, 28, 128)	0	batch_normalization_v1_121[0][0]
conv2d_122 (Conv2D)	(None, 28, 28, 128)	147584	activation_113[0][0]
batch_normalization_v1_122 (Bat	(None, 28, 28, 128)	512	conv2d_122[0][0]
activation_114 (Activation)	(None, 28, 28, 128)	0	batch_normalization_v1_122[0][0]
conv2d_123 (Conv2D)	(None, 28, 28, 512)	66048	activation_114[0][0]
batch_normalization_v1_123 (Bat	(None, 28, 28, 512)	2048	conv2d_123[0][0]
add_36 (Add)	(None, 28, 28, 512)	0	batch_normalization_v1_123[0][0] activation_112[0][0]
activation_115 (Activation)	(None, 28, 28, 512)	0	add_36[0][0]
conv2d_124 (Conv2D)	(None, 28, 28, 128)	65664	activation_115[0][0]
batch_normalization_v1_124 (Bat	(None, 28, 28, 128)	512	conv2d_124[0][0]
activation_116 (Activation)	(None, 28, 28, 128)	0	batch_normalization_v1_124[0][0]
conv2d_125 (Conv2D)	(None, 28, 28, 128)	147584	activation_116[0][0]
batch_normalization_v1_125 (Bat	(None, 28, 28, 128)	512	conv2d_125[0][0]
activation_117 (Activation)	(None, 28, 28, 128)	0	batch_normalization_v1_125[0][0]
conv2d_126 (Conv2D)	(None, 28, 28, 512)	66048	activation_117[0][0]
batch_normalization_v1_126 (Bat	(None, 28, 28, 512)	2048	conv2d_126[0][0]
add_37 (Add)	(None, 28, 28, 512)	0	batch_normalization_v1_126[0][0] activation_115[0][0]
activation_118 (Activation)	(None, 28, 28, 512)	0	add_37[0][0]
conv2d_127 (Conv2D)	(None, 28, 28, 128)	65664	activation_118[0][0]
batch_normalization_v1_127 (Bat	(None, 28, 28, 128)	512	conv2d_127[0][0]
activation_119 (Activation)	(None, 28, 28, 128)	0	batch_normalization_v1_127[0][0]
conv2d_128 (Conv2D)	(None, 28, 28, 128)	147584	activation_119[0][0]
batch_normalization_v1_128 (Bat	(None, 28, 28, 128)	512	conv2d_128[0][0]
activation_120 (Activation)	(None, 28, 28, 128)	0	batch_normalization_v1_128[0][0]
conv2d_129 (Conv2D)	(None, 28, 28, 512)	66048	activation_120[0][0]
batch_normalization_v1_129 (Bat	(None, 28, 28, 512)	2048	conv2d_129[0][0]
add_38 (Add)	(None, 28, 28, 512)	0	batch_normalization_v1_129[0][0] activation_118[0][0]
activation_121 (Activation)	(None, 28, 28, 512)	0	add_38[0][0]
conv2d_131 (Conv2D)	(None, 14, 14, 256)	131328	activation_121[0][0]
batch_normalization_v1_131 (Bat	(None, 14, 14, 256)	1024	conv2d_131[0][0]

activation_122 (Activation)	(None, 14, 14, 256)	0	batch_normalization_v1_131[0][0]
conv2d_132 (Conv2D)	(None, 14, 14, 256)	590080	activation_122[0][0]
batch_normalization_v1_132 (Batch Normalization)	(None, 14, 14, 256)	1024	conv2d_132[0][0]
activation_123 (Activation)	(None, 14, 14, 256)	0	batch_normalization_v1_132[0][0]
conv2d_133 (Conv2D)	(None, 14, 14, 1024)	263168	activation_123[0][0]
conv2d_130 (Conv2D)	(None, 14, 14, 1024)	525312	activation_121[0][0]
batch_normalization_v1_133 (Batch Normalization)	(None, 14, 14, 1024)	4096	conv2d_133[0][0]
batch_normalization_v1_130 (Batch Normalization)	(None, 14, 14, 1024)	4096	conv2d_130[0][0]
add_39 (Add)	(None, 14, 14, 1024)	0	batch_normalization_v1_133[0][0] batch_normalization_v1_130[0][0]
activation_124 (Activation)	(None, 14, 14, 1024)	0	add_39[0][0]
conv2d_134 (Conv2D)	(None, 14, 14, 256)	262400	activation_124[0][0]
batch_normalization_v1_134 (Batch Normalization)	(None, 14, 14, 256)	1024	conv2d_134[0][0]
activation_125 (Activation)	(None, 14, 14, 256)	0	batch_normalization_v1_134[0][0]
conv2d_135 (Conv2D)	(None, 14, 14, 256)	590080	activation_125[0][0]
