

Dataset 2: Potato 1500 Images)

0: Early Blight (500 Images), 1: Late Blight (500 Images), 2: Healthy (500 Images)

80:10:10 Split = 1184:128:188 Images

(90:5:5 Split = 1344:64:92 Images,
70:15:15 Split = 1024:224:252 Images,
60:20:20 Split = 896:288:316 Images,
50:25:25 Split = 736:352:412 Images)

Model 1: CNN

BASE MODEL

```
IMAGE_SIZE=256  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=20
```

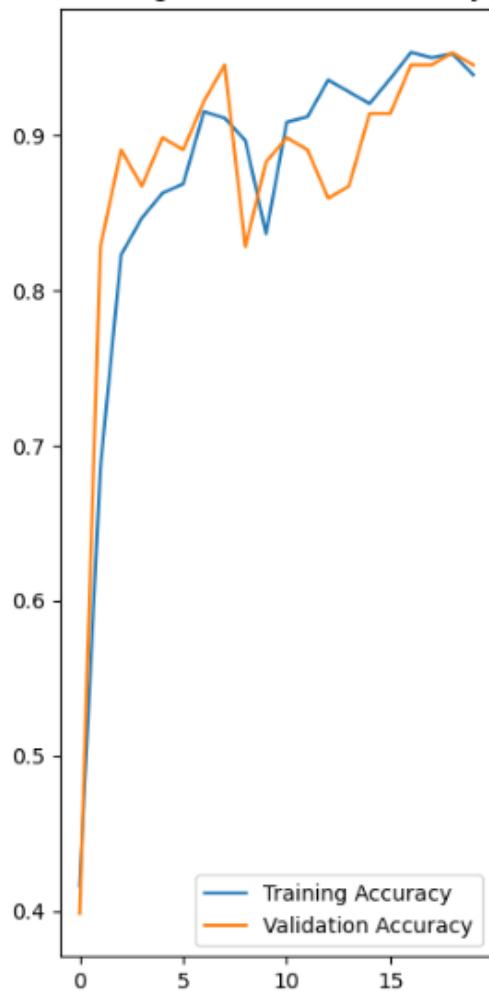
```
scores=model.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 2s 223ms/step - loss: 0.1152 - accuracy: 0.9583  
[0.11523979902267456, 0.9583333134651184]
```

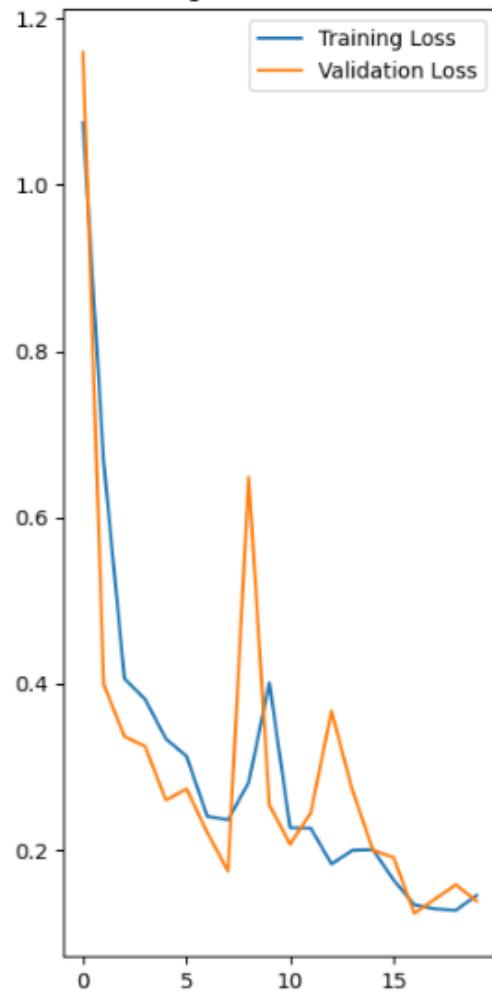
Average Time per Epoch: 47.55 s

history.history['loss']	history.history['accuracy']	history.history['val_loss']	history.history['val_accuracy']
[1.0747509002685547, 0.6661778092384338, 0.4062480032444, 0.38136520981788635, 0.3339095413684845, 0.312842488288794, 0.2406618297100067, 0.23646749556064606, 0.28139421343803406, 0.40115073323249817, 0.2269354909658432, 0.22631195187568665, 0.18325306475162506, 0.1997167021036148, 0.20058777928352356, 0.16406460106372833, 0.13423410058021545, 0.12947791814804077, 0.127665176987648, 0.14548245072364807]	[0.41610169410705566, 0.6855932474136353, 0.8228813409805298, 0.8466101884841919, 0.862711846824607, 0.8686440587043762, 0.9152542352676392, 0.9110169410705566, 0.8966101408004761, 0.8364406824111938, 0.9084745645523071, 0.9118643999099731, 0.9355932474136353, 0.9279661178588867, 0.9203389883041382, 0.9364407062530518, 0.9533898234367371, 0.949999988079071, 0.9525423645973206, 0.9389830231666565]	[1.1591682434082031, 0.3992350101470947, 0.3366336524486542, 0.3248041868209839, 0.2602158784866333, 0.27351802587509155, 0.22124603390693665, 0.17482206225395203, 0.6484273076057434, 0.254161536693573, 0.2070140838623047, 0.24508655071258545, 0.36724650859832764, 0.2728143334388733, 0.20002879202365875, 0.1910671889781952, 0.12387007474899292, 0.14125363528728485, 0.15837462246418, 0.13897964358329773]	[0.3984375, 0.828125, 0.890625, 0.8671875, 0.8984375, 0.890625, 0.921875, 0.9453125, 0.828125, 0.8828125, 0.8984375, 0.890625, 0.859375, 0.8671875, 0.9140625, 0.9140625, 0.9453125, 0.9453125, 0.953125, 0.9453125]

Training and Validation Accuracy



Training and Validation Loss



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.98%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.73%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.89%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 97.43%



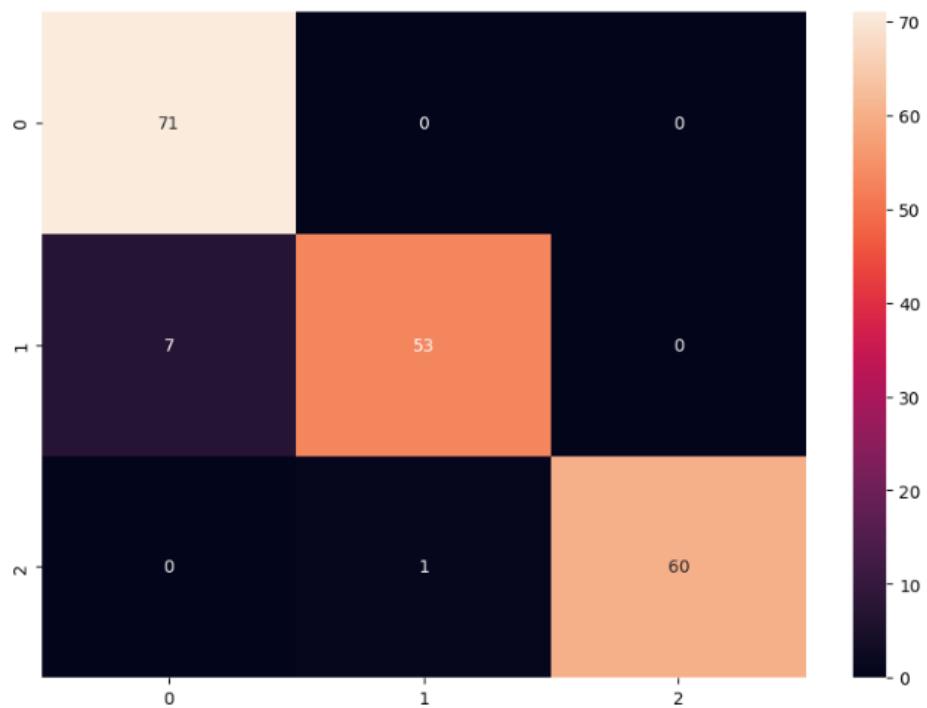
Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.45%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 97.35%



Classification Report:				
	precision	recall	f1-score	support
0	0.91	1.00	0.95	71
1	0.98	0.88	0.93	60
2	1.00	0.98	0.99	61
accuracy			0.96	192
macro avg	0.96	0.96	0.96	192
weighted avg	0.96	0.96	0.96	192



NO. OF EPOCHS

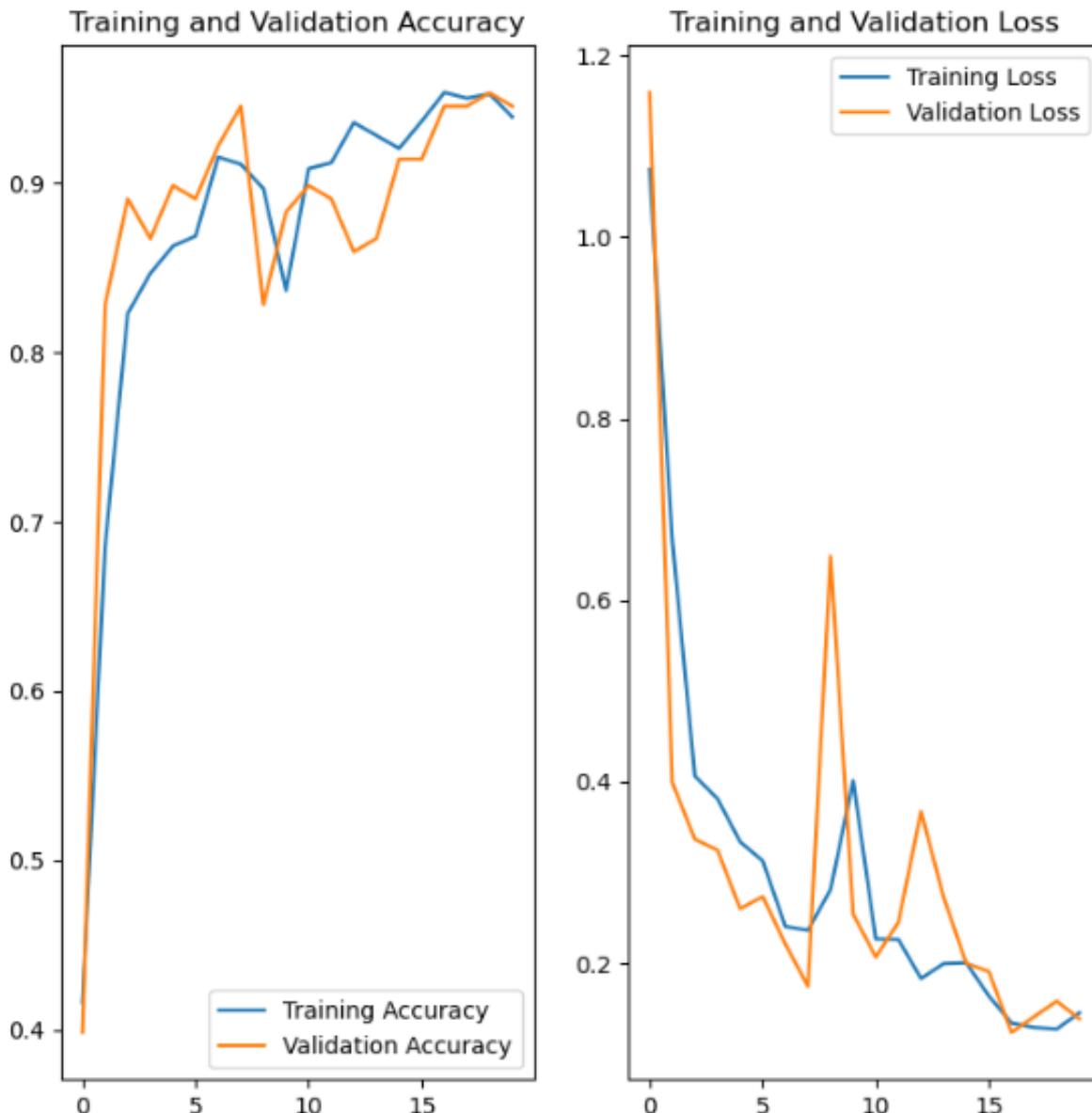
(a) 20

```
IMAGE_SIZE=256  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 2s 223ms/step - loss: 0.1152 - accuracy: 0.9583  
[0.11523979902267456, 0.9583333134651184]
```

Average Time per Epoch: 47.55 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.98%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.89%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.45%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.73%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 97.43%

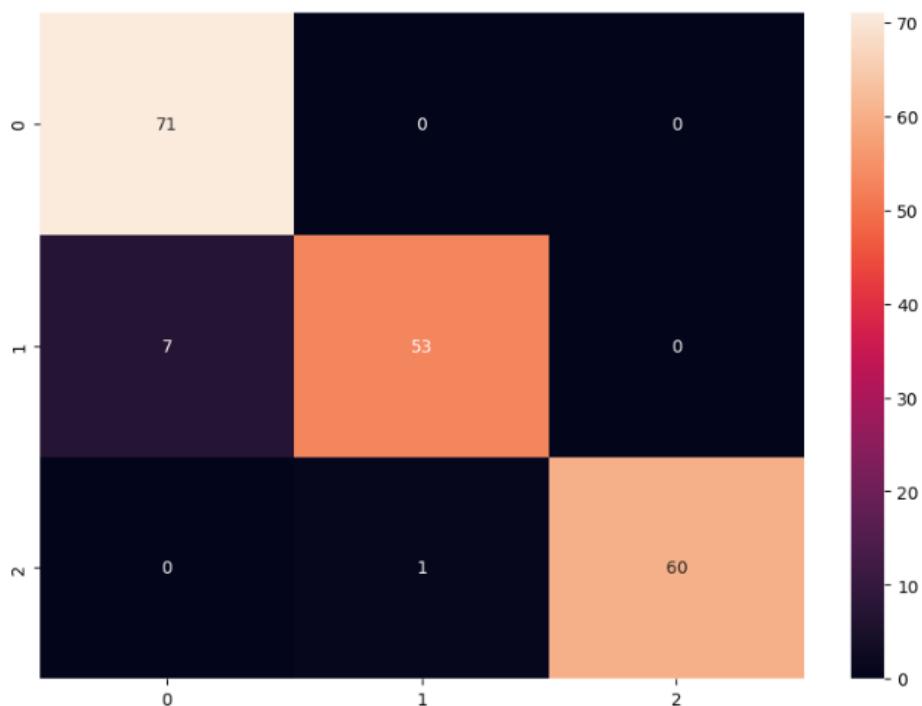


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 97.35%



Classification Report:

	precision	recall	f1-score	support
0	0.91	1.00	0.95	71
1	0.98	0.88	0.93	60
2	1.00	0.98	0.99	61
accuracy			0.96	192
macro avg	0.96	0.96	0.96	192
weighted avg	0.96	0.96	0.96	192



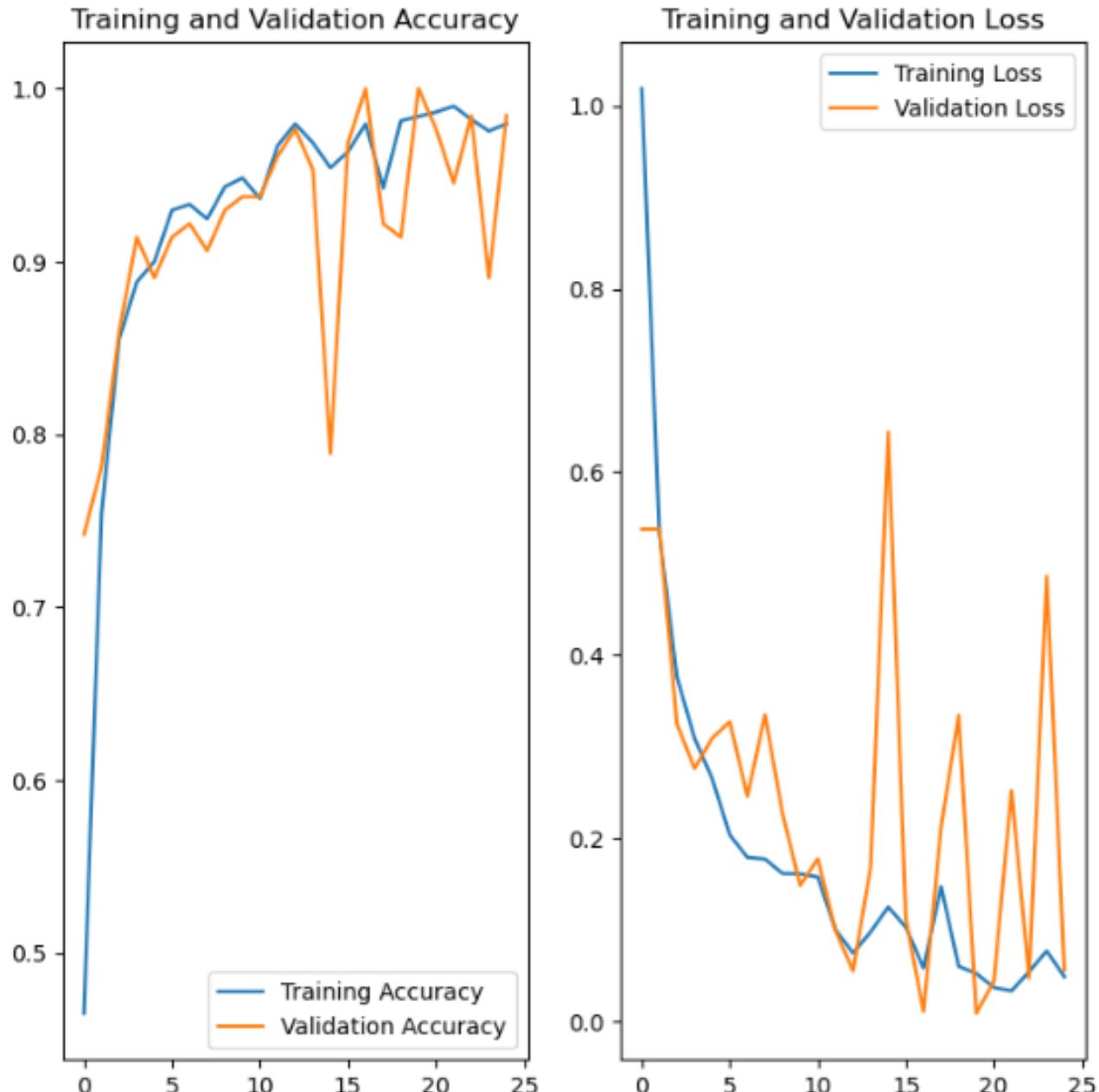
(b) 25

```
IMAGE_SIZE=256  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=25
```

```
scores=model.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 2s 217ms/step - loss: 0.0930 - accuracy: 0.9688  
[0.09302563220262527, 0.96875]
```

