

```
1 C:\Users\Admin\Desktop\KEAM\PROJECT\.venv\Scripts\  
  python.exe C:\Users\Admin\Desktop\KEAM\PROJECT\models\  
    \model_training.py  
2 2025-12-08 10:14:06.735837: I tensorflow/core/util/  
  port.cc:153] oneDNN custom operations are on. You may  
  see slightly different numerical results due to  
  floating-point round-off errors from different  
  computation orders. To turn them off, set the  
  environment variable `TF_ENABLE_ONEDNN_OPTS=0`.  
3 2025-12-08 10:14:10.569247: I tensorflow/core/util/  
  port.cc:153] oneDNN custom operations are on. You may  
  see slightly different numerical results due to  
  floating-point round-off errors from different  
  computation orders. To turn them off, set the  
  environment variable `TF_ENABLE_ONEDNN_OPTS=0`.  
4 Starting Skin Disease Detection Model Training (  
  HAM10000 - 7 Classes)  
5 =====  
6 Loading data from: ../data/skin_dataset  
7 Found 8015 images belonging to 7 classes.  
8 Found 2000 images belonging to 7 classes.  
9 Training samples: 8015  
10 Validation samples: 2000  
11 Number of classes: 7  
12 Class indices: {'akiec': 0, 'bcc': 1, 'bkl': 2, 'df':  
  '3, 'mel': 4, 'nv': 5, 'vasc': 6}  
13  
14 Building model...  
15 2025-12-08 10:14:14.072537: I tensorflow/core/  
  platform/cpu_feature_guard.cc:210] This TensorFlow  
  binary is optimized to use available CPU instructions  
  in performance-critical operations.  
16 To enable the following instructions: SSE3 SSE4.1  
  SSE4.2 AVX AVX2 FMA, in other operations, rebuild  
  TensorFlow with the appropriate compiler flags.  
17 Downloading data from https://storage.googleapis.com/  
  tensorflow/keras-applications/resnet/  
  resnet50_weights_tf_dim_ordering_tf_kernels_notop.h5  
18 94765736/94765736 ━━━━━━━━━━ 123s 1us/step  
19 Model built successfully!  
20 Model summary:
```

21 Model: "functional"			
22			
23	Layer (type)	Output Shape	Param
24	# Connected to		
25	input_layer	(None, 224, 224,	
0	-	3	
26	(InputLayer)		
27	)		
28	conv1_pad	(None, 230, 230,	
0	input_layer[0][0]	3	
29	(ZeroPadding2D)		
30	)		
31	conv1_conv (Conv2D)	(None, 112, 112, 9,	
472	conv1_pad[0][0]	64	
32	)		
33			
34	conv1_bn	(None, 112, 112, 64)	
256	conv1_conv[0][0]		
35	(BatchNormalizatio...		
36	)		
37	conv1_relu	(None, 112, 112, 64)	
0	conv1_bn[0][0]		
38	(Activation)		
39	)		
40	pool1_pad	(None, 114, 114, 64)	
0	conv1_relu[0][0]		
41	(ZeroPadding2D)		
)			

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42
43     pool1_pool      (None, 56, 56,
44     0   pool1_pad[0][0] 64
44     ) (MaxPooling2D)
45
46     conv2_block1_1_conv (None, 56, 56,
47     160  pool1_pool[0][0] 4,
47     ) (Conv2D) 64
48
49     conv2_block1_1_bn (None, 56, 56,
50     256  conv2_block1_1_c... 64
50     ) (BatchNormalizatio...
51
52     conv2_block1_1_relu (None, 56, 56,
53     0   conv2_block1_1_b... 64
53     ) (Activation)
54
55     conv2_block1_2_conv (None, 56, 56,
56     928  conv2_block1_1_r... 36,
56     ) (Conv2D) 64
57
58     conv2_block1_2_bn (None, 56, 56,
59     256  conv2_block1_2_c... 64
59     ) (BatchNormalizatio...
60
61     conv2_block1_2_relu (None, 56, 56,
62     0   conv2_block1_2_b... 64
62     ) (Activation)
```

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62 )
63
64 | conv2_block1_0_conv | (None, 56, 56, | 16,
640 | pool1_pool[0][0] | 256
65 | (Conv2D) |
66
67 | conv2_block1_3_conv | (None, 56, 56, | 16,
640 | conv2_block1_2_r... | 256
68 | (Conv2D) |
69
70 | conv2_block1_0_bn | (None, 56, 56, | 1,
024 | conv2_block1_0_c... | 256
71 | (BatchNormalizatio... |
72
73 | conv2_block1_3_bn | (None, 56, 56, | 1,
024 | conv2_block1_3_c... | 256
74 | (BatchNormalizatio... |
75
76 | conv2_block1_add | (None, 56, 56
77 | 0 | conv2_block1_0_b... | 256 |
77 | (Add) | conv2_block1_3_b... |
78
79 | conv2_block1_out | (None, 56, 56
80 | 0 | conv2_block1_add... | 256
80 | (Activation) | conv2_block1_out...
81
82 | conv2_block2_1_conv | (None, 56, 56, | 16,
448 | conv2_block1_out... |
```