batch_normalization_v1_135 (Batch Normalization)	(None, 14, 14, 256)	1024	conv2d_135[0][0]
activation_126 (Activation)	(None, 14, 14, 256)	0	batch_normalization_v1_135[0][0]
conv2d_136 (Conv2D)	(None, 14, 14, 1024)	263168	activation_126[0][0]
batch_normalization_v1_136 (Batch Normalization)	(None, 14, 14, 1024)	4096	conv2d_136[0][0]
add_40 (Add)	(None, 14, 14, 1024)	0	batch_normalization_v1_136[0][0] activation_124[0][0]
activation_127 (Activation)	(None, 14, 14, 1024)	0	add_40[0][0]
conv2d_137 (Conv2D)	(None, 14, 14, 256)	262400	activation_127[0][0]
batch_normalization_v1_137 (Batch Normalization)	(None, 14, 14, 256)	1024	conv2d_137[0][0]
activation_128 (Activation)	(None, 14, 14, 256)	0	batch_normalization_v1_137[0][0]
conv2d_138 (Conv2D)	(None, 14, 14, 256)	590080	activation_128[0][0]
batch_normalization_v1_138 (Batch Normalization)	(None, 14, 14, 256)	1024	conv2d_138[0][0]
activation_129 (Activation)	(None, 14, 14, 256)	0	batch_normalization_v1_138[0][0]
conv2d_139 (Conv2D)	(None, 14, 14, 1024)	263168	activation_129[0][0]
batch_normalization_v1_139 (Batch Normalization)	(None, 14, 14, 1024)	4096	conv2d_139[0][0]
add_41 (Add)	(None, 14, 14, 1024)	0	batch_normalization_v1_139[0][0] activation_127[0][0]
activation_130 (Activation)	(None, 14, 14, 1024)	0	add_41[0][0]
conv2d_140 (Conv2D)	(None, 14, 14, 256)	262400	activation_130[0][0]
batch_normalization_v1_140 (Batch Normalization)	(None, 14, 14, 256)	1024	conv2d_140[0][0]
activation_131 (Activation)	(None, 14, 14, 256)	0	batch_normalization_v1_140[0][0]
conv2d_141 (Conv2D)	(None, 14, 14, 256)	590080	activation_131[0][0]
batch_normalization_v1_141 (Batch Normalization)	(None, 14, 14, 256)	1024	conv2d_141[0][0]
activation_132 (Activation)	(None, 14, 14, 256)	0	batch_normalization_v1_141[0][0]
conv2d_142 (Conv2D)	(None, 14, 14, 1024)	263168	activation_132[0][0]
batch_normalization_v1_142 (Batch Normalization)	(None, 14, 14, 1024)	4096	conv2d_142[0][0]
add_42 (Add)	(None, 14, 14, 1024)	0	batch_normalization_v1_142[0][0] activation_130[0][0]
activation_133 (Activation)	(None, 14, 14, 1024)	0	add_42[0][0]
conv2d_143 (Conv2D)	(None, 14, 14, 256)	262400	activation_133[0][0]

batch_normalization_v1_143 (Batch Normalization)	(None, 14, 14, 256)	1024	conv2d_143[0][0]
activation_134 (Activation)	(None, 14, 14, 256)	0	batch_normalization_v1_143[0][0]
conv2d_144 (Conv2D)	(None, 14, 14, 256)	590080	activation_134[0][0]
batch_normalization_v1_144 (Batch Normalization)	(None, 14, 14, 256)	1024	conv2d_144[0][0]
activation_135 (Activation)	(None, 14, 14, 256)	0	batch_normalization_v1_144[0][0]
conv2d_145 (Conv2D)	(None, 14, 14, 1024)	263168	activation_135[0][0]
batch_normalization_v1_145 (Batch Normalization)	(None, 14, 14, 1024)	4096	conv2d_145[0][0]
add_43 (Add)	(None, 14, 14, 1024)	0	batch_normalization_v1_145[0][0] activation_133[0][0]
activation_136 (Activation)	(None, 14, 14, 1024)	0	add_43[0][0]
conv2d_146 (Conv2D)	(None, 14, 14, 256)	262400	activation_136[0][0]
batch_normalization_v1_146 (Batch Normalization)	(None, 14, 14, 256)	1024	conv2d_146[0][0]
activation_137 (Activation)	(None, 14, 14, 256)	0	batch_normalization_v1_146[0][0]
conv2d_147 (Conv2D)	(None, 14, 14, 256)	590080	activation_137[0][0]
batch_normalization_v1_147 (Batch Normalization)	(None, 14, 14, 256)	1024	conv2d_147[0][0]