Average Time per Epoch: 46.24 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.99%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Early_blight,
Confidence: 78.66%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.99%

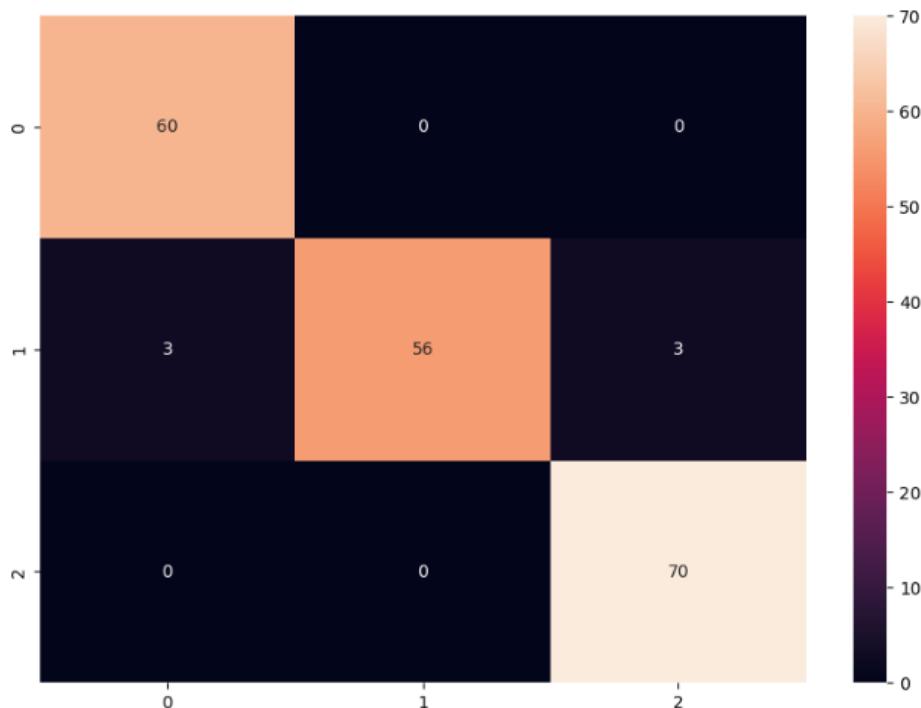


Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 93.79%



Classification Report:

	precision	recall	f1-score	support
0	0.95	1.00	0.98	60
1	1.00	0.90	0.95	62
2	0.96	1.00	0.98	70
accuracy			0.97	192
macro avg	0.97	0.97	0.97	192
weighted avg	0.97	0.97	0.97	192



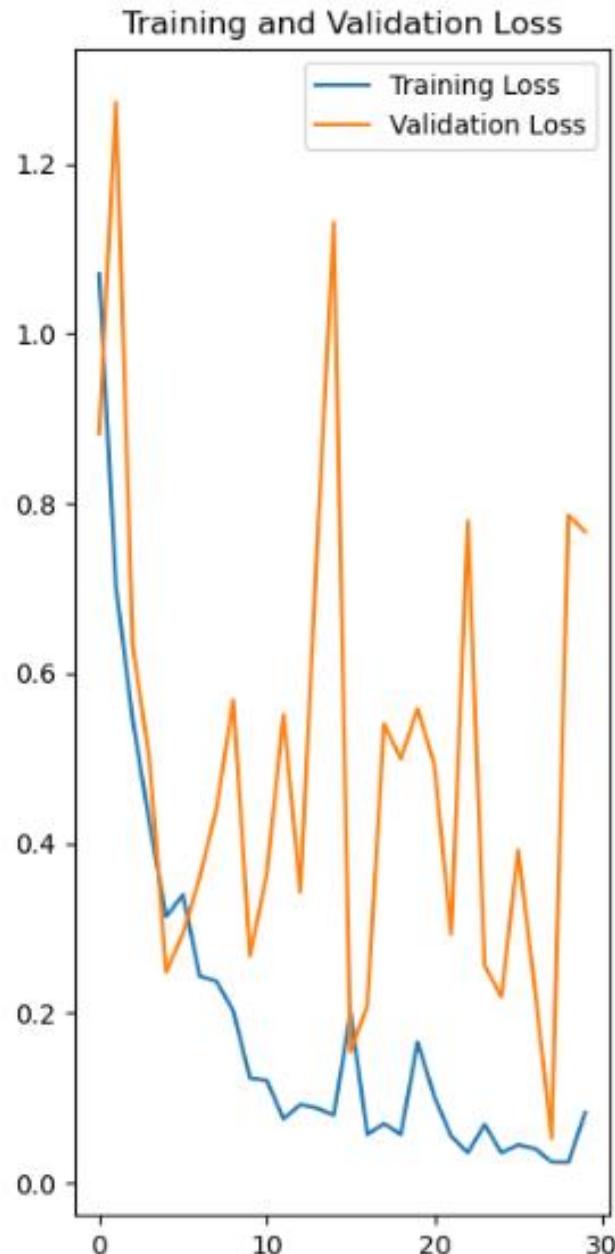
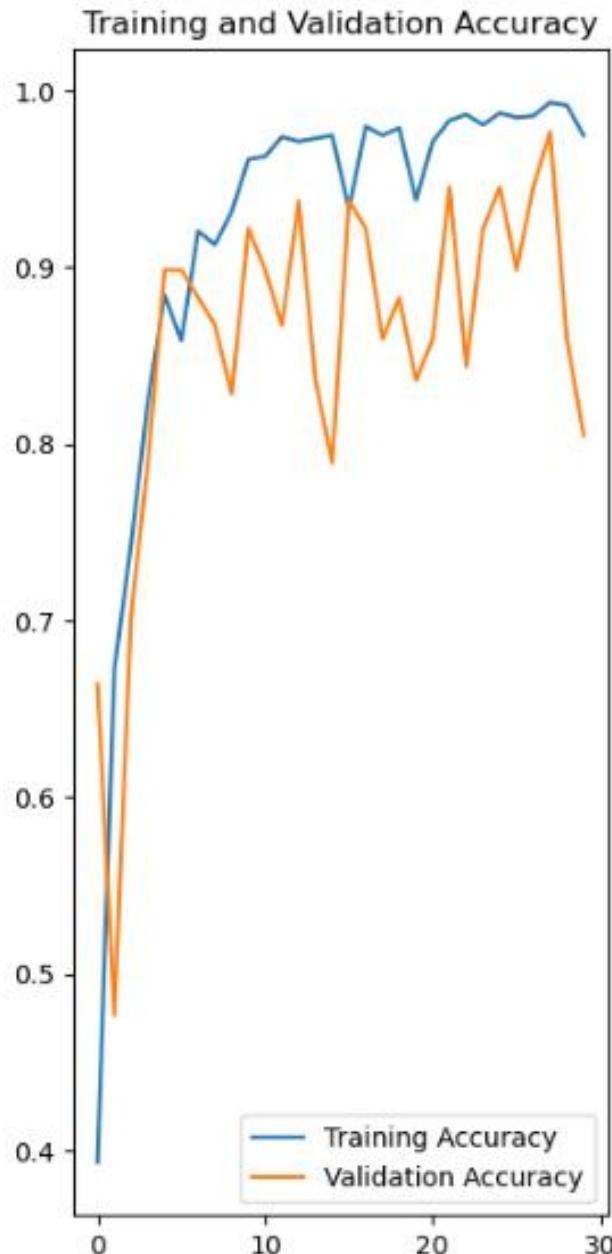
(c) 30

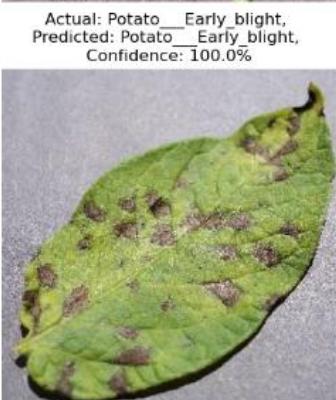
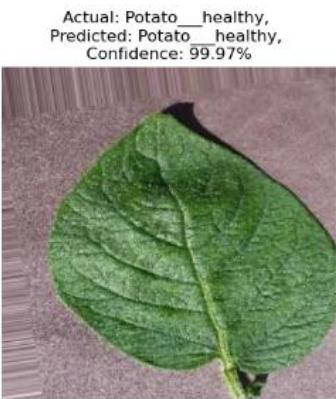
```
IMAGE_SIZE=256  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=30
```

```
scores=model.evaluate(test_ds)  
scores
```

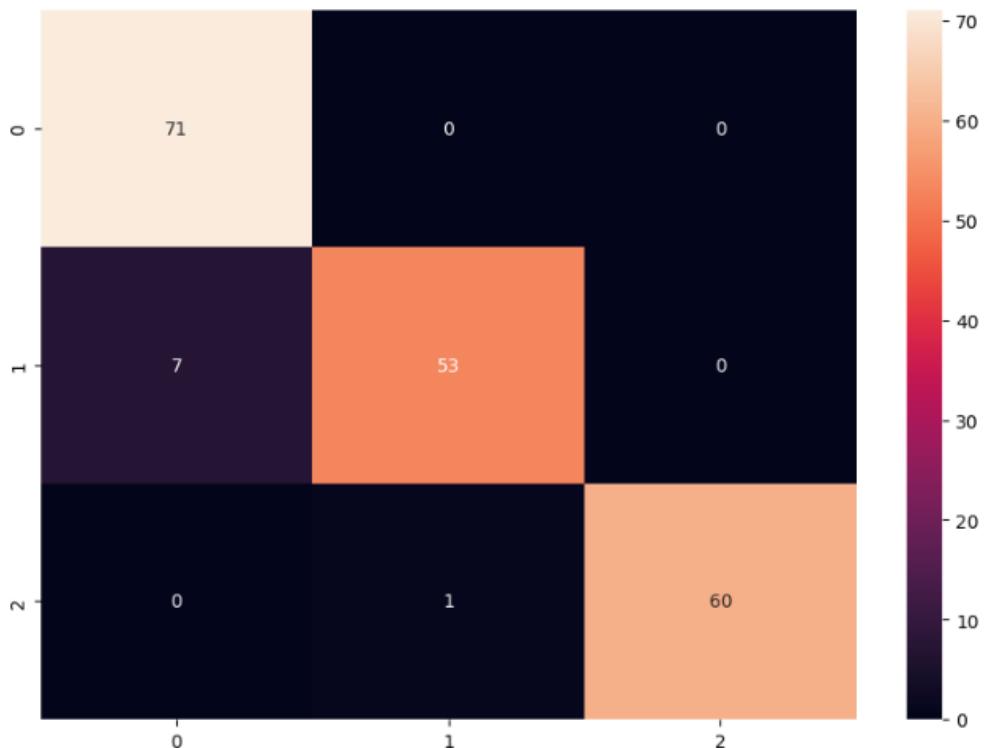
```
6/6 [=====] - 2s 228ms/step - loss: 0.7763 - accuracy: 0.8125  
[0.7762865424156189, 0.8125]
```

Average Time per Epoch: 46.50 s





Classification Report:					
	precision	recall	f1-score	support	
0	0.66	1.00	0.79	69	
1	1.00	0.44	0.61	64	
2	1.00	1.00	1.00	59	
accuracy			0.81	192	
macro avg	0.89	0.81	0.80	192	
weighted avg	0.88	0.81	0.80	192	



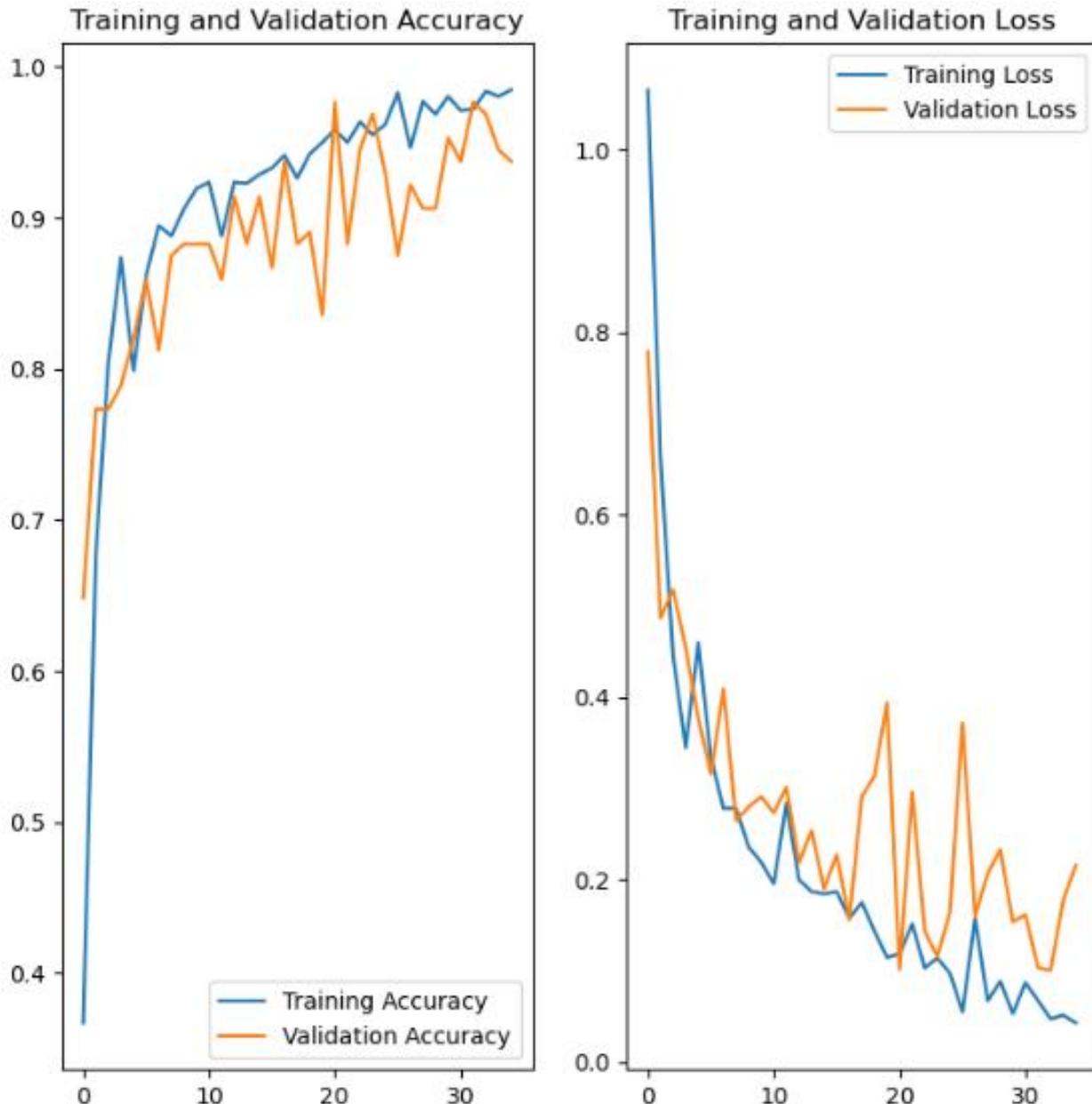
(d) 35

```
IMAGE_SIZE=256  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=35
```

```
scores=model.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 2s 218ms/step - loss: 0.1189 - accuracy: 0.9531  
[0.11888817697763443, 0.953125]
```

Average Time per Epoch: 45.17 s



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.09%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.93%

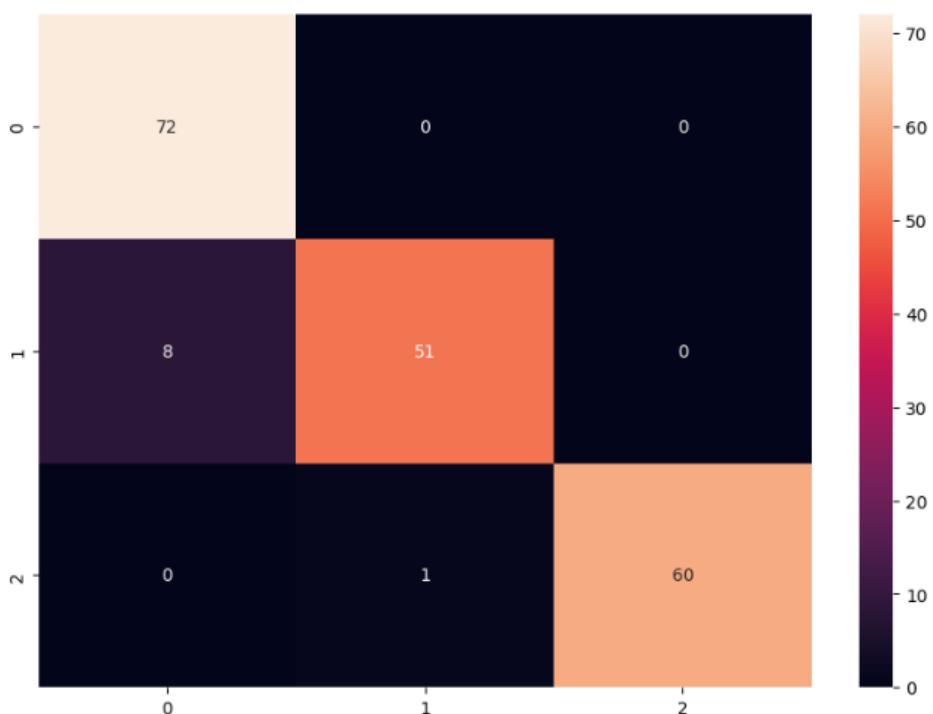


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.92%



Classification Report:

	precision	recall	f1-score	support
0	0.90	1.00	0.95	72
1	0.98	0.86	0.92	59
2	1.00	0.98	0.99	61
accuracy			0.95	192
macro avg	0.96	0.95	0.95	192
weighted avg	0.96	0.95	0.95	192