83	(Conv2D)		64		
84	)				
85	conv2_block2_1_bn		(None, 56, 56,		
256	conv2_block2_1_c...				
86	(BatchNormalizatio...		64		
87	)				
88	conv2_block2_1_relu	0	conv2_block2_1_b...	(None, 56, 56	
89	(Activation)				
90	)		64		
91	conv2_block2_2_conv		(None, 56, 56,		36,
928	conv2_block2_1_r...				
92	(Conv2D)		64		
93	)				
94	conv2_block2_2_bn		(None, 56, 56,		
256	conv2_block2_2_c...				
95	(BatchNormalizatio...		64		
96	)				
97	conv2_block2_2_relu	0	conv2_block2_2_b...	(None, 56, 56	
98	(Activation)				
99	)		64		
100	conv2_block2_3_conv		(None, 56, 56,		16,
640	conv2_block2_2_r...				
101	(Conv2D)		256		
102	)				
103	conv2_block2_3_bn		(None, 56, 56,		1,

103	024	conv2_block2_3_c...			
104		(BatchNormalizatio...	256		
105		)			
106		conv2_block2_add	(None, 56, 56		
107		0   conv2_block1_out...	256		
108		)   conv2_block2_3_b...			
109		conv2_block2_out	(None, 56, 56		
110		0   conv2_block2_add...	256		
111		)   (Activation)			
112		conv2_block3_1_conv	(None, 56, 56,	16,	
113	448	conv2_block2_out...	64		
114		)   (Conv2D)			
115		conv2_block3_1_bn	(None, 56, 56,		
116	256	conv2_block3_1_c...	64		
117		)   (BatchNormalizatio...			
118		conv2_block3_1_relu	(None, 56, 56		
119		0   conv2_block3_1_b...	64		
120		)   (Activation)			
121		conv2_block3_2_conv	(None, 56, 56,	36,	
122	928	conv2_block3_1_r...	64		
123		)   (Conv2D)			

124	conv2_block3_2_bn	(None, 56, 56,	
256	conv2_block3_2_c...	64	
125	(BatchNormalizatio...	)	
126			
127	conv2_block3_2_relu	(None, 56, 56	
0		conv2_block3_2_b...	
128	(Activation)	64	
)			
129			
130	conv2_block3_3_conv	(None, 56, 56,	16,
640	conv2_block3_2_r...	256	
131	(Conv2D)	)	
132			
133	conv2_block3_3_bn	(None, 56, 56,	1,
024	conv2_block3_3_c...	256	
134	(BatchNormalizatio...	)	
135			
136	conv2_block3_add	(None, 56, 56	
0		conv2_block2_out...	
137	(Add)	256	
)			
138			
139	conv2_block3_out	(None, 56, 56	
0		conv2_block3_add...	
140	(Activation)	256	
)			
141			
142	conv3_block1_1_conv	(None, 28, 28,	32,
896	conv2_block3_out...	128	
143	(Conv2D)	)	
144			

144				
145	conv3_block1_1_bn	(None, 28, 28, 512)	conv3_block1_1_c...	
146		(BatchNormalizatio...	128	)
147				
148	conv3_block1_1_relu	(None, 28, 28 0)	conv3_block1_1_b...	
149		(Activation)	128	)
150				
151	conv3_block1_2_conv	(None, 28, 28, 584)	conv3_block1_1_r...	147,
152		(Conv2D)	128	)
153				
154	conv3_block1_2_bn	(None, 28, 28, 512)	conv3_block1_2_c...	
155		(BatchNormalizatio...	128	)
156				
157	conv3_block1_2_relu	(None, 28, 28 0)	conv3_block1_2_b...	
158		(Activation)	128	)
159				
160	conv3_block1_0_conv	(None, 28, 28, 584)	conv2_block3_out...	131,
161		(Conv2D)	512	)
162				
163	conv3_block1_3_conv	(None, 28, 28, 048)	conv3_block1_2_r...	66,
164		(Conv2D)	512	)

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165
166 | conv3_block1_0_bn | (None, 28, 28,
048 | conv3_block1_0_c... | 512 | 2,
167 | (BatchNormalizatio... |
168
169 | conv3_block1_3_bn | (None, 28, 28,
048 | conv3_block1_3_c... | 512 | 2,
170 | (BatchNormalizatio... |
171
172 | conv3_block1_add | (None, 28, 28
0 | conv3_block1_0_b... | 512 |
173 | (Add) | conv3_block1_3_b... |
174
175 | conv3_block1_out | (None, 28, 28
0 | conv3_block1_add... | 512 |
176 | (Activation) | conv3_block1_out |
177
178 | conv3_block2_1_conv | (None, 28, 28,
664 | conv3_block1_out... | 128 | 65,
179 | (Conv2D) | conv3_block2_1_conv |
180
181 | conv3_block2_1_bn | (None, 28, 28,
512 | conv3_block2_1_c... | 128 |
182 | (BatchNormalizatio... |
183
184 | conv3_block2_1_relu | (None, 28, 28
0 | conv3_block2_1_b... | 128 |
185 | (Activation) | conv3_block2_1_relu |
```

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185 )
186
187     | conv3_block2_2_conv | (None, 28, 28, | 147,
188     | 584 | conv3_block2_1_r... | 128
188     | (Conv2D) |           |
189
190     | conv3_block2_2_bn | (None, 28, 28, |
191     | 512 | conv3_block2_2_c... | 128
191     | (BatchNormalizatio... |
192
193     | conv3_block2_2_relu | (None, 28, 28
194     | 0 | conv3_block2_2_b... | 128
194     | (Activation) |           |
195
196     | conv3_block2_3_conv | (None, 28, 28, | 66,
197     | 048 | conv3_block2_2_r... | 512
197     | (Conv2D) |           |
198
199     | conv3_block2_3_bn | (None, 28, 28, | 2,
200     | 048 | conv3_block2_3_c... | 512
200     | (BatchNormalizatio... |
201
202     | conv3_block2_add | (None, 28, 28
203     | 0 | conv3_block1_out... | 512
203     | (Add) |           |
204
205     | conv3_block2_out | (None, 28, 28
205     | , | conv3_block2_add... |
```