activation_138 (Activation)	(None, 14, 14, 256)	0	batch_normalization_v1_147[0][0]
conv2d_148 (Conv2D)	(None, 14, 14, 1024)	263168	activation_138[0][0]
batch_normalization_v1_148 (Batch Normalization)	(None, 14, 14, 1024)	4096	conv2d_148[0][0]
add_44 (Add)	(None, 14, 14, 1024)	0	batch_normalization_v1_148[0][0] activation_136[0][0]
activation_139 (Activation)	(None, 14, 14, 1024)	0	add_44[0][0]
conv2d_150 (Conv2D)	(None, 7, 7, 512)	524800	activation_139[0][0]
batch_normalization_v1_150 (Batch Normalization)	(None, 7, 7, 512)	2048	conv2d_150[0][0]
activation_140 (Activation)	(None, 7, 7, 512)	0	batch_normalization_v1_150[0][0]
conv2d_151 (Conv2D)	(None, 7, 7, 512)	2359808	activation_140[0][0]
batch_normalization_v1_151 (Batch Normalization)	(None, 7, 7, 512)	2048	conv2d_151[0][0]
activation_141 (Activation)	(None, 7, 7, 512)	0	batch_normalization_v1_151[0][0]
conv2d_152 (Conv2D)	(None, 7, 7, 2048)	1050624	activation_141[0][0]
conv2d_149 (Conv2D)	(None, 7, 7, 2048)	2099200	activation_139[0][0]
batch_normalization_v1_152 (Batch Normalization)	(None, 7, 7, 2048)	8192	conv2d_152[0][0]
batch_normalization_v1_149 (Batch Normalization)	(None, 7, 7, 2048)	8192	conv2d_149[0][0]
add_45 (Add)	(None, 7, 7, 2048)	0	batch_normalization_v1_152[0][0] batch_normalization_v1_149[0][0]
activation_142 (Activation)	(None, 7, 7, 2048)	0	add_45[0][0]
conv2d_153 (Conv2D)	(None, 7, 7, 512)	1049088	activation_142[0][0]
batch_normalization_v1_153 (Batch Normalization)	(None, 7, 7, 512)	2048	conv2d_153[0][0]
activation_143 (Activation)	(None, 7, 7, 512)	0	batch_normalization_v1_153[0][0]
conv2d_154 (Conv2D)	(None, 7, 7, 512)	2359808	activation_143[0][0]
batch_normalization_v1_154 (Batch Normalization)	(None, 7, 7, 512)	2048	conv2d_154[0][0]
activation_144 (Activation)	(None, 7, 7, 512)	0	batch_normalization_v1_154[0][0]
conv2d_155 (Conv2D)	(None, 7, 7, 2048)	1050624	activation_144[0][0]
batch_normalization_v1_155 (Batch Normalization)	(None, 7, 7, 2048)	8192	conv2d_155[0][0]
add_46 (Add)	(None, 7, 7, 2048)	0	batch_normalization_v1_155[0][0] activation_142[0][0]
activation_145 (Activation)	(None, 7, 7, 2048)	0	add_46[0][0]

conv2d_156 (Conv2D)	(None, 7, 7, 512)	1049088	activation_145[0][0]
batch_normalization_v1_156 (Batch Normalization)	(None, 7, 7, 512)	2048	conv2d_156[0][0]
activation_146 (Activation)	(None, 7, 7, 512)	0	batch_normalization_v1_156[0][0]
conv2d_157 (Conv2D)	(None, 7, 7, 512)	2359808	activation_146[0][0]
batch_normalization_v1_157 (Batch Normalization)	(None, 7, 7, 512)	2048	conv2d_157[0][0]
activation_147 (Activation)	(None, 7, 7, 512)	0	batch_normalization_v1_157[0][0]
conv2d_158 (Conv2D)	(None, 7, 7, 2048)	1050624	activation_147[0][0]
batch_normalization_v1_158 (Batch Normalization)	(None, 7, 7, 2048)	8192	conv2d_158[0][0]
add_47 (Add)	(None, 7, 7, 2048)	0	batch_normalization_v1_158[0][0] activation_145[0][0]
activation_148 (Activation)	(None, 7, 7, 2048)	0	add_47[0][0]
global_avg_pooling (Global Average Pooling)	(None, 2048)	0	activation_148[0][0]
dense_2 (Dense)	(None, 5)	10245	global_avg_pooling[0][0]
activation_149 (Activation)	(None, 5)	0	dense_2[0][0]
=====			
Total params: 23,597,957			
Trainable params: 23,544,837			
Non-trainable params: 53,120			

```

Using Enhanced Data Generation
Found 24216 images belonging to 5 classes.