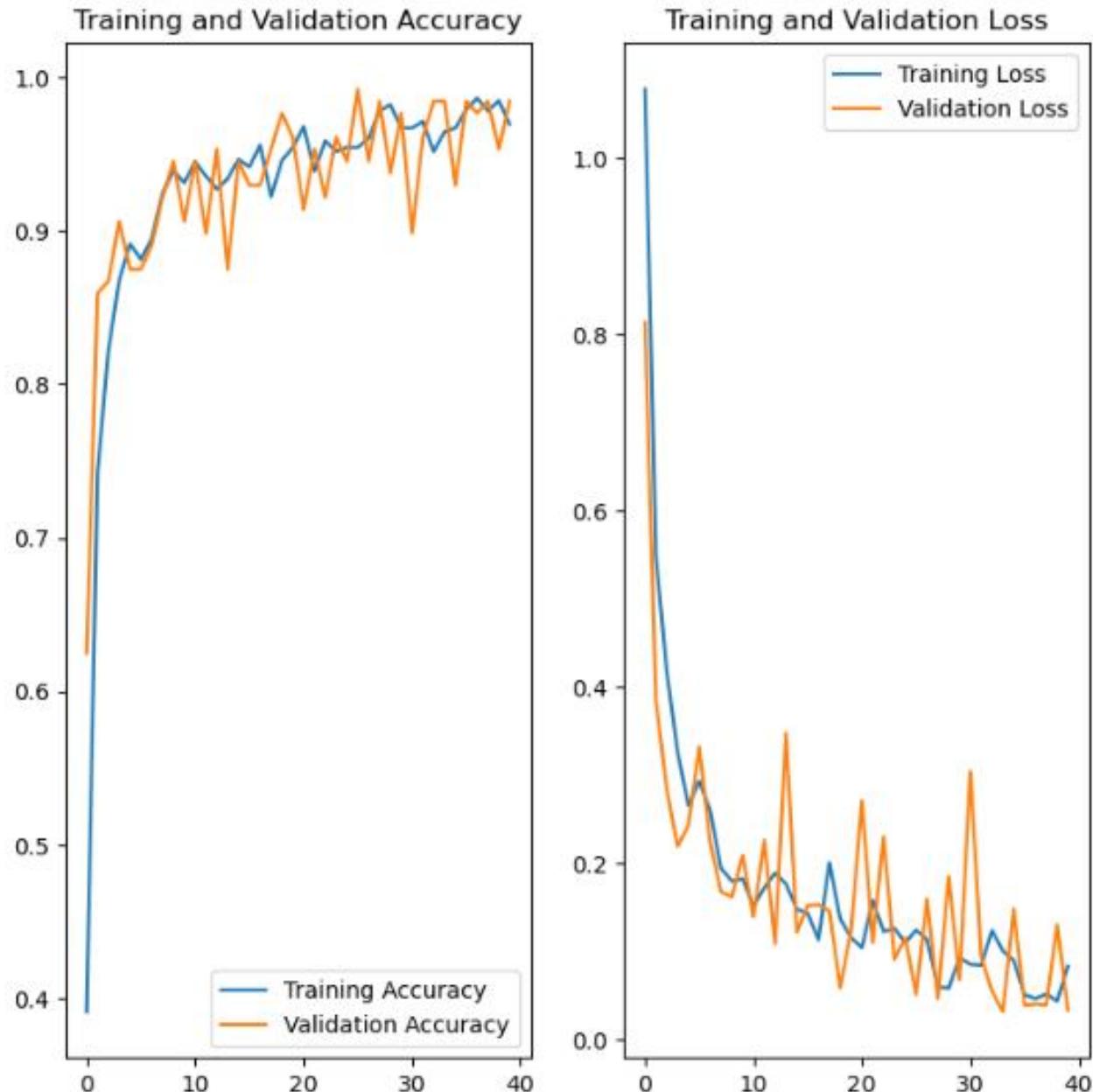
(e) 40

```
IMAGE_SIZE=256  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=40
```

```
scores=model.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 3s 219ms/step - loss: 0.0335 - accuracy: 0.9896  
[0.033482521772384644, 0.9895833134651184]
```

Average Time per Epoch: 45.20 s



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.99%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.99%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.29%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%

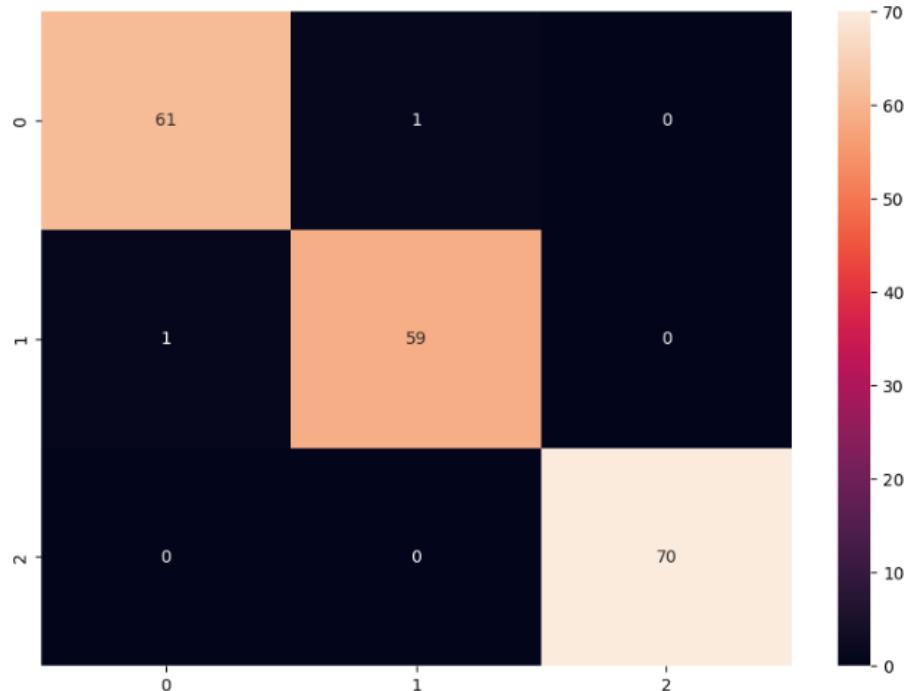


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.95%



Classification Report:

	precision	recall	f1-score	support
0	0.98	0.98	0.98	62
1	0.98	0.98	0.98	60
2	1.00	1.00	1.00	70
accuracy			0.99	192
macro avg	0.99	0.99	0.99	192
weighted avg	0.99	0.99	0.99	192



BATCH SIZE

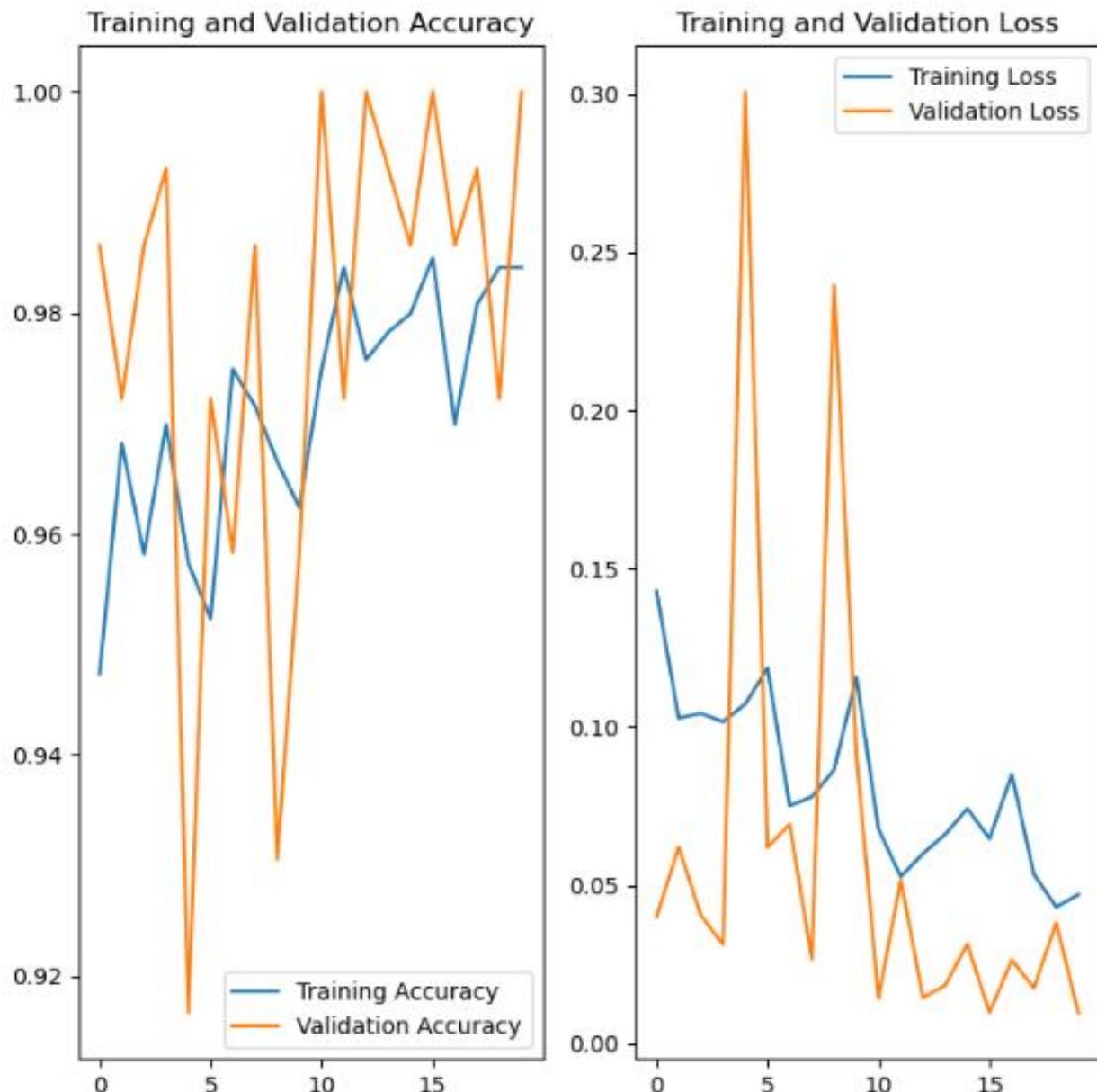
(a) 16

```
IMAGE_SIZE=256  
BATCH_SIZE=16  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

```
10/10 [=====] - 2s 113ms/step - loss: 0.0452 - accuracy: 0.9812  
[0.045248664915561676, 0.981249988079071]
```

Average Time per Epoch: 47.00 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.99%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.94%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.99%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%

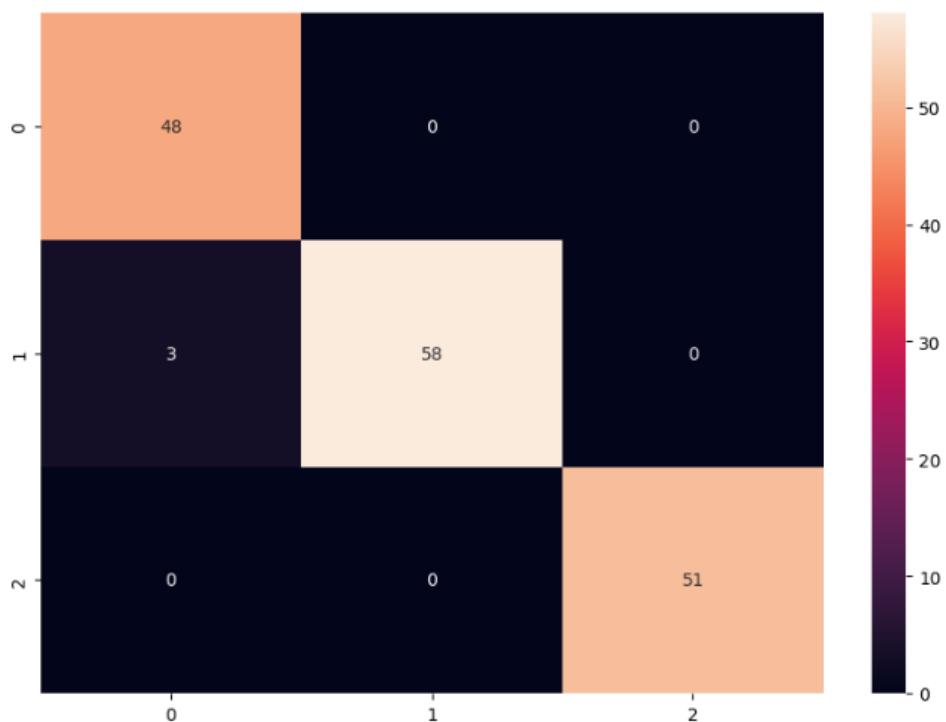


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	0.94	1.00	0.97	48
1	1.00	0.95	0.97	61
2	1.00	1.00	1.00	51
accuracy			0.98	160
macro avg	0.98	0.98	0.98	160
weighted avg	0.98	0.98	0.98	160



(b) 24

```
IMAGE_SIZE=256  
BATCH_SIZE=24  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

```
7/7 [=====] - 2s 187ms/step - loss: 0.0965 - accuracy: 0.9702  
[0.09648531675338745, 0.9702380895614624]
```

Average Time per Epoch: 47.50 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.73%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.14%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.58%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.48%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.52%

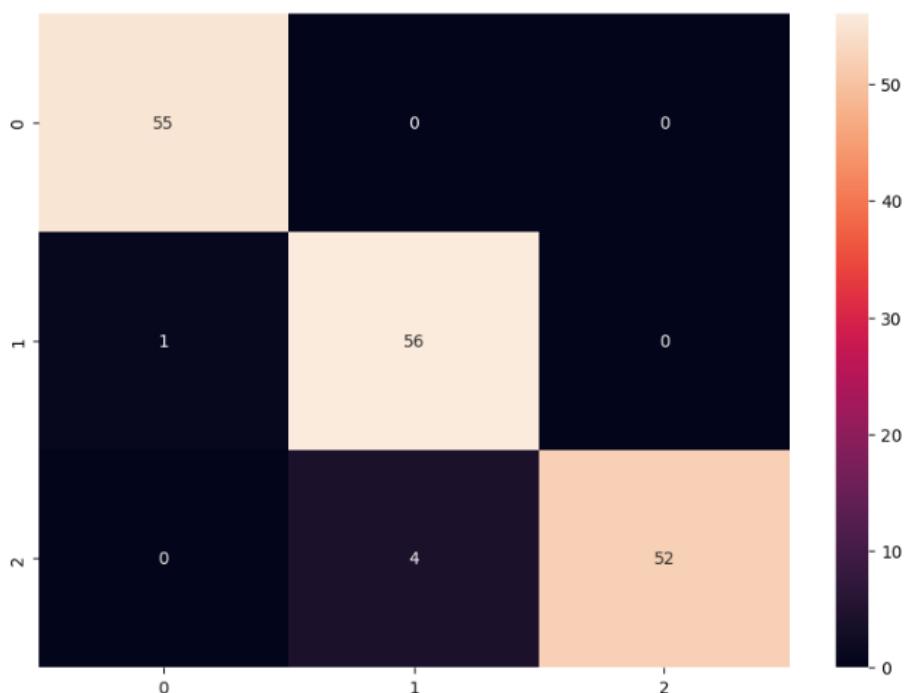


Actual: Potato_healthy,
Predicted: Potato_Late_blight,
Confidence: 62.8%



Classification Report:

	precision	recall	f1-score	support
0	0.98	1.00	0.99	55
1	0.93	0.98	0.96	57
2	1.00	0.93	0.96	56
accuracy			0.97	168
macro avg	0.97	0.97	0.97	168
weighted avg	0.97	0.97	0.97	168