206	(Activation)	512		
207	)			
208	conv3_block3_1_conv 664   conv3_block2_out...	(None, 28, 28, 128		65,
209	(Conv2D)			
210	)			
211	conv3_block3_1_bn 512   conv3_block3_1_c...	(None, 28, 28, 128		
212	(BatchNormalizatio...			
213	)			
214	conv3_block3_1_relu 0   conv3_block3_1_b...	(None, 28, 28 128		
215	(Activation)			
216	)			
217	conv3_block3_2_conv 584   conv3_block3_1_r...	(None, 28, 28, 128		147,
218	(Conv2D)			
219	)			
220	conv3_block3_2_bn 512   conv3_block3_2_c...	(None, 28, 28, 128		
221	(BatchNormalizatio...			
222	)			
223	conv3_block3_2_relu 0   conv3_block3_2_b...	(None, 28, 28 128		
224	(Activation)			
225	)			
226	conv3_block3_3_conv	(None, 28, 28,		66,

226	048	conv3_block3_2_r...			
227		(Conv2D)	512		
228		)			
229		conv3_block3_3_bn	(None, 28, 28,		2,
048		conv3_block3_3_c...	512		
230		(BatchNormalizatio...			
231		)			
232		conv3_block3_add	(None, 28, 28		
	0		512		
233		(Add)			
234		)			
235		conv3_block3_out	(None, 28, 28		
	0		512		
236		(Activation)			
237		)			
238		conv3_block4_1_conv	(None, 28, 28,		65,
664		conv3_block3_out...	128		
239		(Conv2D)			
240		)			
241		conv3_block4_1_bn	(None, 28, 28,		
512		conv3_block4_1_c...	128		
242		(BatchNormalizatio...			
243		)			
244		conv3_block4_1_relu	(None, 28, 28		
	0		128		
245		(Activation)			
246		)			

247	conv3_block4_2_conv 584   conv3_block4_1_r... (Conv2D)		(None, 28, 28, 128)		147,
248	)				
249					
250	conv3_block4_2_bn 512   conv3_block4_2_c... (BatchNormalizatio...)		(None, 28, 28, 128)		
251	)				
252					
253	conv3_block4_2_relu 0   conv3_block4_2_b... (Activation)		(None, 28, 28 128)		
254	)				
255					
256	conv3_block4_3_conv 048   conv3_block4_2_r... (Conv2D)		(None, 28, 28, 512)		66,
257	)				
258					
259	conv3_block4_3_bn 048   conv3_block4_3_c... (BatchNormalizatio...)		(None, 28, 28, 512)		2,
260	)				
261					
262	conv3_block4_add 0   conv3_block3_out... (Add)		(None, 28, 28 512)		
263	)				
264					
265	conv3_block4_out 0   conv3_block4_add... (Activation)		(None, 28, 28 512)		
266	)				
267					

267					
268	conv4_block1_1_conv	(None, 14, 14, 256)		131,	
328	conv3_block4_out...				
269	(Conv2D)				
270					
271	conv4_block1_1_bn	(None, 14, 14, 1)			
024	conv4_block1_1_c...				
272	(BatchNormalizatio...)	256			
273					
274	conv4_block1_1_relu	(None, 14, 14, 0)	conv4_block1_1_b...		
275	(Activation)	256			
276					
277	conv4_block1_2_conv	(None, 14, 14, 590,			
080	conv4_block1_1_r...				
278	(Conv2D)	256			
279					
280	conv4_block1_2_bn	(None, 14, 14, 1)			
024	conv4_block1_2_c...				
281	(BatchNormalizatio...)	256			
282					
283	conv4_block1_2_relu	(None, 14, 14, 0)	conv4_block1_2_b...		
284	(Activation)	256			
285					
286	conv4_block1_0_conv	(None, 14, 14, 525,			
312	conv3_block4_out...				
287	(Conv2D)	1024			

288				
289	conv4_block1_3_conv	(None, 14, 14, 1024)		263,
290	168   conv4_block1_2_r...			
291	) (Conv2D)	1024		
292				
293	conv4_block1_0_bn	(None, 14, 14, 1024)		4,
294	096   conv4_block1_0_c...			
295	) (BatchNormalizatio...	1024		
296				
297				
298	conv4_block1_3_bn	(None, 14, 14, 1024)		4,
299	096   conv4_block1_3_c...			
300	) (BatchNormalizatio...	1024		
301				
302	conv4_block1_add 0	(None, 14, 14, 1024)		
303	) (Add)	1024	conv4_block1_3_b...	
304				
305	conv4_block1_out 0	(None, 14, 14, 256)		
306	) (Activation)	256		
307				
308	conv4_block2_1_conv	(None, 14, 14, 256)		262,
400	400   conv4_block1_out...			
305	) (Conv2D)	256		
306				
307	conv4_block2_1_bn	(None, 14, 14, 256)		1,
308	024   conv4_block2_1_c...			
	) (BatchNormalizatio...	256		

```
308 )
309
310 | conv4_block2_1_relu | (None, 14, 14
311 | (Activation)      | 0 | conv4_block2_1_b...
311 | )                   | 256
312
313 | conv4_block2_2_conv | (None, 14, 14,
313 | 080 | conv4_block2_1_r... | 590,
314 | (Conv2D)           | 256
314 | )
315
316 | conv4_block2_2_bn  | (None, 14, 14,
316 | 024 | conv4_block2_2_c... | 1,
317 | (BatchNormalizatio... | 256
317 | )
318
319 | conv4_block2_2_relu | (None, 14, 14
319 | (Activation)       | 0 | conv4_block2_2_b...
319 | )                   | 256
320
321
322 | conv4_block2_3_conv | (None, 14, 14,
322 | 168 | conv4_block2_2_r... | 263,
323 | (Conv2D)           | 1024
323 | )
324
325 | conv4_block2_3_bn  | (None, 14, 14,
325 | 096 | conv4_block2_3_c... | 4,
326 | (BatchNormalizatio... | 1024
326 | )
327
328 | conv4_block2_add   | (None, 14, 14
328 | ,                 | 0 | conv4_block1_out...
```