Found 6063 images belonging to 5 classes.
JSON Mapping for the model classes saved to /content/drive/My Drive/images/json/model_class.json
Number of experiments (Epochs) : 10
Epoch 1/10
190/190 [=====] - 54s 285ms/step - loss: 1.5502 - acc: 0.3003

Epoch 00001: saving model to /content/drive/My Drive/images/models/model_ex-001_acc-0.300346.h5
757/757 [=====] - 5245s 7s/step - loss: 1.6733 - acc: 0.2901 - val_loss: 1.5502 - val_acc: 0.3003
Epoch 2/10
190/190 [=====] - 51s 271ms/step - loss: 2.7759 - acc: 0.3119

Epoch 00002: saving model to /content/drive/My Drive/images/models/model_ex-002_acc-0.311892.h5
757/757 [=====] - 750s 990ms/step - loss: 1.4610 - acc: 0.3703 - val_loss: 2.7759 - val_acc: 0.3119
Epoch 3/10
190/190 [=====] - 52s 272ms/step - loss: 3.4520 - acc: 0.3084

Epoch 00003: saving model to /content/drive/My Drive/images/models/model_ex-003_acc-0.308428.h5
757/757 [=====] - 752s 994ms/step - loss: 1.2106 - acc: 0.5060 - val_loss: 3.4520 - val_acc: 0.3084
Epoch 4/10
190/190 [=====] - 51s 270ms/step - loss: 1.2445 - acc: 0.5044

Epoch 00004: saving model to /content/drive/My Drive/images/models/model_ex-004_acc-0.504371.h5
757/757 [=====] - 746s 986ms/step - loss: 1.0755 - acc: 0.5674 - val_loss: 1.2445 - val_acc: 0.5044
Epoch 5/10
190/190 [=====] - 52s 272ms/step - loss: 1.2065 - acc: 0.5062

Epoch 00005: saving model to /content/drive/My Drive/images/models/model_ex-005_acc-0.506185.h5
757/757 [=====] - 748s 988ms/step - loss: 0.9873 - acc: 0.6069 - val_loss: 1.2065 - val_acc: 0.5062
Epoch 6/10
190/190 [=====] - 52s 272ms/step - loss: 0.9323 - acc: 0.6266

Epoch 00006: saving model to /content/drive/My Drive/images/models/model_ex-006_acc-0.626588.h5
757/757 [=====] - 752s 994ms/step - loss: 0.8453 - acc: 0.6679 - val_loss: 0.9323 - val_acc: 0.6266
Epoch 7/10
190/190 [=====] - 51s 271ms/step - loss: 0.8238 - acc: 0.6762

Epoch 00007: saving model to /content/drive/My Drive/images/models/model_ex-007_acc-0.676233.h5
757/757 [=====] - 751s 993ms/step - loss: 0.8091 - acc: 0.6834 - val_loss: 0.8238 - val_acc: 0.6762
Epoch 8/10
190/190 [=====] - 52s 272ms/step - loss: 0.8095 - acc: 0.6799

Epoch 00008: saving model to /content/drive/My Drive/images/models/model_ex-008_acc-0.679861.h5
757/757 [=====] - 746s 985ms/step - loss: 0.7821 - acc: 0.6961 - val_loss: 0.8095 - val_acc: 0.6799
Epoch 9/10
190/190 [=====] - 51s 269ms/step - loss: 0.8060 - acc: 0.6812

Epoch 00009: saving model to /content/drive/My Drive/images/models/model_ex-009_acc-0.681181.h5
757/757 [=====] - 746s 985ms/step - loss: 0.7771 - acc: 0.6963 - val_loss: 0.8060 - val_acc: 0.6812
Epoch 10/10
190/190 [=====] - 52s 272ms/step - loss: 0.8058 - acc: 0.6828

Epoch 00010: saving model to /content/drive/My Drive/images/models/model_ex-010_acc-0.682830.h5

```

757/757 [=====] - 747s 987ms/step - loss: 0.7735 - acc: 0.6998 - val\_loss: 0.8058 - val\_acc: 0.6828