(c) 32

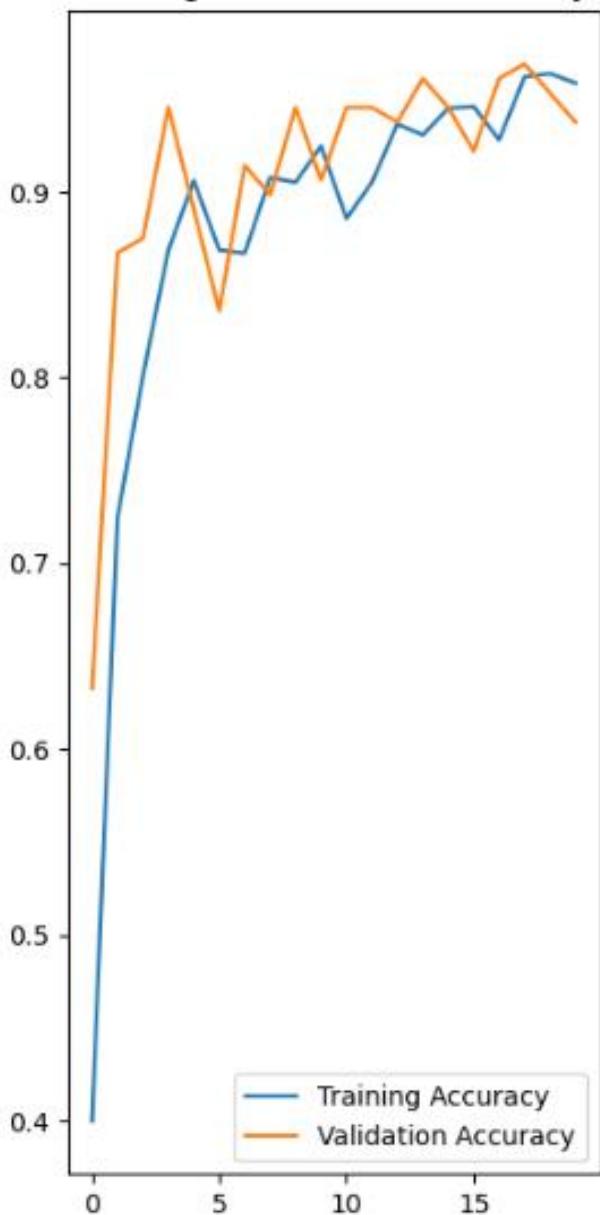
```
IMAGE_SIZE=256  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

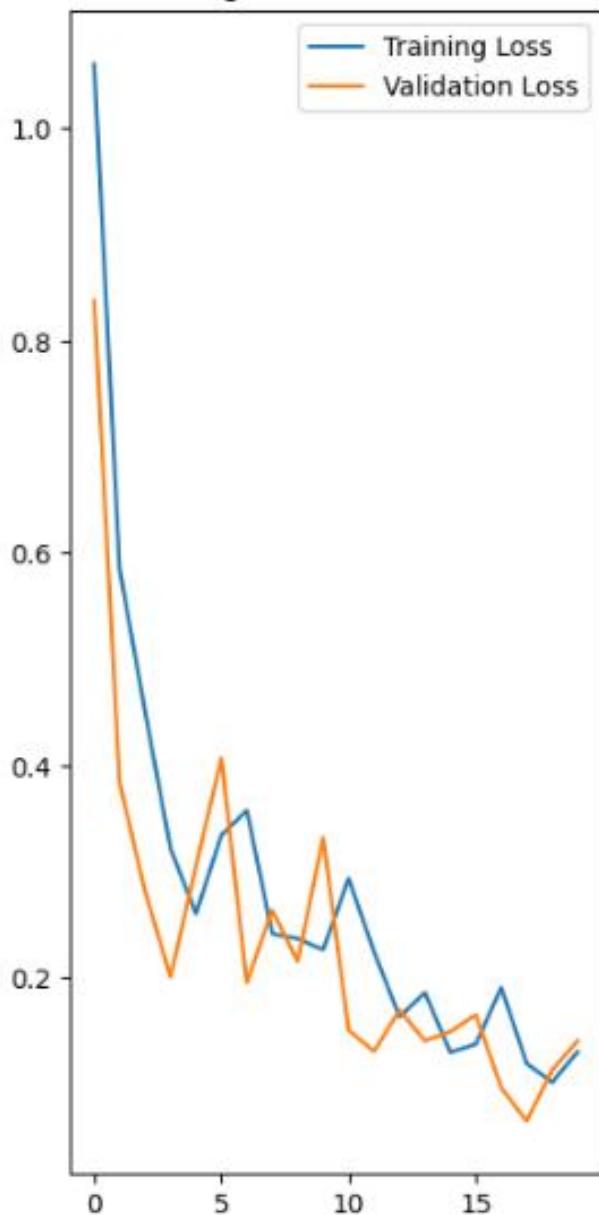
```
6/6 [=====] - 2s 233ms/step - loss: 0.1680 - accuracy: 0.9323  
[0.16803063452243805, 0.9322916865348816]
```

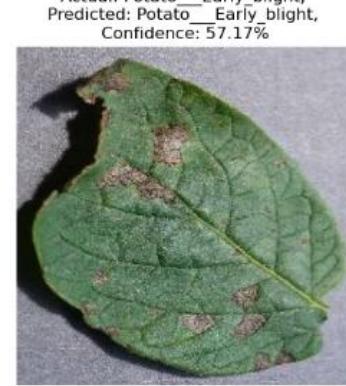
Average Time per Epoch: 45.40 s

Training and Validation Accuracy

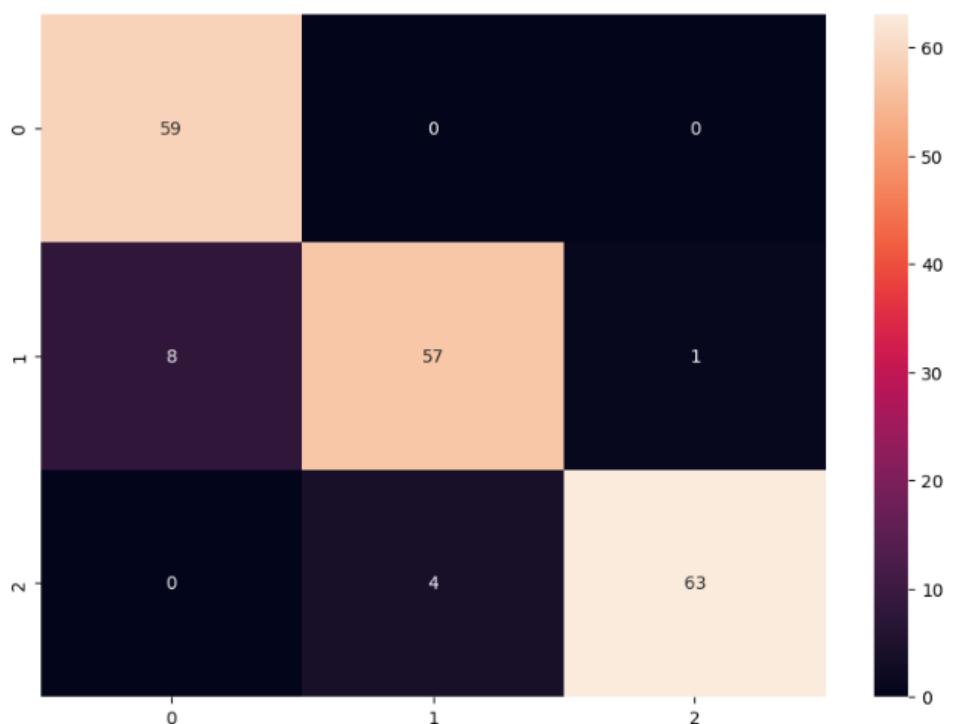


Training and Validation Loss





Classification Report:					
	precision	recall	f1-score	support	
0	0.88	1.00	0.94	59	
1	0.93	0.86	0.90	66	
2	0.98	0.94	0.96	67	
accuracy			0.93	192	
macro avg	0.93	0.93	0.93	192	
weighted avg	0.94	0.93	0.93	192	



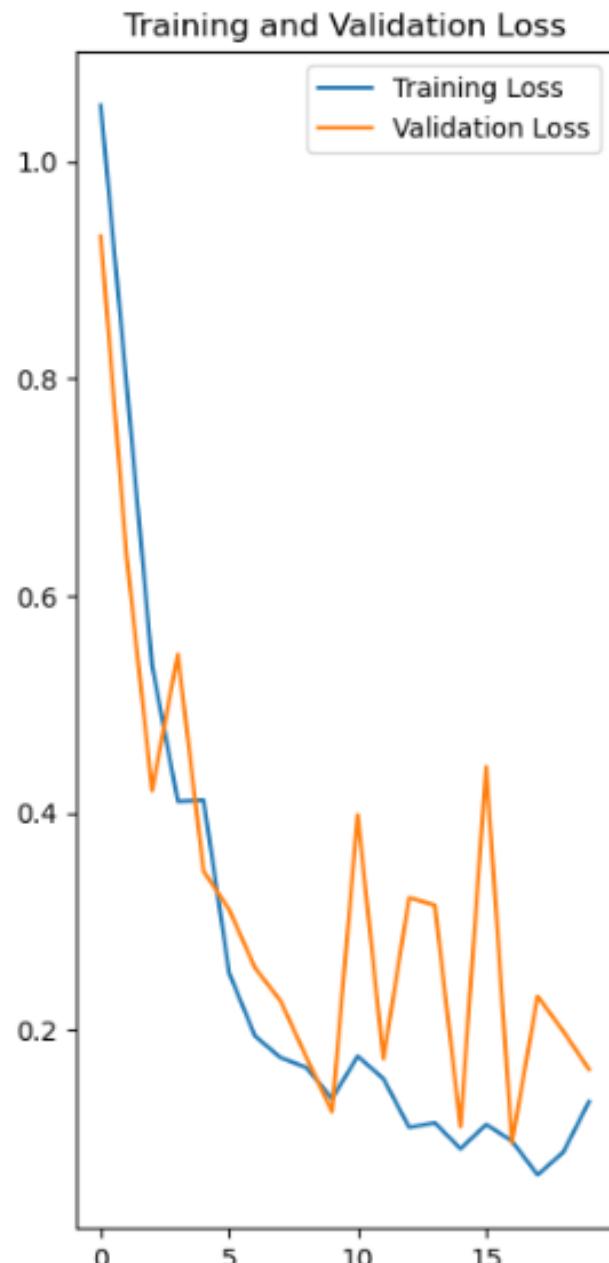
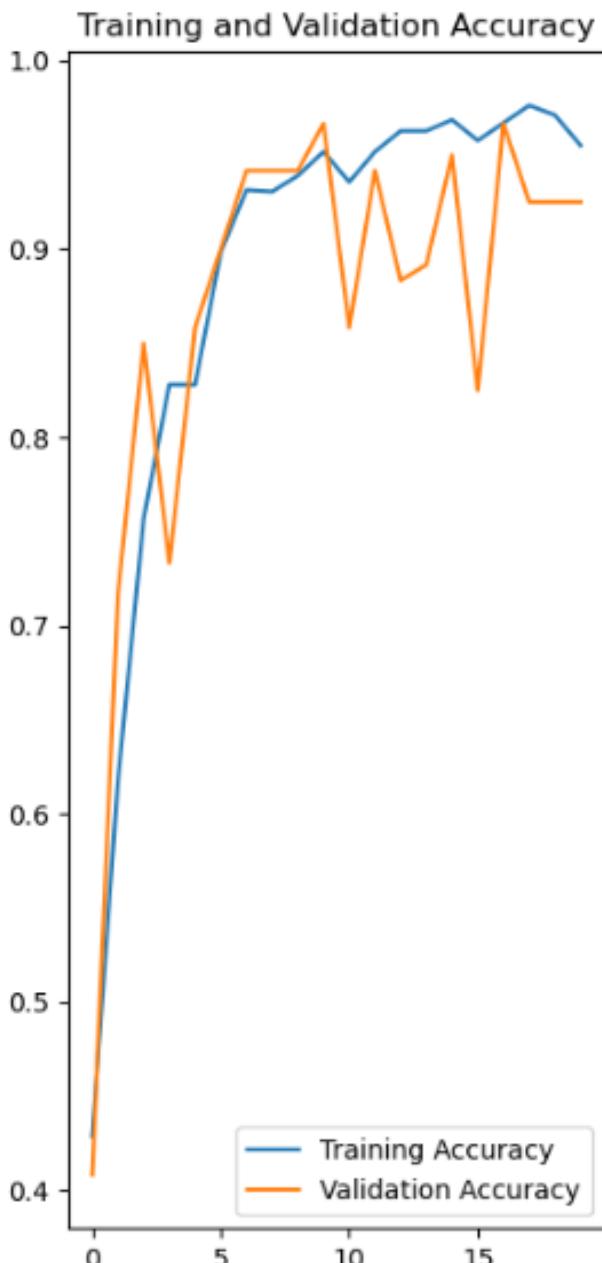
(d) 40

```
IMAGE_SIZE=256  
BATCH_SIZE=40  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

```
5/5 [=====] - 2s 287ms/step - loss: 0.0596 - accuracy: 0.9750  
[0.059619221836328506, 0.9750000238418579]
```

Average Time per Epoch: 46.20 s



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.69%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 98.1%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Early_blight,
Confidence: 87.66%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 92.93%

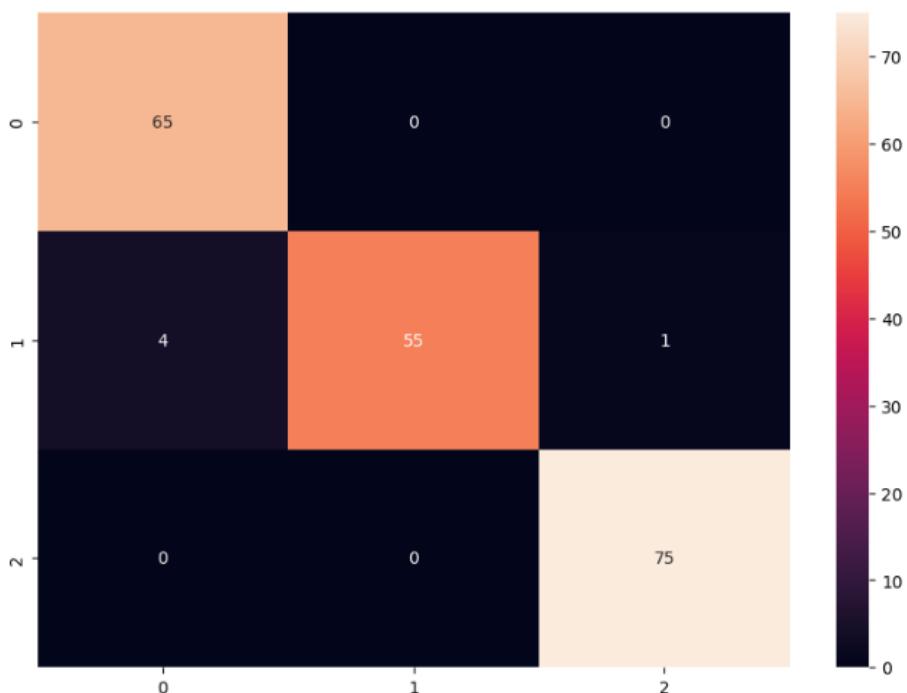


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	0.94	1.00	0.97	65
1	1.00	0.92	0.96	60
2	0.99	1.00	0.99	75
accuracy			0.97	200
macro avg	0.98	0.97	0.97	200
weighted avg	0.98	0.97	0.97	200



(e) 48

```
IMAGE_SIZE=256  
BATCH_SIZE=48  
CHANNELS=3  
EPOCHS=20
```

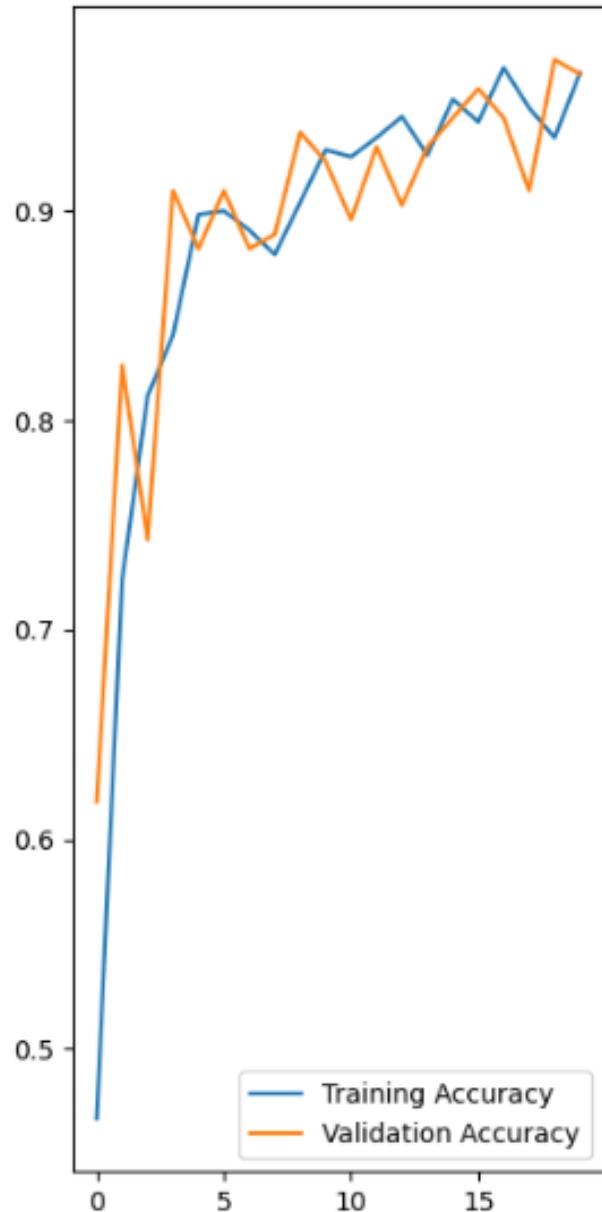
```
scores=model.evaluate(test_ds)
```

```
scores
```

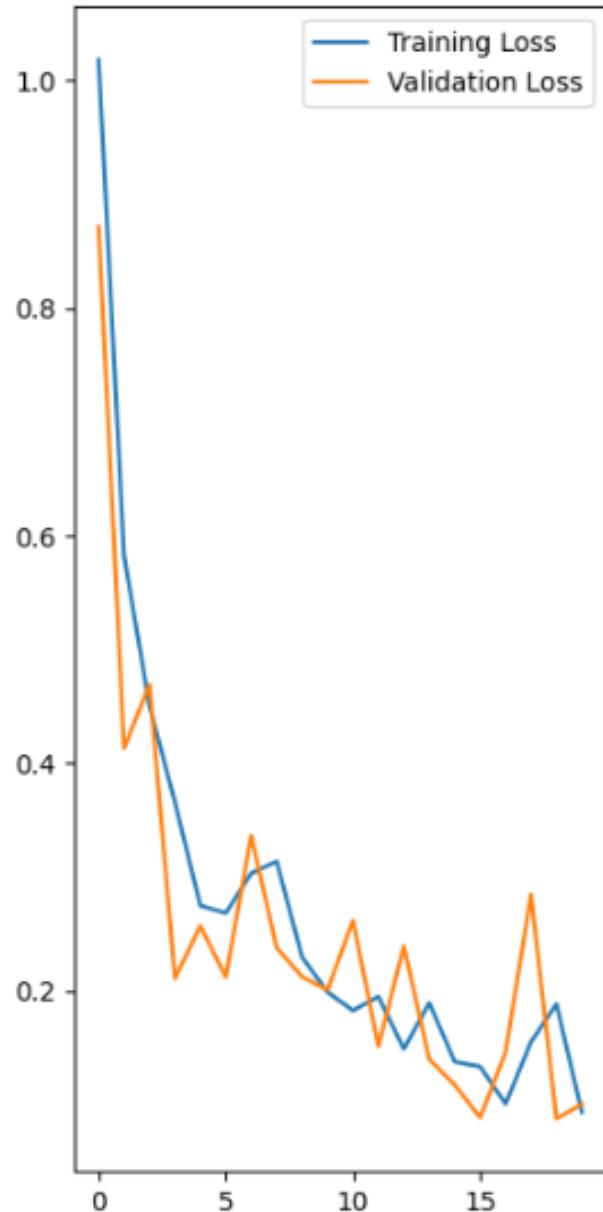
```
4/4 [=====] - 2s 316ms/step - loss: 0.1211 - accuracy: 0.9531  
[0.12112591415643692, 0.953125]
```