329	(Add)		1024	conv4_block2_3_b...	
330					
331	conv4_block2_out	0	(None, 14, 14)	conv4_block2_add...	
332	(Activation)		1024		
333					
334	conv4_block3_1_conv		(None, 14, 14,		262,
400	conv4_block2_out...		256		
335	(Conv2D)				
336					
337	conv4_block3_1_bn		(None, 14, 14,		1,
024	conv4_block3_1_c...		256		
338	(BatchNormalizatio...				
339					
340	conv4_block3_1_relu	0	(None, 14, 14		
			256	conv4_block3_1_b...	
341	(Activation)				
342					
343	conv4_block3_2_conv		(None, 14, 14,		590,
080	conv4_block3_1_r...		256		
344	(Conv2D)				
345					
346	conv4_block3_2_bn		(None, 14, 14,		1,
024	conv4_block3_2_c...		256		
347	(BatchNormalizatio...				
348					
349	conv4_block3_2_relu		(None, 14, 14		

349		0	conv4_block3_2_b...	
350	(Activation)			256
351	)			
352	conv4_block3_3_conv		(None, 14, 14,	263,
168	conv4_block3_2_r...		1024	
353	(Conv2D)			
354	)			
355	conv4_block3_3_bn		(None, 14, 14,	4,
096	conv4_block3_3_c...		1024	
356	(BatchNormalizatio...			
357	)			
358	conv4_block3_add		(None, 14, 14	
359	0		conv4_block2_out...	
(Add)			1024	
360	)			conv4_block3_3_b...
361	conv4_block3_out		(None, 14, 14	
362	0		conv4_block3_add...	
(Activation)			1024	
363	)			
364	conv4_block4_1_conv		(None, 14, 14,	262,
400	conv4_block3_out...		256	
365	(Conv2D)			
366	)			
367	conv4_block4_1_bn		(None, 14, 14,	1,
024	conv4_block4_1_c...		256	
368	(BatchNormalizatio...			
369	)			

370	conv4_block4_1_relu	0	(None, 14, 14)	
371	(Activation)		256	
372				
373	conv4_block4_2_conv	080	(None, 14, 14,	590,
374	conv4_block4_1_r...		256	
375	(Conv2D)			
376	conv4_block4_2_bn	024	(None, 14, 14,	1,
377	conv4_block4_2_c...		256	
378	(BatchNormalizatio...			
379	conv4_block4_2_relu	0	(None, 14, 14	
380	conv4_block4_2_b...		256	
381	(Activation)			
382	conv4_block4_3_conv	168	(None, 14, 14,	263,
383	conv4_block4_2_r...		1024	
384	(Conv2D)			
385	conv4_block4_3_bn	096	(None, 14, 14,	4,
386	conv4_block4_3_c...		1024	
387	(BatchNormalizatio...			
388	conv4_block4_add	0	(None, 14, 14	
389	conv4_block3_out...		1024	
390	(Add)			conv4_block4_3_b...

390				
391	conv4_block4_out	0	(None, 14, 14)	
392	(Activation)		1024	
393				
394	conv4_block5_1_conv		(None, 14, 14,	262,
400	conv4_block4_out...		256	
395	(Conv2D)			
396				
397	conv4_block5_1_bn		(None, 14, 14,	1,
024	conv4_block5_1_c...		256	
398	(BatchNormalizatio...			
399				
400	conv4_block5_1_relu	0	(None, 14, 14	
401	(Activation)		conv4_block5_1_b...	
402			256	
403	conv4_block5_2_conv		(None, 14, 14,	590,
080	conv4_block5_1_r...		256	
404	(Conv2D)			
405				
406	conv4_block5_2_bn		(None, 14, 14,	1,
024	conv4_block5_2_c...		256	
407	(BatchNormalizatio...			
408				
409	conv4_block5_2_relu	0	(None, 14, 14	
410	(Activation)		conv4_block5_2_b...	
			256	