Average Time per Epoch: 47.25 s

Training and Validation Accuracy



Training and Validation Loss



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.98%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.99%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.98%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 53.01%

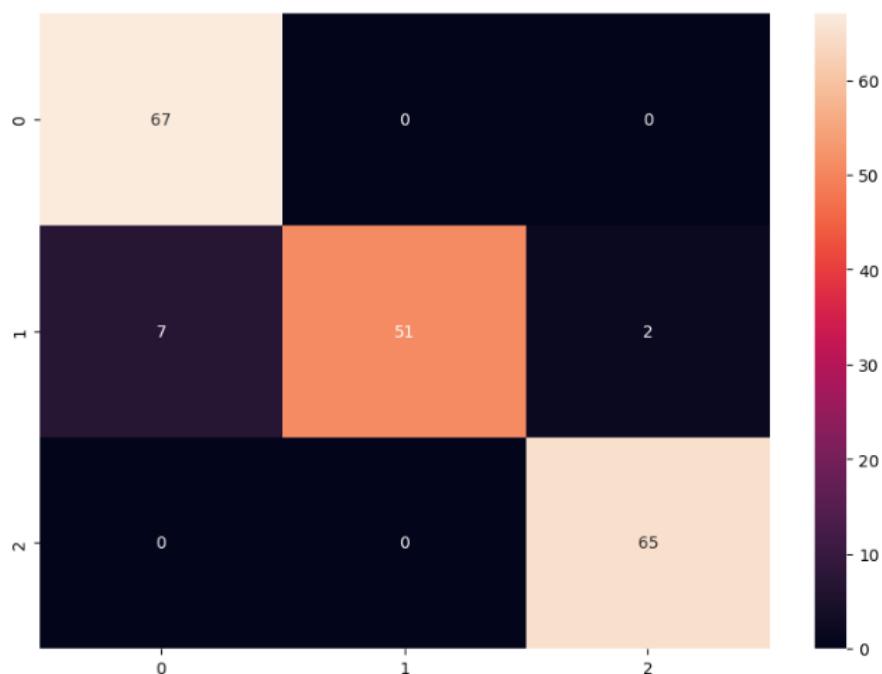


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.93%



Classification Report:

	precision	recall	f1-score	support
0	0.91	1.00	0.95	67
1	1.00	0.85	0.92	60
2	0.97	1.00	0.98	65
accuracy			0.95	192
macro avg	0.96	0.95	0.95	192
weighted avg	0.96	0.95	0.95	192



DATASET SPLIT RATIO

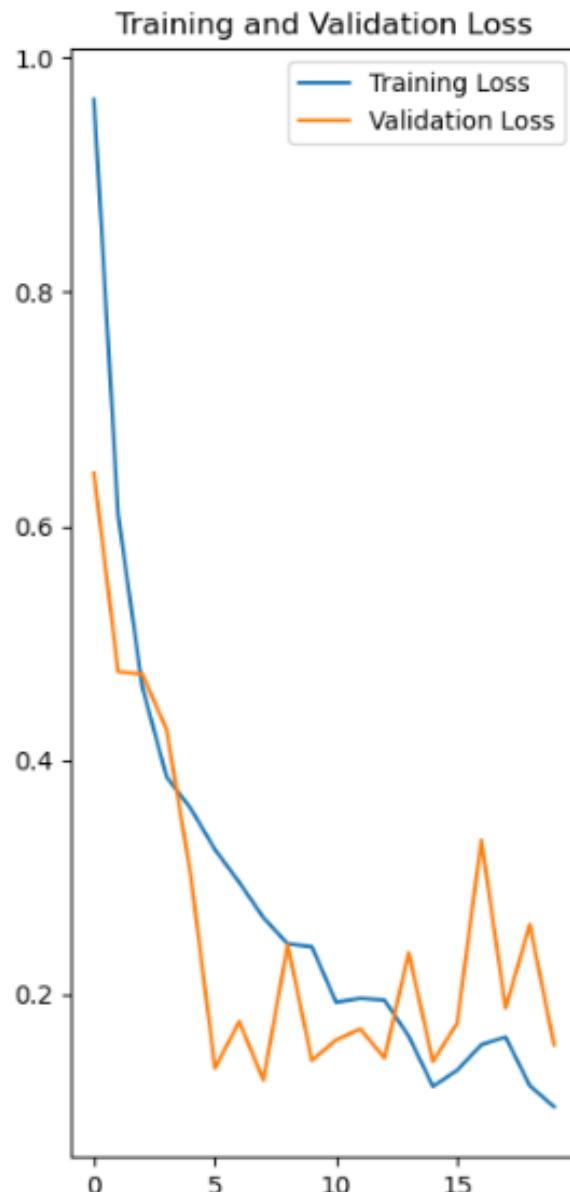
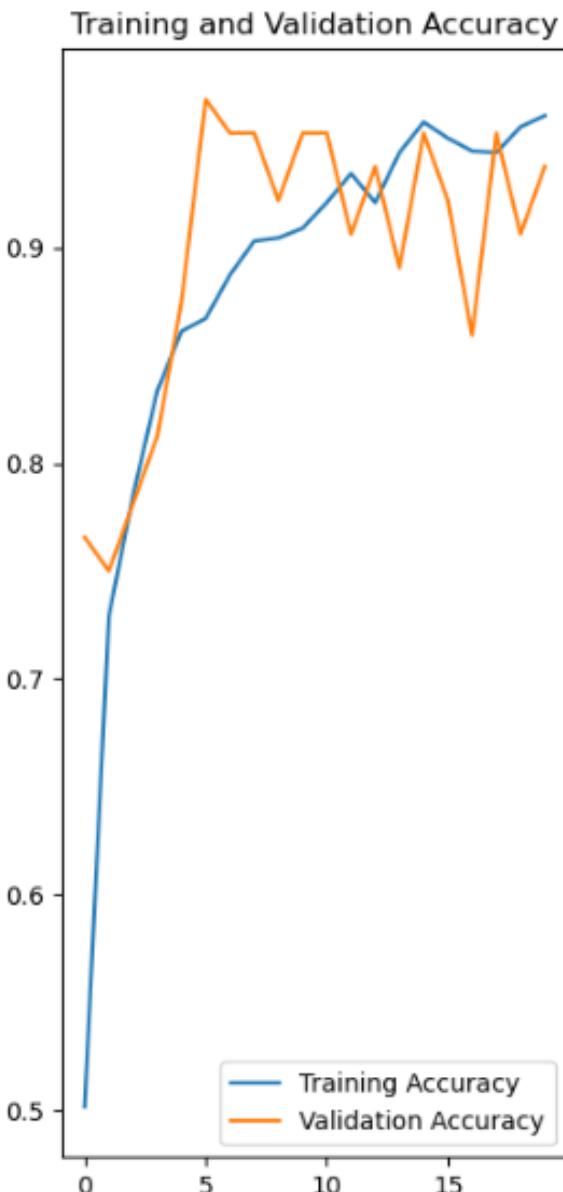
(a) 90:5:5

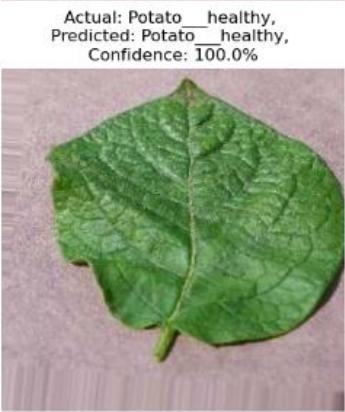
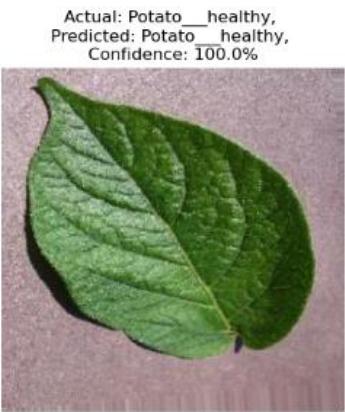
```
IMAGE_SIZE=256  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

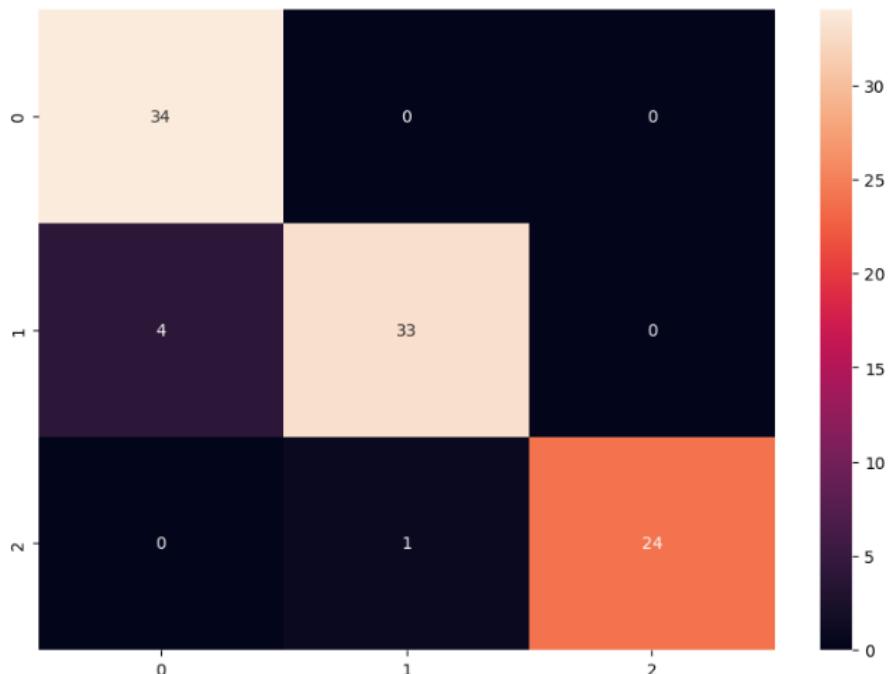
```
3/3 [=====] - 1s 235ms/step - loss: 0.1488 - accuracy: 0.9479  
[0.14880073070526123, 0.9479166865348816]
```

Average Time per Epoch: 50.35 s





Classification Report:					
	precision	recall	f1-score	support	
0	0.89	1.00	0.94	34	
1	0.97	0.89	0.93	37	
2	1.00	0.96	0.98	25	
accuracy			0.95	96	
macro avg	0.96	0.95	0.95	96	
weighted avg	0.95	0.95	0.95	96	



(b) 80:10:10

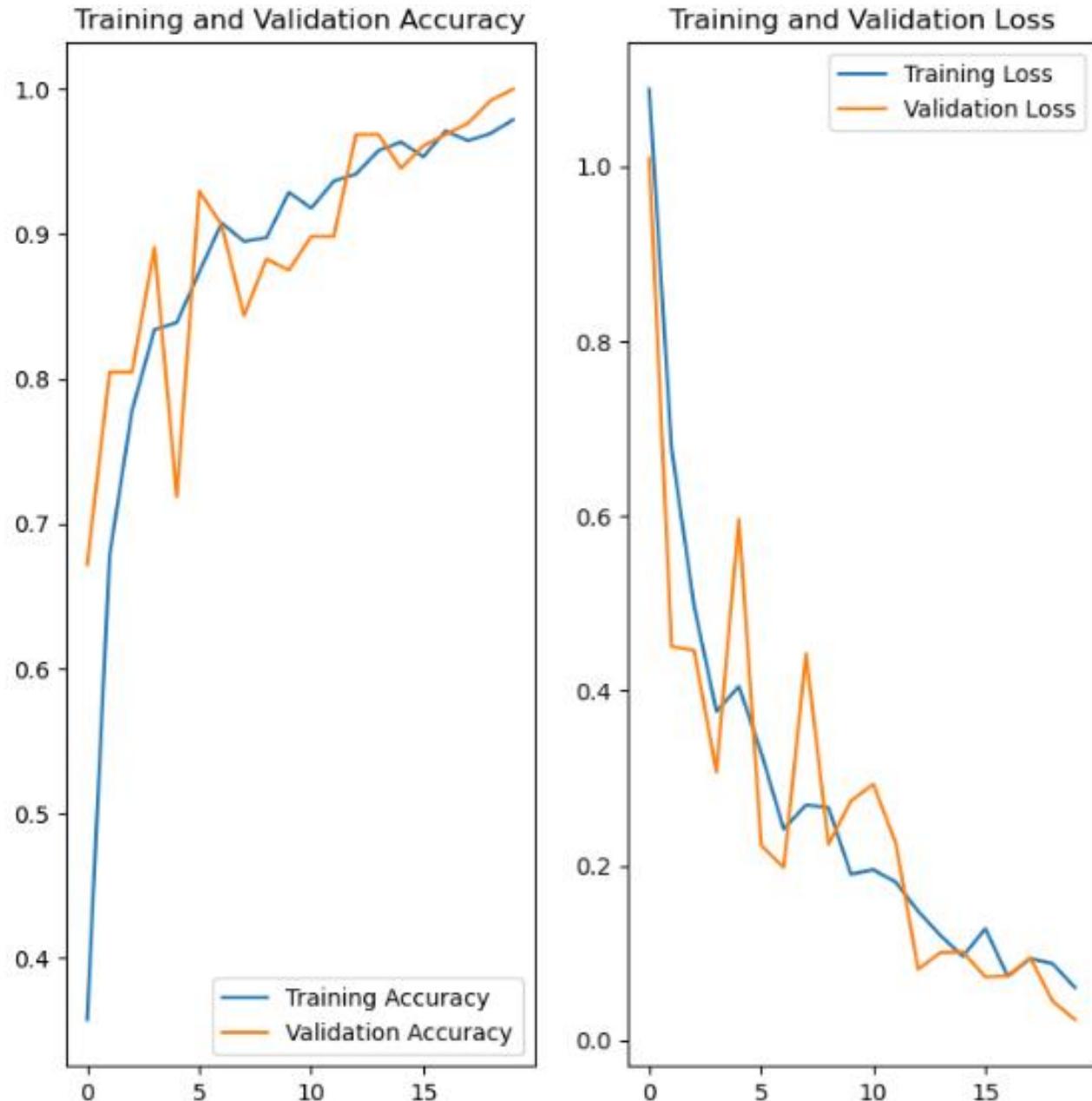
```
IMAGE_SIZE=256  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)
```

```
scores
```

```
6/6 [=====] - 2s 226ms/step - loss: 0.0835 - accuracy: 0.9740  
[0.08346224576234818, 0.9739583134651184]
```

Average Time per Epoch: 45.00 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 98.29%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.98%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%

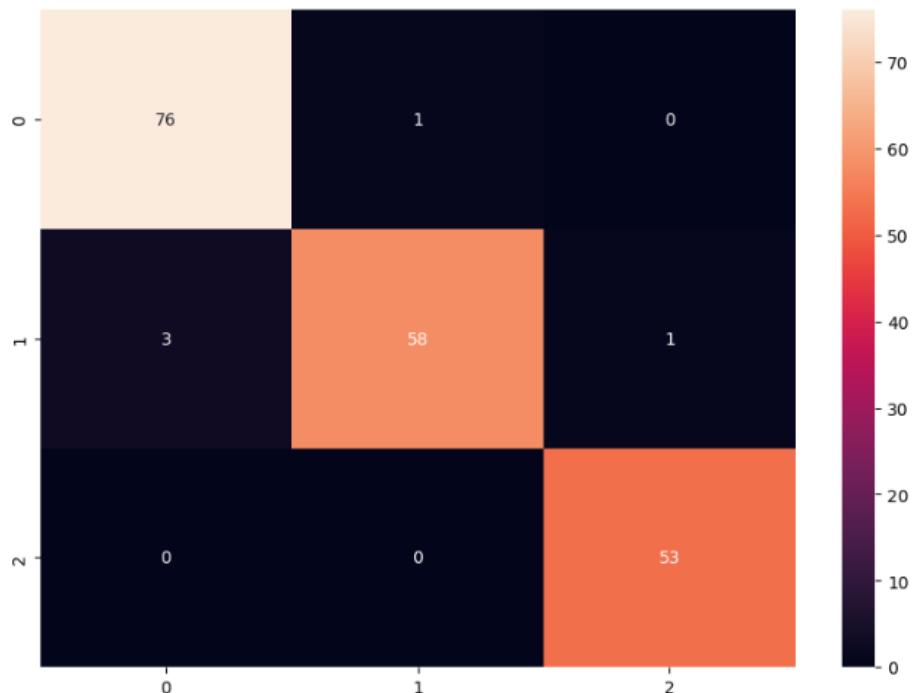


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	0.96	0.99	0.97	77
1	0.98	0.94	0.96	62
2	0.98	1.00	0.99	53
accuracy			0.97	192
macro avg	0.98	0.97	0.97	192
weighted avg	0.97	0.97	0.97	192



(c) 70:15:15

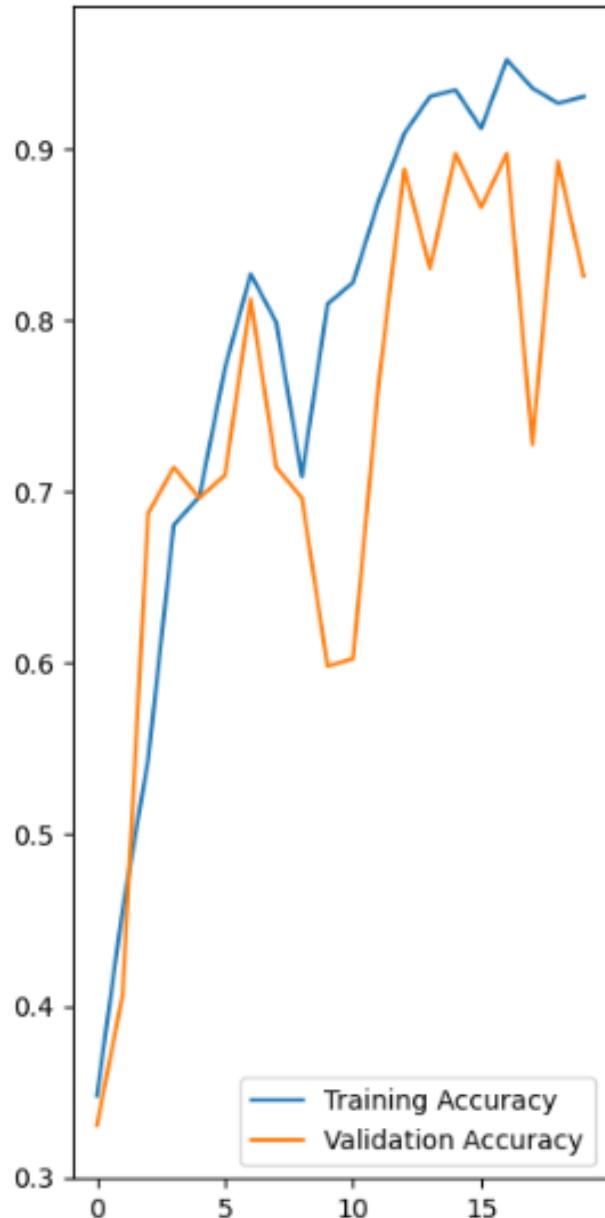
```
IMAGE_SIZE=256  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

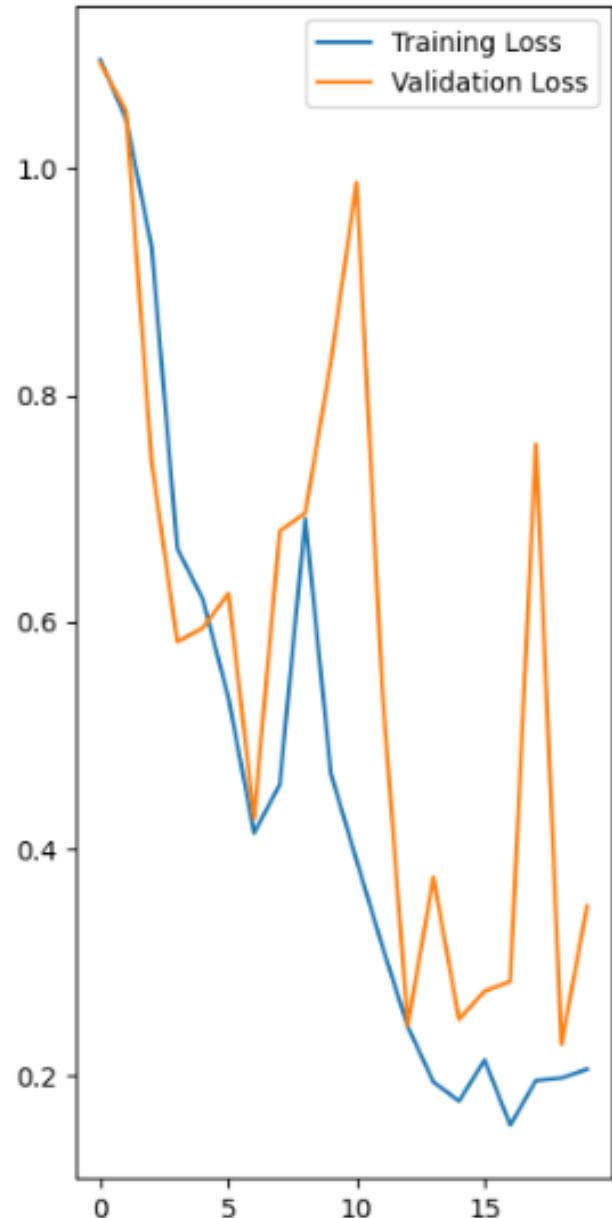
```
8/8 [=====] - 2s 219ms/step - loss: 0.2986 - accuracy: 0.8438  
[0.29861414432525635, 0.84375]
```

Average Time per Epoch: 39.80 s

Training and Validation Accuracy



Training and Validation Loss



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 98.56%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 94.55%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.35%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.93%



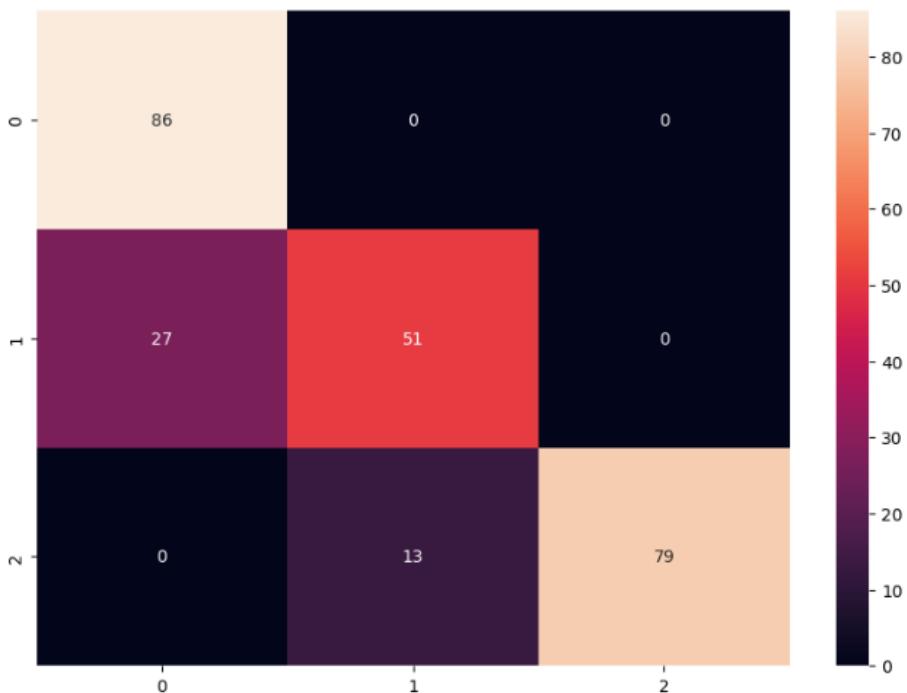
Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 98.85%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 97.81%



Classification Report:					
	precision	recall	f1-score	support	
0	0.76	1.00	0.86	86	
1	0.80	0.65	0.72	78	
2	1.00	0.86	0.92	92	
accuracy			0.84	256	
macro avg	0.85	0.84	0.84	256	
weighted avg	0.86	0.84	0.84	256	



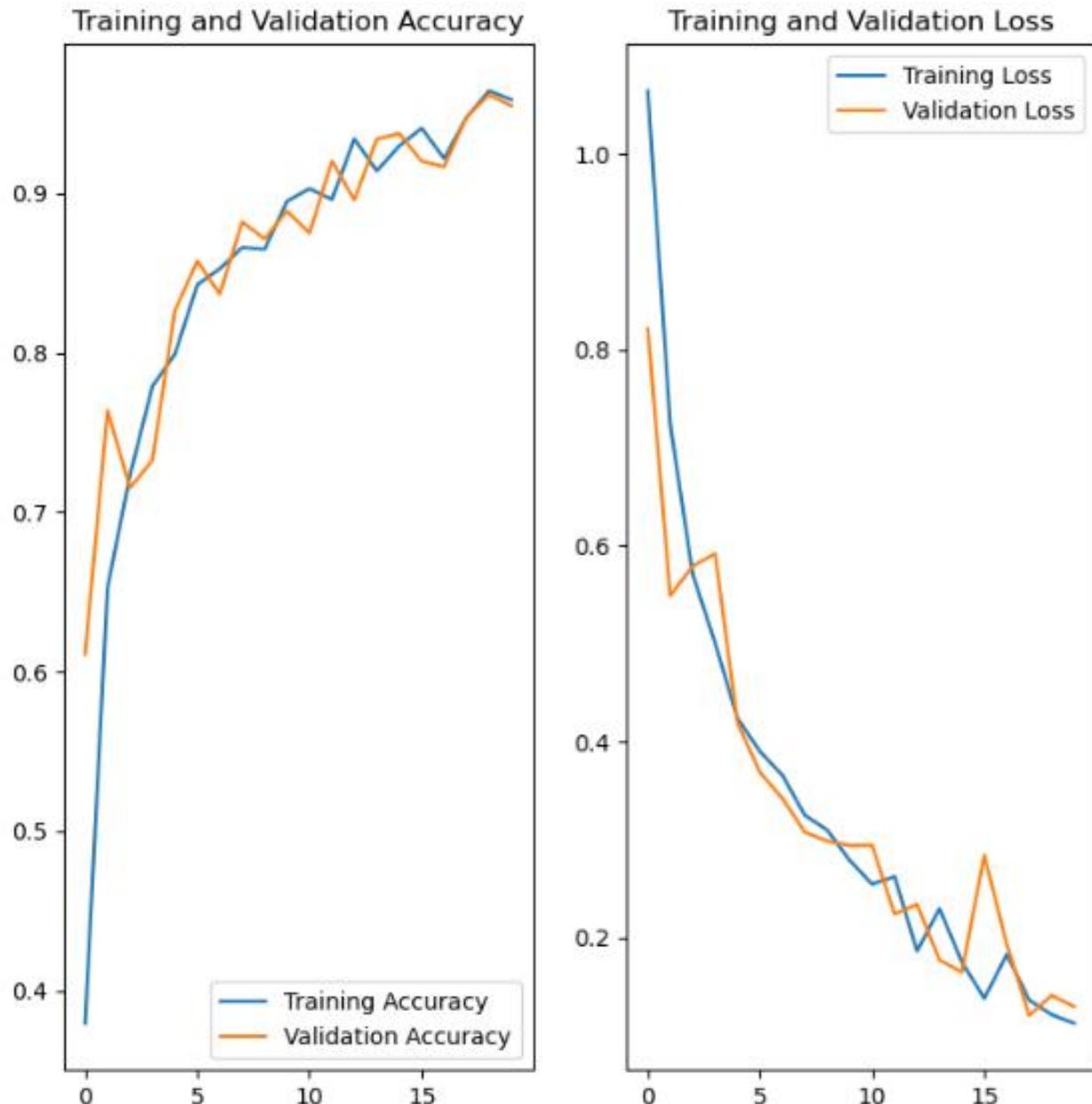
(d) 60:20:20

```
IMAGE_SIZE=256  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

```
10/10 [=====] - 3s 221ms/step - loss: 0.1598 - accuracy: 0.9375  
[0.15979883074760437, 0.9375]
```

Average Time per Epoch: 36.05 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.93%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 92.8%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.93%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 94.26%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.19%

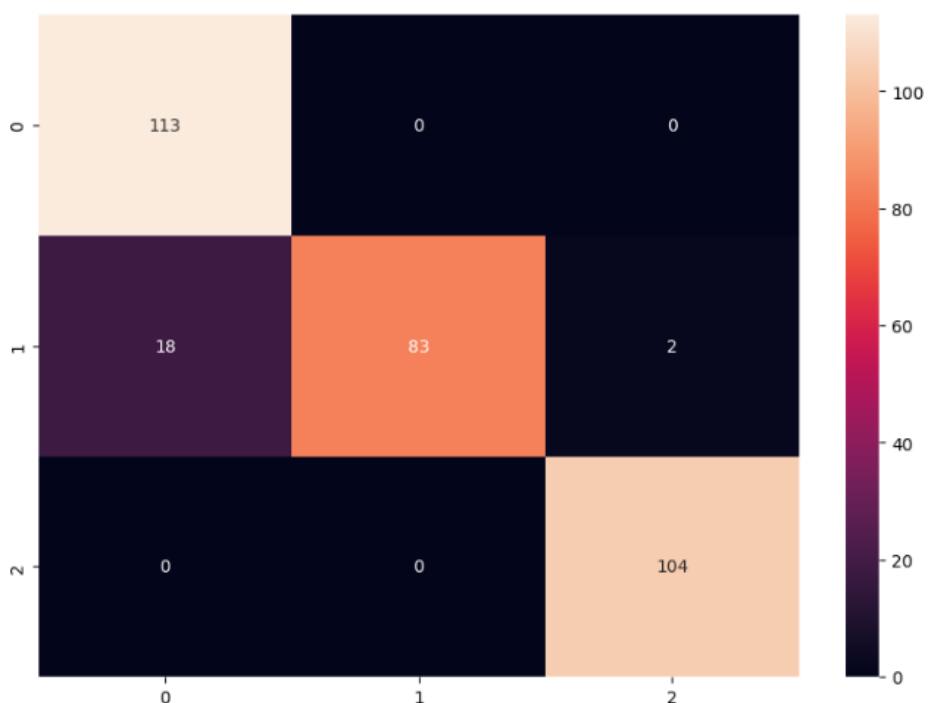


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.47%



Classification Report:

	precision	recall	f1-score	support
0	0.86	1.00	0.93	113
1	1.00	0.81	0.89	103
2	0.98	1.00	0.99	104
accuracy			0.94	320
macro avg	0.95	0.94	0.94	320
weighted avg	0.95	0.94	0.94	320



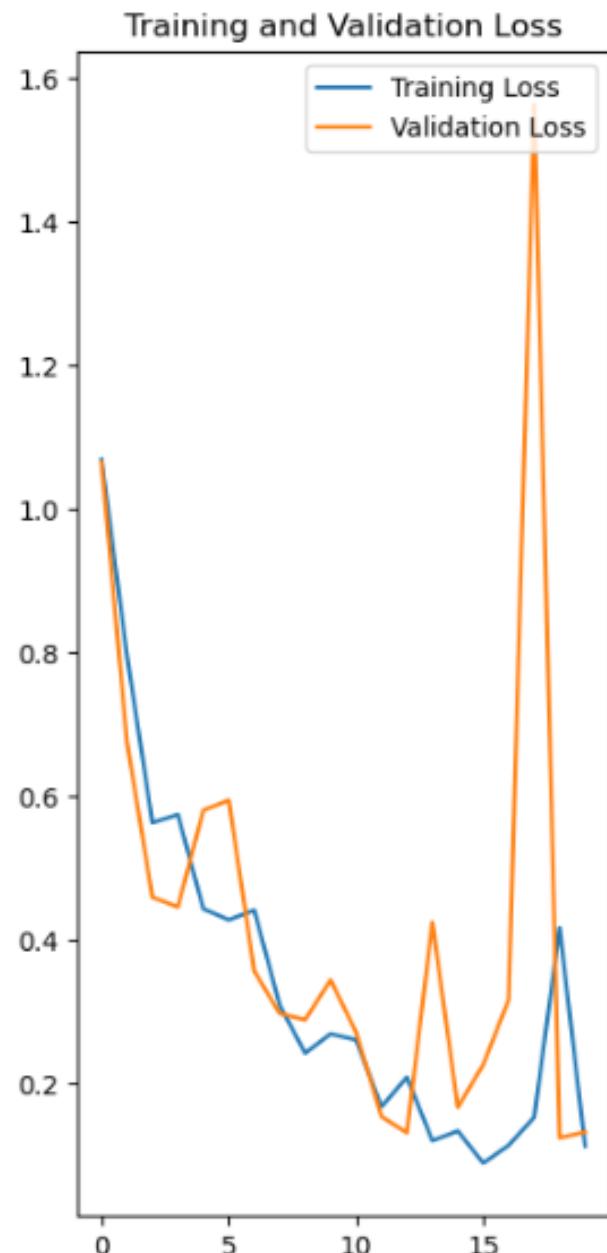
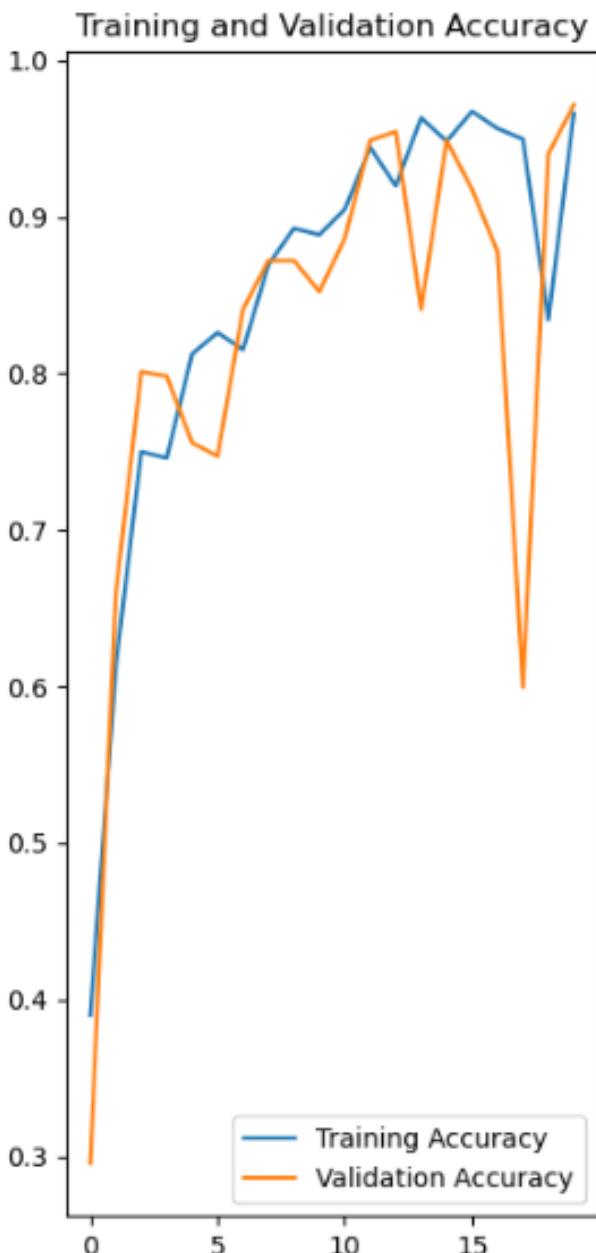
(e) 50:25:25

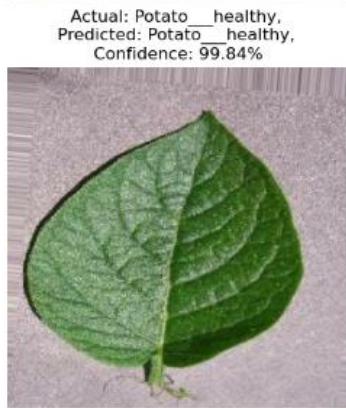
```
IMAGE_SIZE=256  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