411				
412	conv4_block5_3_conv	(None, 14, 14, 263,		
168   conv4_block5_2_r...		1024		
413   (Conv2D)		)		
414				
415 conv4_block5_3_bn	(None, 14, 14, 4,			
096   conv4_block5_3_c...		1024		
416   (BatchNormalizatio...		)		
417				
418 conv4_block5_add	(None, 14, 14			
0   conv4_block4_out...		1024		
419   (Add)		)		
420				
421 conv4_block5_out	(None, 14, 14			
0   conv4_block5_add...		1024		
422   (Activation)		)		
423				
424 conv4_block6_1_conv	(None, 14, 14, 262,			
400   conv4_block5_out...		256		
425   (Conv2D)		)		
426				
427 conv4_block6_1_bn	(None, 14, 14, 1,			
024   conv4_block6_1_c...		256		
428   (BatchNormalizatio...		)		
429				
430 conv4_block6_1_relu	(None, 14, 14			
0   conv4_block6_1_b...		256		
431   (Activation)		)		

```
431 )
432
433     | conv4_block6_2_conv | (None, 14, 14,      | 590,
434     | 080 | conv4_block6_1_r... | 256
434     | (Conv2D)           |
435
436     | conv4_block6_2_bn  | (None, 14, 14,      | 1,
437     | 024 | conv4_block6_2_c... | 256
437     | (BatchNormalizatio...
438
439     | conv4_block6_2_relu | (None, 14, 14
440     | 0 | conv4_block6_2_b... | 256
440     | (Activation)
441
442     | conv4_block6_3_conv | (None, 14, 14,      | 263,
443     | 168 | conv4_block6_2_r... | 1024
443     | (Conv2D)
444
445     | conv4_block6_3_bn  | (None, 14, 14,      | 4,
446     | 096 | conv4_block6_3_c... | 1024
446     | (BatchNormalizatio...
447
448     | conv4_block6_add   | (None, 14, 14
449     | 0 | conv4_block5_out... | 1024
449     | (Add)
450
451     | conv4_block6_out   | (None, 14, 14
451     | , | conv4_block6_add...
451     | 0 | conv4_block6_add...
```

452	(Activation)	1024	
453	)		
454	conv5_block1_1_conv 800   conv4_block6_out...	(None, 7, 7, 512)	524,
455	(Conv2D)		
456	)		
457	conv5_block1_1_bn 048   conv5_block1_1_c...	(None, 7, 7, 512)	2,
458	(BatchNormalizatio		
...			
459	)		
460	conv5_block1_1_relu } 0   conv5_block1_1_b...	(None, 7, 7, 512)	
461	(Activation)		
462	)		
463	conv5_block1_2_conv 808   conv5_block1_1_r...	(None, 7, 7, 512)	2,359,
464	(Conv2D)		
465	)		
466	conv5_block1_2_bn 048   conv5_block1_2_c...	(None, 7, 7, 512)	2,
467	(BatchNormalizatio		
...			
468	)		
469	conv5_block1_2_relu } 0   conv5_block1_2_b...	(None, 7, 7, 512)	

470	(Activation	)				
471						
472	conv5_block1_0_conv		(None, 7, 7,		2,099,	
200	conv4_block6_out...		2048			
473	(Conv2D)					
474						
475	conv5_block1_3_conv		(None, 7, 7,		1,050,	
624	conv5_block1_2_r...		2048			
476	(Conv2D)					
477						
478	conv5_block1_0_bn		(None, 7, 7,		8,	
192	conv5_block1_0_c...		2048			
479	(BatchNormalizatio...					
480						
481	conv5_block1_3_bn		(None, 7, 7,		8,	
192	conv5_block1_3_c...		2048			
482	(BatchNormalizatio...					
483						
484	conv5_block1_add		(None, 7, 7			
	0		conv5_block1_0_b...			
485	(Add)		2048			
486			conv5_block1_3_b...			
487	conv5_block1_out		(None, 7, 7			
	0		conv5_block1_add...			
488	(Activation)		2048			
489						

490	conv5_block2_1_conv	(None, 7, 7, 512)	1,049,
088	conv5_block1_out...		
491	(Conv2D		
)			
492			
493	conv5_block2_1_bn	(None, 7, 7, 512)	2,
048	conv5_block2_1_c...		
494	(BatchNormalizatio		
...			
495			
496	conv5_block2_1_relu	(None, 7, 7, 512	
)	0	conv5_block2_1_b...	
497	(Activation		
)			
498			
499	conv5_block2_2_conv	(None, 7, 7, 512)	2,359,
808	conv5_block2_1_r...		
500	(Conv2D		
)			
501			
502	conv5_block2_2_bn	(None, 7, 7, 512)	2,
048	conv5_block2_2_c...		
503	(BatchNormalizatio		
...			
504			
505	conv5_block2_2_relu	(None, 7, 7, 512	
)	0	conv5_block2_2_b...	
506	(Activation		
)			
507			

507				
508	conv5_block2_3_conv	(None, 7, 7,		1,050,
624	conv5_block2_2_r...	2048		
509	(Conv2D)			
510				
511	conv5_block2_3_bn	(None, 7, 7,		8,
192	conv5_block2_3_c...	2048		
512	(BatchNormalizatio...			
513				
514	conv5_block2_add	(None, 7, 7		
0		conv5_block1_out...		
515	(Add)	2048		
516				
517	conv5_block2_out	(None, 7, 7		
0		conv5_block2_add...		
518	(Activation)	2048		
519				
520	conv5_block3_1_conv	(None, 7, 7, 512)		1,049,
088	conv5_block2_out...			
521	(Conv2D)			
522				
523	conv5_block3_1_bn	(None, 7, 7, 512)		2,
048	conv5_block3_1_c...			
524	(BatchNormalizatio...			
...				
525				
526	conv5_block3_1_relu	(None, 7, 7, 512		
0		conv5_block3_1_b...		