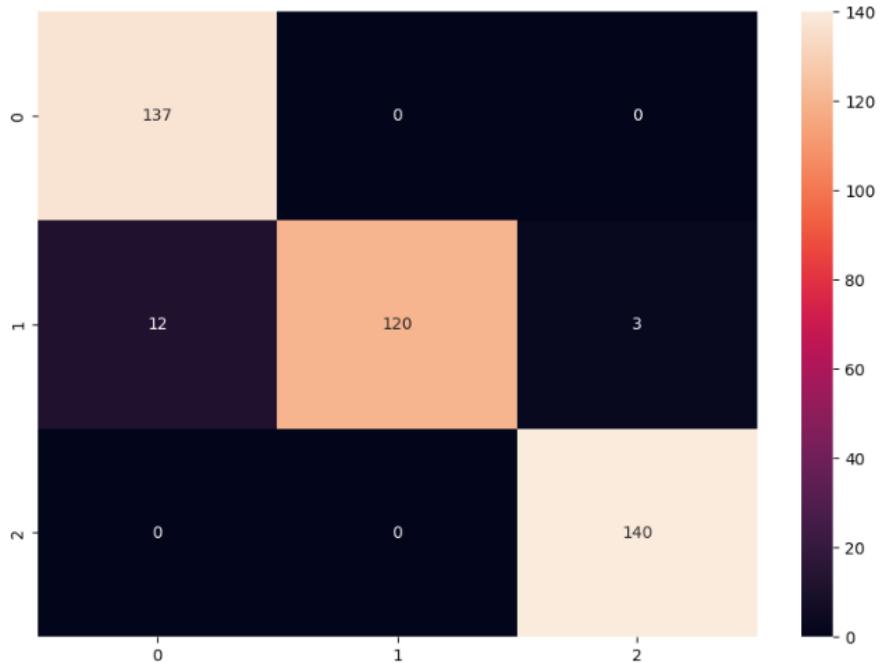
```
13/13 [=====] - 3s 213ms/step - loss: 0.1043 - accuracy: 0.9636  
[0.10430409759283066, 0.9635922312736511]
```

Average Time per Epoch: 30.15 s





Classification Report:					
	precision	recall	f1-score	support	
0	0.92	1.00	0.96	137	
1	1.00	0.89	0.94	135	
2	0.98	1.00	0.99	140	
accuracy			0.96	412	
macro avg	0.97	0.96	0.96	412	
weighted avg	0.97	0.96	0.96	412	



Model 2: ResNet50

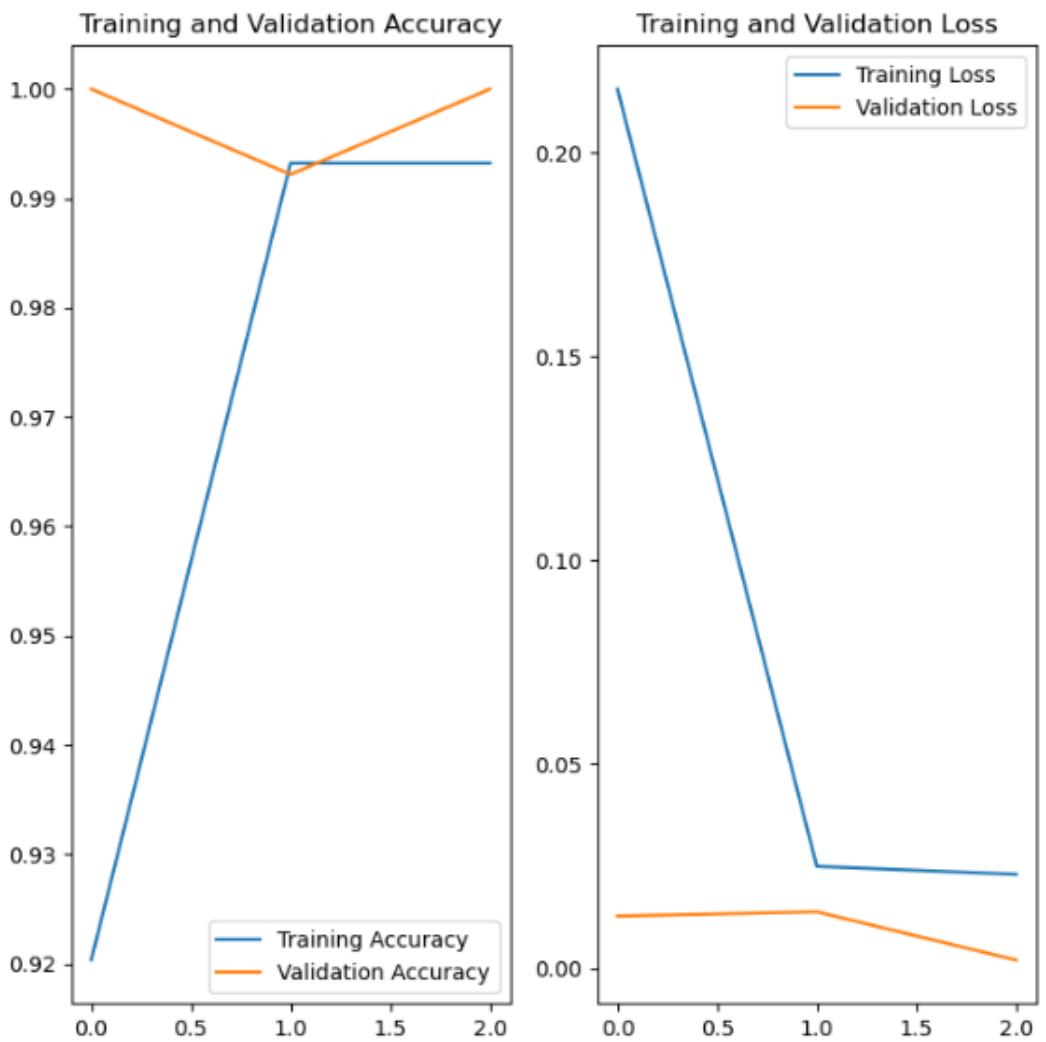
BASE MODEL

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=3
```

```
scores=model.evaluate(test_ds)  
scores  
  
6/6 [=====] - 8s 1s/step - loss: 0.0049 - accuracy: 1.0000  
[0.004877329338341951, 1.0]
```

Average Time per Epoch: 70.67 s

```
history.history['loss']  
  
[0.2155802845954895, 0.024982508271932602, 0.023031199350953102]  
  
history.history['accuracy']  
  
[0.9203389883041382, 0.993220329284668, 0.993220329284668]  
  
history.history['val_loss']  
  
[0.012781288474798203, 0.01383163407444954, 0.002010297728702426]  
  
history.history['val_accuracy']  
  
[1.0, 0.9921875, 1.0]
```



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.78%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.99%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 93.05%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



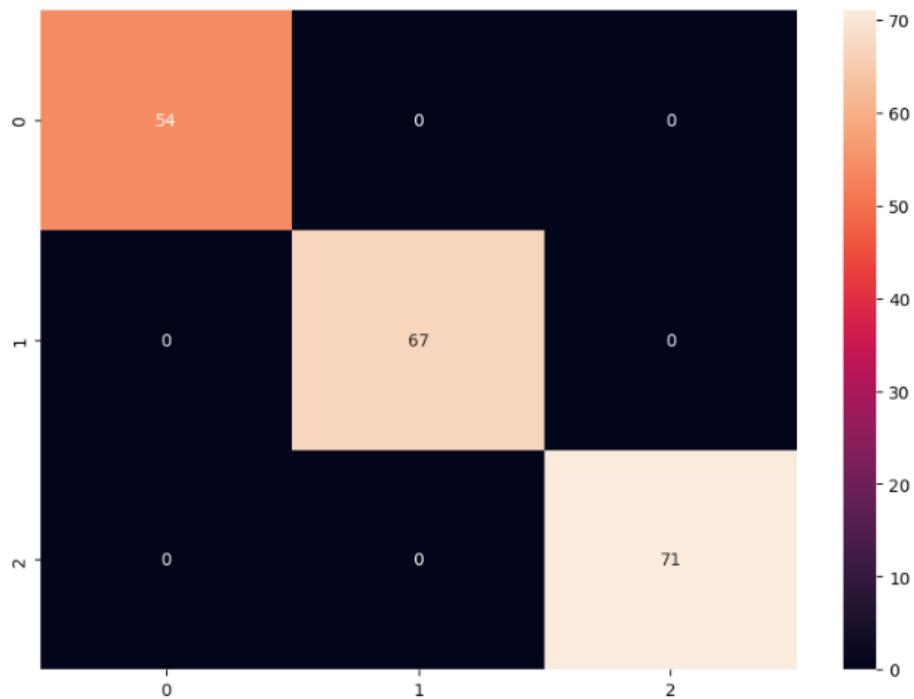
Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.37%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Classification Report:					
	precision	recall	f1-score	support	
0	1.00	1.00	1.00	54	
1	1.00	1.00	1.00	67	
2	1.00	1.00	1.00	71	
accuracy			1.00	192	
macro avg	1.00	1.00	1.00	192	
weighted avg	1.00	1.00	1.00	192	



NO. OF EPOCHS

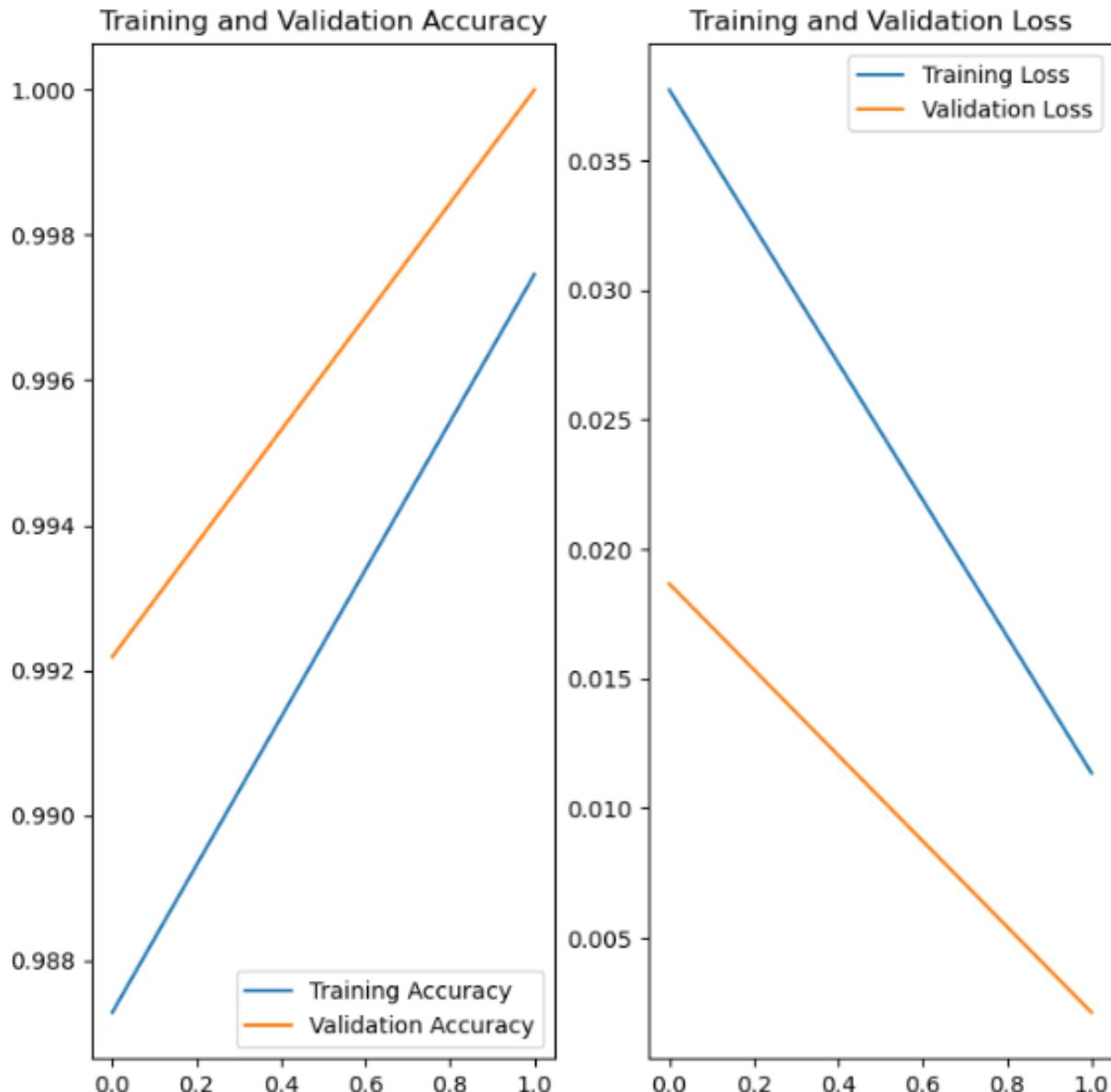
(a) 2

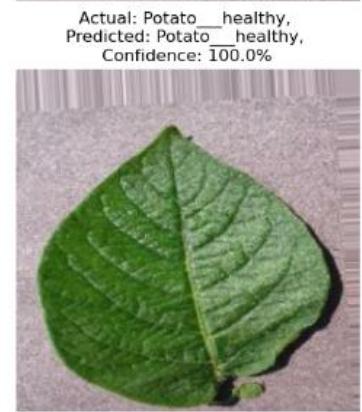
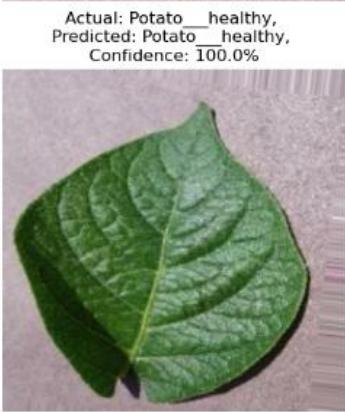
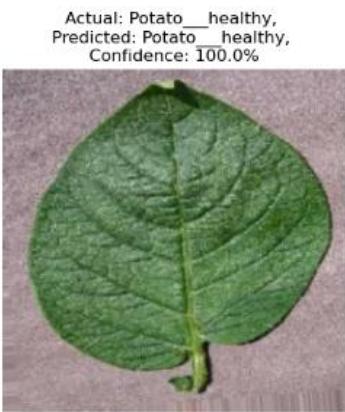
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=2
```

```
scores=model.evaluate(test_ds)  
scores
```

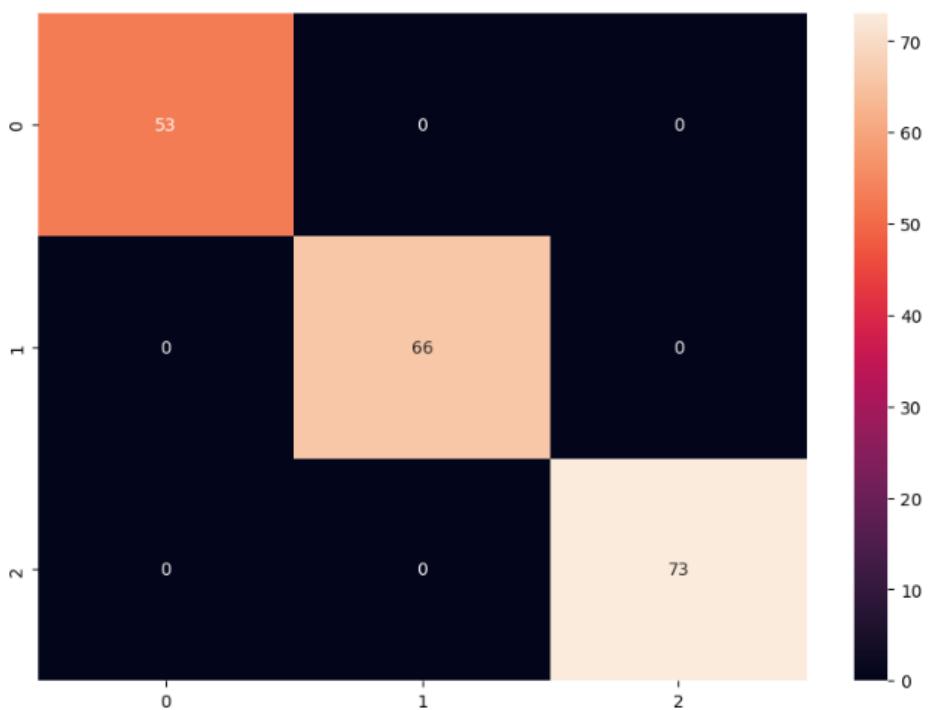
```
6/6 [=====] - 12s 2s/step - loss: 0.0033 - accuracy: 1.0000  
[0.003257493721321225, 1.0]
```

Average Time per Epoch: 69.00 s





Classification Report:					
	precision	recall	f1-score	support	
0	1.00	1.00	1.00	53	
1	1.00	1.00	1.00	66	
2	1.00	1.00	1.00	73	
accuracy			1.00	192	
macro avg	1.00	1.00	1.00	192	
weighted avg	1.00	1.00	1.00	192	