527	)	(Activation				
528						
529	conv5_block3_2_conv	(None, 7, 7, 512)	2,359,			
808	conv5_block3_1_r...					
530	(Conv2D					
	)					
531						
532	conv5_block3_2_bn	(None, 7, 7, 512)	2,			
048	conv5_block3_2_c...					
533	(BatchNormalizatio					
...						
534						
535	conv5_block3_2_relu	(None, 7, 7, 512				
)	0	conv5_block3_2_b...				
536	(Activation					
	)					
537						
538	conv5_block3_3_conv	(None, 7, 7,	1,050,			
624	conv5_block3_2_r...					
539	(Conv2D)	2048				
	)					
540						
541	conv5_block3_3_bn	(None, 7, 7,	8,			
192	conv5_block3_3_c...					
542	(BatchNormalizatio...	2048				
	)					
543						
544	conv5_block3_add	(None, 7, 7				
	0	conv5_block2_out...				
545	(Add)	2048				

```
545 ) | | conv5_block3_3_b...
546 | |
547 | conv5_block3_out | (None, 7, 7
548 | (Activation) | 0 | conv5_block3_add... | 2048
549 |
550 | global_average_poo... | (None, 2048
551 | ) | 0 | conv5_block3_out... |
551 | (GlobalAveragePool |
552 |
553 | batch_normalization | (None, 2048) | 8,
553 | 192 | global_average_p... |
554 | ) | (BatchNormalizatio |
555 |
556 | dropout (Dropout) | (None, 2048
556 | ) | 0 | batch_normalizat... |
557 |
558 | dense (Dense) | (None, 128) | 262,
558 | 272 | dropout[0][0] |
559 |
560 | batch_normalizatio... | (None, 128)
560 | 512 | dense[0][0]
561 | ) | (BatchNormalizatio |
561 | ... |
562 |
563 | dropout_1 (Dropout) | (None, 128
563 | ) | 0 | batch_normalizat... |
564 |
```

```
564
565 | dense_1 (Dense) | (None, 7)
903 | dropout_1[0][0] |
566
567 Total params: 23,859,591 (91.02 MB)
568 Trainable params: 267,527 (1.02 MB)
569 Non-trainable params: 23,592,064 (90.00 MB)
570
571 Starting model training...
572 Epoch 1/20
573 251/251 ━━━━━━━━ 0s 3s/step - accuracy:
0.4608 - loss: 1.8457
574 Epoch 1: val_accuracy improved from None to 0.67100
, saving model to ../models/skin_disease_model_best.h5
575 WARNING:absl:You are saving your model as an HDF5
file via `model.save()` or `keras.saving.save_model(
model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g
. `model.save('my_model.keras')` or `keras.saving.
save_model(model, 'my_model.keras')`.
576 251/251 ━━━━━━━━ 1085s 4s/step -
accuracy: 0.5580 - loss: 1.5121 - val_accuracy: 0.
6710 - val_loss: 1.1194 - learning_rate: 0.0010
577 Epoch 2/20
578 251/251 ━━━━━━━━ 0s 3s/step - accuracy:
0.6522 - loss: 1.0988
579 Epoch 2: val_accuracy improved from 0.67100 to 0.
67650, saving model to ../models/
skin_disease_model_best.h5
580 WARNING:absl:You are saving your model as an HDF5
file via `model.save()` or `keras.saving.save_model(
model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g
. `model.save('my_model.keras')` or `keras.saving.
save_model(model, 'my_model.keras')`.
581 251/251 ━━━━━━━━ 948s 4s/step - accuracy
: 0.6549 - loss: 1.0856 - val_accuracy: 0.6765 -
val_loss: 0.9806 - learning_rate: 0.0010
582 Epoch 3/20
```

```
583 251/251 ━━━━━━━━ 0s 2s/step - accuracy:  
    0.6673 - loss: 1.0162  
584 WARNING:absl:You are saving your model as an HDF5  
file via `model.save()` or `keras.saving.save_model(  
model)`. This file format is considered legacy. We  
recommend using instead the native Keras format, e.g  
. `model.save('my_model.keras')` or `keras.saving.  
save_model(model, 'my_model.keras')`.  
585 Epoch 3: val_accuracy improved from 0.67650 to 0.  
70750, saving model to ../models/  
skin_disease_model_best.h5  
586 251/251 ━━━━━━━━ 673s 3s/step - accuracy  
: 0.6715 - loss: 1.0064 - val_accuracy: 0.7075 -  
val_loss: 0.8476 - learning_rate: 0.0010  
587 Epoch 4/20  
588 251/251 ━━━━━━━━ 0s 7s/step - accuracy:  
    0.6718 - loss: 0.9736  
589 Epoch 4: val_accuracy did not improve from 0.70750  
590 251/251 ━━━━━━━━ 1986s 8s/step -  
accuracy: 0.6712 - loss: 0.9814 - val_accuracy: 0.  
6970 - val_loss: 0.8594 - learning_rate: 0.0010  
591 Epoch 5/20  
592 251/251 ━━━━━━━━ 0s 3s/step - accuracy:  
    0.6704 - loss: 0.9516  
593 Epoch 5: val_accuracy did not improve from 0.70750  
594 251/251 ━━━━━━━━ 785s 3s/step - accuracy  
: 0.6744 - loss: 0.9495 - val_accuracy: 0.7025 -  
val_loss: 0.8301 - learning_rate: 0.0010  
595 Epoch 6/20  
596 251/251 ━━━━━━━━ 0s 2s/step - accuracy:  
    0.6722 - loss: 0.9721  
597  
598 Epoch 6: val_accuracy did not improve from 0.70750  
599 251/251 ━━━━━━━━ 738s 3s/step - accuracy  
: 0.6792 - loss: 0.9470 - val_accuracy: 0.7035 -  
val_loss: 0.8214 - learning_rate: 0.0010  
600 Epoch 7/20  
601 251/251 ━━━━━━━━ 0s 2s/step - accuracy:  
    0.6946 - loss: 0.9080  
602 Epoch 7: val_accuracy did not improve from 0.70750  
603 251/251 ━━━━━━━━ 652s 3s/step - accuracy
```

```
603 : 0.6843 - loss: 0.9234 - val_accuracy: 0.6995 -  
      val_loss: 0.8252 - learning_rate: 0.0010  
604 Epoch 8/20  
605 251/251 ━━━━━━━━ 0s 3s/step - accuracy:  
      0.6886 - loss: 0.9133  
606 Epoch 8: val_accuracy did not improve from 0.70750  
607 251/251 ━━━━━━━━ 907s 4s/step - accuracy:  
      : 0.6856 - loss: 0.9164 - val_accuracy: 0.7045 -  
      val_loss: 0.8060 - learning_rate: 0.0010  
608 Epoch 9/20  
609 251/251 ━━━━━━━━ 0s 3s/step - accuracy:  
      0.6828 - loss: 0.9157  
610 Epoch 9: val_accuracy did not improve from 0.70750  
611 251/251 ━━━━━━━━ 924s 4s/step - accuracy:  
      : 0.6840 - loss: 0.9151 - val_accuracy: 0.7015 -  
      val_loss: 0.8083 - learning_rate: 0.0010  
612 Epoch 10/20  
613 251/251 ━━━━━━━━ 0s 3s/step - accuracy:  
      0.6858 - loss: 0.9066  
614 Epoch 10: val_accuracy did not improve from 0.70750  
615 251/251 ━━━━━━━━ 814s 3s/step - accuracy:  
      : 0.6877 - loss: 0.9057 - val_accuracy: 0.7005 -  
      val_loss: 0.8092 - learning_rate: 0.0010  
616 Epoch 11/20  
617 251/251 ━━━━━━━━ 0s 2s/step - accuracy:  
      0.6974 - loss: 0.8925  
618 Epoch 11: val_accuracy did not improve from 0.70750  
619 251/251 ━━━━━━━━ 682s 3s/step - accuracy:  
      : 0.6896 - loss: 0.9025 - val_accuracy: 0.7015 -  
      val_loss: 0.8095 - learning_rate: 0.0010  
620 Epoch 12/20  
621 251/251 ━━━━━━━━ 0s 2s/step - accuracy:  
      0.6898 - loss: 0.8782  
622 Epoch 12: val_accuracy did not improve from 0.70750  
623 251/251 ━━━━━━━━ 727s 3s/step - accuracy:  
      : 0.6866 - loss: 0.8924 - val_accuracy: 0.7055 -  
      val_loss: 0.7897 - learning_rate: 0.0010  
624 Epoch 13/20  
625 251/251 ━━━━━━━━ 0s 2s/step - accuracy:  
      0.6839 - loss: 0.8854  
626 Epoch 13: val_accuracy did not improve from 0.70750
```

```
627 251/251 ━━━━━━━━ 750s 3s/step - accuracy
    : 0.6868 - loss: 0.8904 - val_accuracy: 0.7045 -
    val_loss: 0.7989 - learning_rate: 0.0010
628 Epoch 14/20
629 251/251 ━━━━━━━━ 0s 3s/step - accuracy:
    0.6911 - loss: 0.8744
630 Epoch 14: val_accuracy improved from 0.70750 to 0.
    70800, saving model to ../models/
    skin_disease_model_best.h5
631 WARNING:absl:You are saving your model as an HDF5
    file via `model.save()` or `keras.saving.save_model(
    model)`. This file format is considered legacy. We
    recommend using instead the native Keras format, e.g
    . `model.save('my_model.keras')` or `keras.saving.
    save_model(model, 'my_model.keras')`.
632 251/251 ━━━━━━━━ 780s 3s/step - accuracy
    : 0.6912 - loss: 0.8843 - val_accuracy: 0.7080 -
    val_loss: 0.7942 - learning_rate: 0.0010
633 Epoch 15/20
634 251/251 ━━━━━━━━ 0s 2s/step - accuracy:
    0.6940 - loss: 0.8938
635 Epoch 15: val_accuracy did not improve from 0.70800
636 251/251 ━━━━━━━━ 678s 3s/step - accuracy
    : 0.6900 - loss: 0.8893 - val_accuracy: 0.7035 -
    val_loss: 0.8050 - learning_rate: 0.0010
637 Epoch 16/20
638 251/251 ━━━━━━━━ 0s 2s/step - accuracy:
    0.6824 - loss: 0.8935
639 Epoch 16: val_accuracy improved from 0.70800 to 0.
    71250, saving model to ../models/
    skin_disease_model_best.h5
640 WARNING:absl:You are saving your model as an HDF5
    file via `model.save()` or `keras.saving.save_model(
    model)`. This file format is considered legacy. We
    recommend using instead the native Keras format, e.g
    . `model.save('my_model.keras')` or `keras.saving.
    save_model(model, 'my_model.keras')`.
641 251/251 ━━━━━━━━ 636s 3s/step - accuracy
    : 0.6913 - loss: 0.8770 - val_accuracy: 0.7125 -
    val_loss: 0.7957 - learning_rate: 0.0010
642 Epoch 17/20
```

```
643 251/251 ━━━━━━━━ 0s 2s/step - accuracy:  
    0.6935 - loss: 0.8653  
644 Epoch 17: val_accuracy improved from 0.71250 to 0.  
    71350, saving model to ../models/  
    skin_disease_model_best.h5  
645 WARNING:absl:You are saving your model as an HDF5  
    file via `model.save()` or `keras.saving.save_model(  
    model)`. This file format is considered legacy. We  
    recommend using instead the native Keras format, e.g  
    . `model.save('my_model.keras')` or `keras.saving.  
    save_model(model, 'my_model.keras')`.  
646 251/251 ━━━━━━━━ 716s 3s/step - accuracy  
    : 0.6902 - loss: 0.8840 - val_accuracy: 0.7135 -  
    val_loss: 0.7893 - learning_rate: 0.0010  
647 Epoch 18/20  
648 251/251 ━━━━━━━━ 0s 2s/step - accuracy:  
    0.6892 - loss: 0.8855  
649  
650 Epoch 18: val_accuracy did not improve from 0.71350  
651 251/251 ━━━━━━━━ 12697s 51s/step -  
    accuracy: 0.6949 - loss: 0.8834 - val_accuracy: 0.  
    7020 - val_loss: 0.7979 - learning_rate: 0.0010  
652 Epoch 19/20  
653 251/251 ━━━━━━━━ 0s 3s/step - accuracy:  
    0.6943 - loss: 0.8792  
654 Epoch 19: val_accuracy did not improve from 0.71350  
655 251/251 ━━━━━━━━ 785s 3s/step - accuracy  
    : 0.6938 - loss: 0.8738 - val_accuracy: 0.7085 -  
    val_loss: 0.7806 - learning_rate: 0.0010  
656 Epoch 20/20  
657 251/251 ━━━━━━━━ 0s 2s/step - accuracy:  
    0.6949 - loss: 0.8608  
658 Epoch 20: val_accuracy did not improve from 0.71350  
659 251/251 ━━━━━━━━ 754s 3s/step - accuracy  
    : 0.6912 - loss: 0.8762 - val_accuracy: 0.6995 -  
    val_loss: 0.8040 - learning_rate: 0.0010  
660 Restoring model weights from the end of the best  
    epoch: 19.  
661  
662 Starting fine-tuning...  
663 Base model structure unexpected for fine-tuning.
```

```
663 Attempting to set trainable=True on base_model.  
664 Starting fine-tuning...  
665 Epoch 1/10  
666 251/251 ━━━━━━━━ 6425s 26s/step -  
    accuracy: 0.6941 - loss: 0.8781 - val_accuracy: 0.  
    7025 - val_loss: 0.7837  
667 Epoch 2/10  
668 251/251 ━━━━━━━━ 897s 4s/step - accuracy  
    : 0.6942 - loss: 0.8702 - val_accuracy: 0.7035 -  
    val_loss: 0.7811  
669 Epoch 3/10  
670 251/251 ━━━━━━━━ 808s 3s/step - accuracy  
    : 0.6972 - loss: 0.8776 - val_accuracy: 0.7040 -  
    val_loss: 0.7801  
671 Epoch 4/10  
672 251/251 ━━━━━━━━ 768s 3s/step - accuracy  
    : 0.6992 - loss: 0.8596 - val_accuracy: 0.7075 -  
    val_loss: 0.7754  
673 Epoch 5/10  
674 251/251 ━━━━━━━━ 760s 3s/step - accuracy  
    : 0.6953 - loss: 0.8636 - val_accuracy: 0.7050 -  
    val_loss: 0.7720  
675 Epoch 6/10  
676 251/251 ━━━━━━━━ 723s 3s/step - accuracy  
    : 0.6911 - loss: 0.8835 - val_accuracy: 0.7060 -  
    val_loss: 0.7721  
677 Epoch 7/10  
678 251/251 ━━━━━━━━ 909s 4s/step - accuracy  
    : 0.6957 - loss: 0.8590 - val_accuracy: 0.7060 -  
    val_loss: 0.7730  
679 Epoch 8/10  
680 251/251 ━━━━━━━━ 911s 4s/step - accuracy  
    : 0.6959 - loss: 0.8628 - val_accuracy: 0.7045 -  
    val_loss: 0.7742  
681 Epoch 9/10  
682 251/251 ━━━━━━━━ 919s 4s/step - accuracy  
    : 0.6967 - loss: 0.8641 - val_accuracy: 0.7075 -  
    val_loss: 0.7714  
683 Epoch 10/10  
684 251/251 ━━━━━━━━ 904s 4s/step - accuracy  
    : 0.6939 - loss: 0.8656 - val_accuracy: 0.7070 -
```

```
684 val_loss: 0.7713
685
686 Plotting training history...
687
688 Saving model to: ../models/skin_disease_model.h5
689 WARNING:absl:You are saving your model as an HDF5
file via `model.save()` or `keras.saving.save_model(
model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g
. `model.save('my_model.keras')` or `keras.saving.
save_model(model, 'my_model.keras')`.
690 Model saved to ../models/skin_disease_model.h5
691
692 Model training completed successfully!
693
694 Process finished with exit code 0
695
```