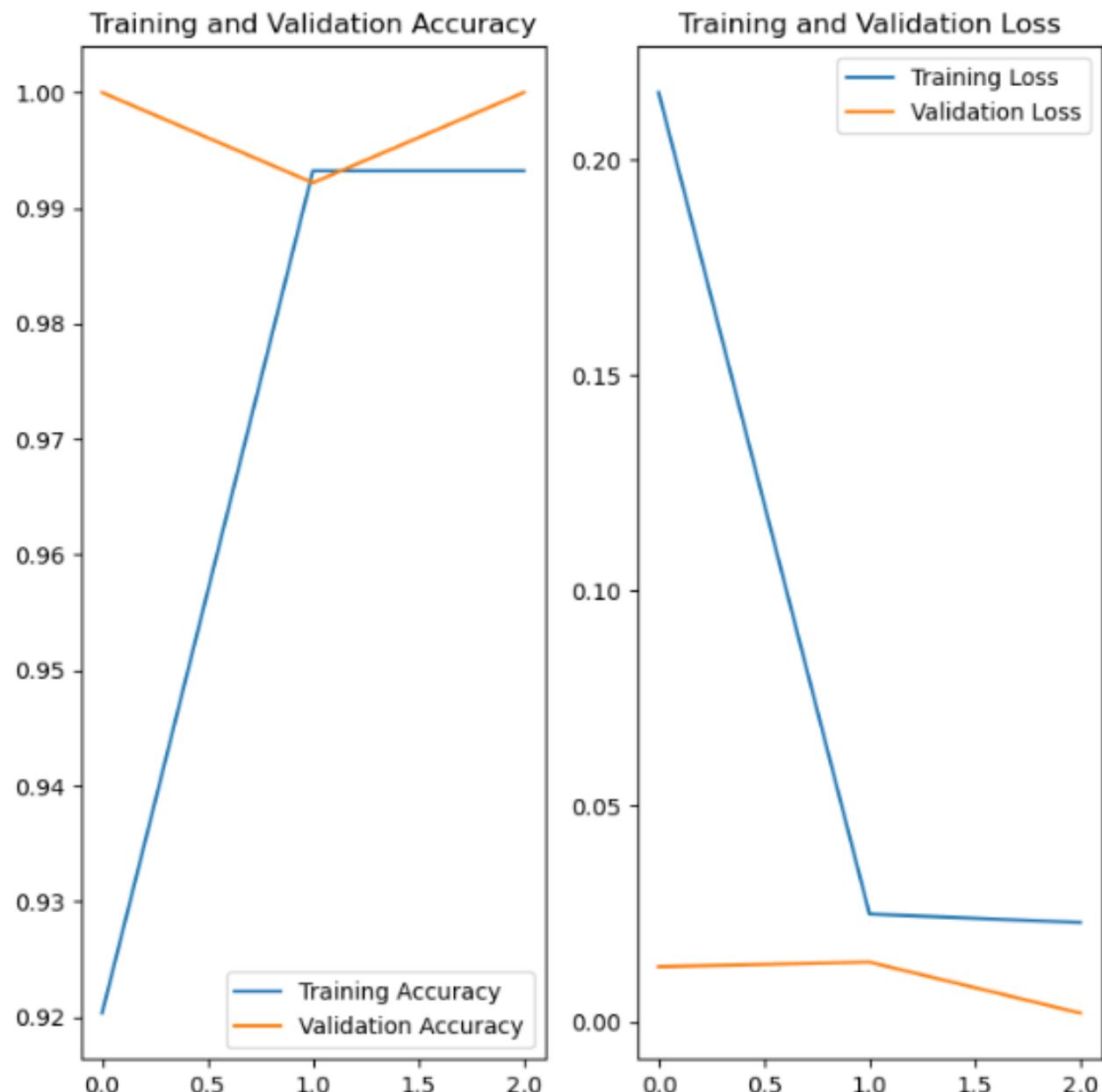
(b) 3

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=3
```

```
scores=model.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 8s 1s/step - loss: 0.0049 - accuracy: 1.0000  
[0.004877329338341951, 1.0]
```

Average Time per Epoch: 70.67 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.78%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 93.05%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.37%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.99%



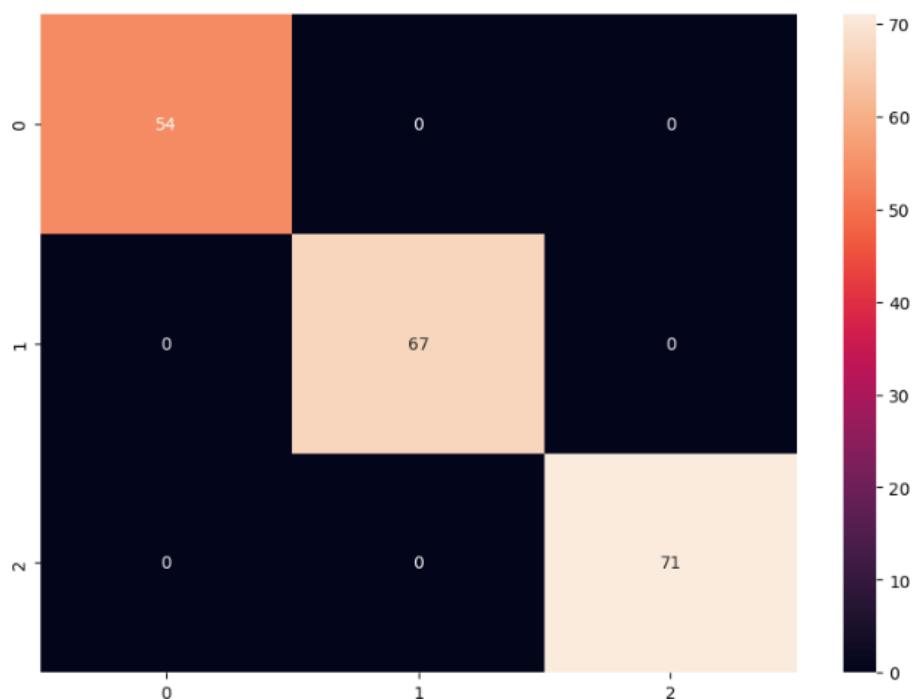
Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Classification Report:					
	precision	recall	f1-score	support	
0	1.00	1.00	1.00	54	
1	1.00	1.00	1.00	67	
2	1.00	1.00	1.00	71	
accuracy			1.00	192	
macro avg	1.00	1.00	1.00	192	
weighted avg	1.00	1.00	1.00	192	



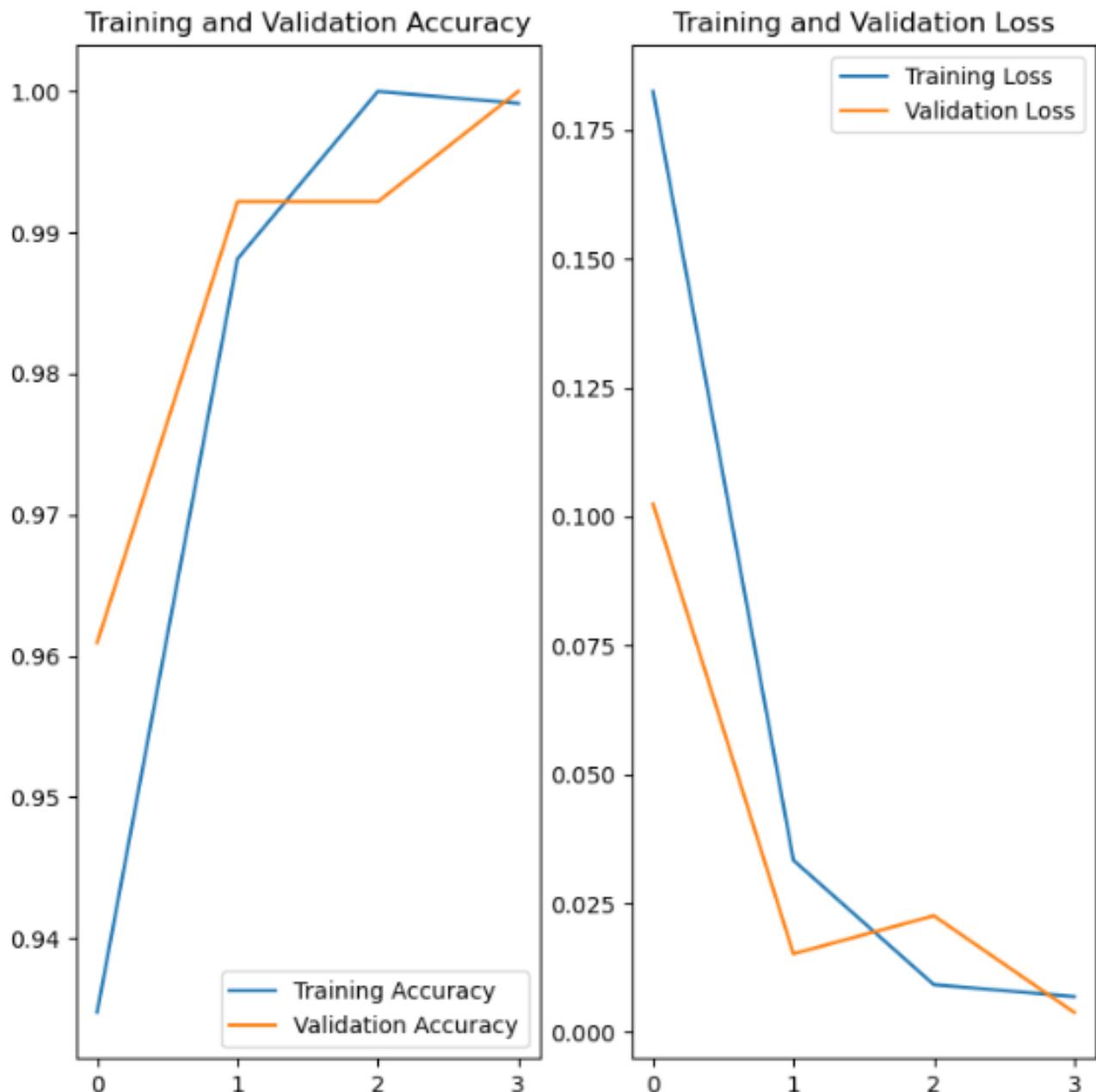
(c) 4

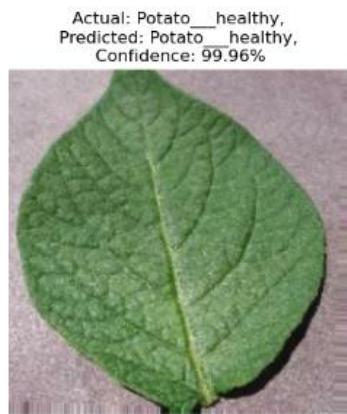
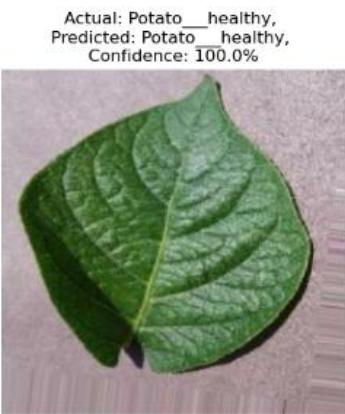
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=4
```

```
scores=model.evaluate(test_ds)  
scores
```

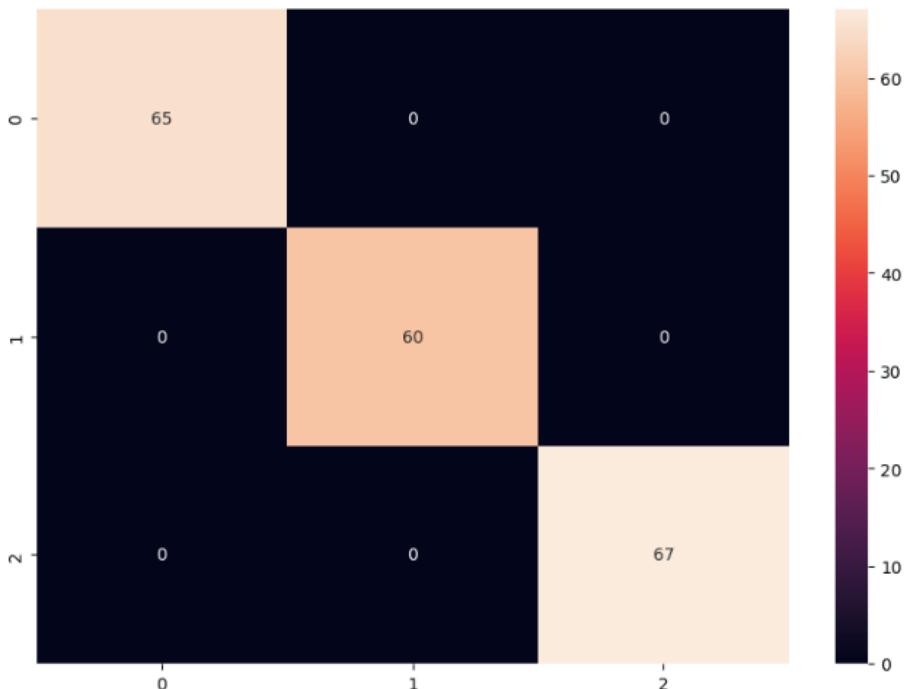
```
6/6 [=====] - 10s 2s/step - loss: 0.0029 - accuracy: 1.0000  
[0.002891202224418521, 1.0]
```

Average Time per Epoch: 71.25 s





Classification Report:					
	precision	recall	f1-score	support	
0	1.00	1.00	1.00	65	
1	1.00	1.00	1.00	60	
2	1.00	1.00	1.00	67	
accuracy			1.00	192	
macro avg	1.00	1.00	1.00	192	
weighted avg	1.00	1.00	1.00	192	



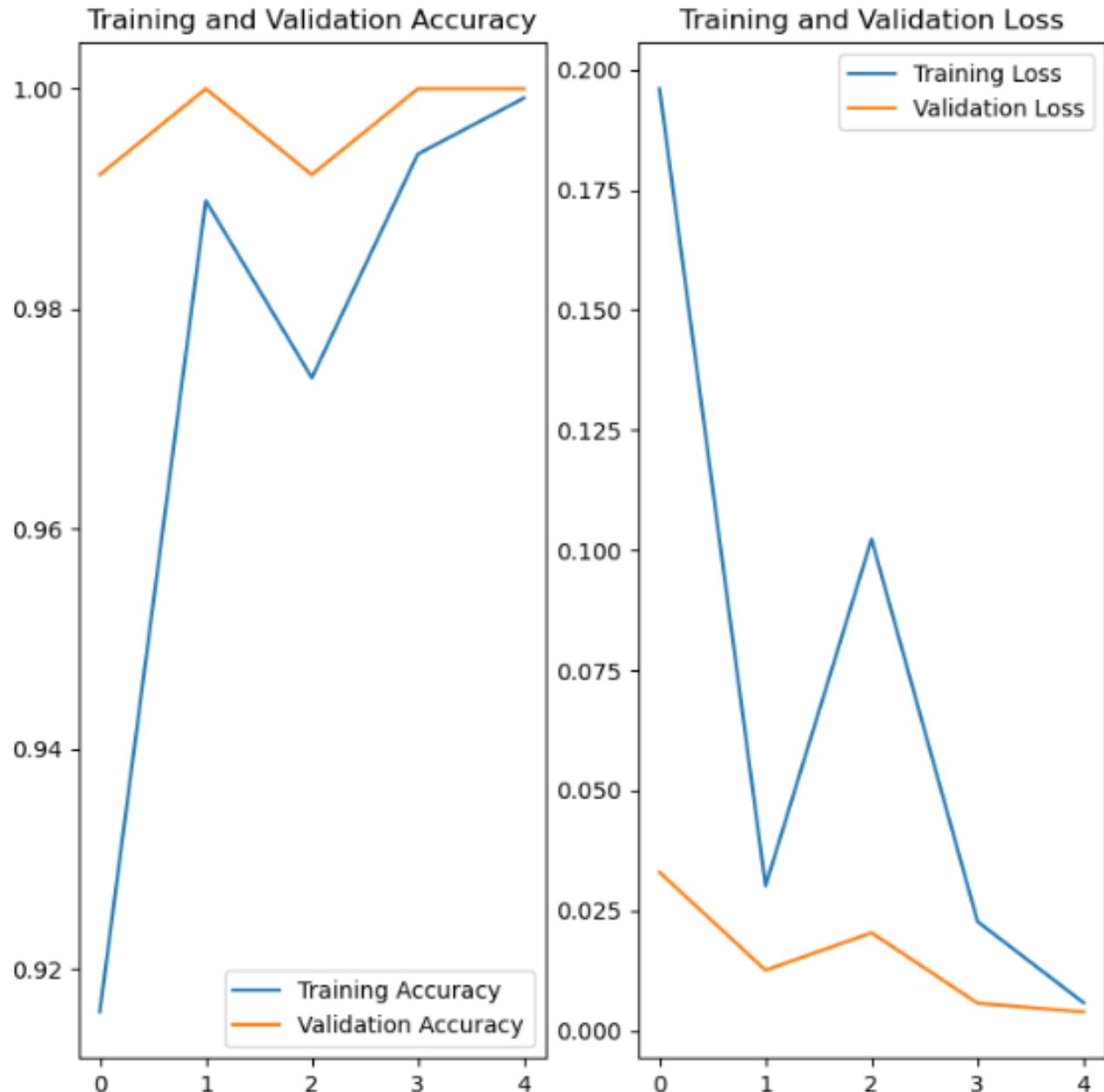
(d) 5

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=5
```

```
scores=model.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 8s 1s/step - loss: 0.0064 - accuracy: 1.0000  
[0.006389376241713762, 1.0]
```

Average Time per Epoch: 69.20 s



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.9%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%

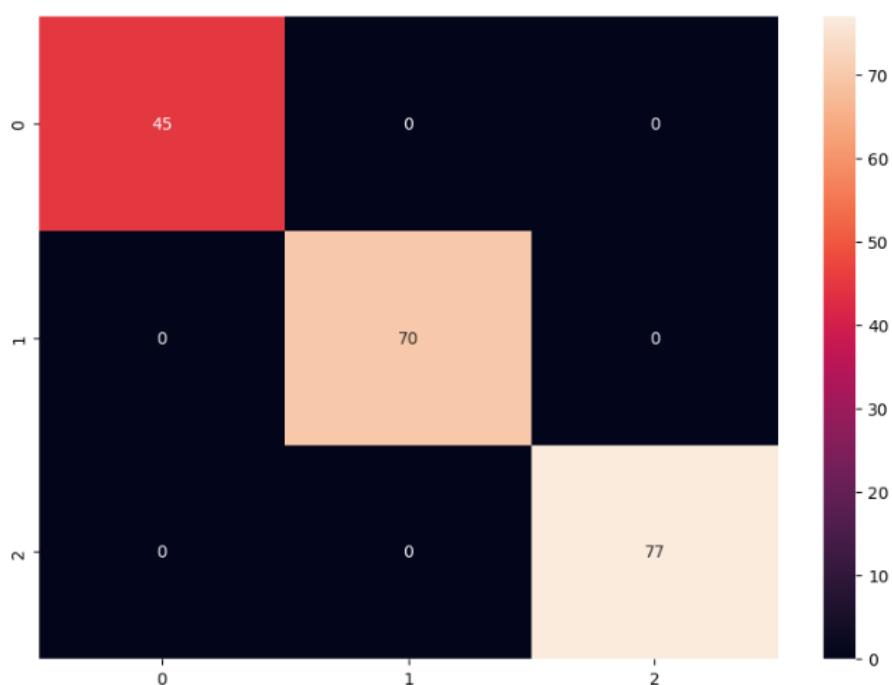


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	1.00	1.00	1.00	45
1	1.00	1.00	1.00	70
2	1.00	1.00	1.00	77
accuracy			1.00	192
macro avg	1.00	1.00	1.00	192
weighted avg	1.00	1.00	1.00	192



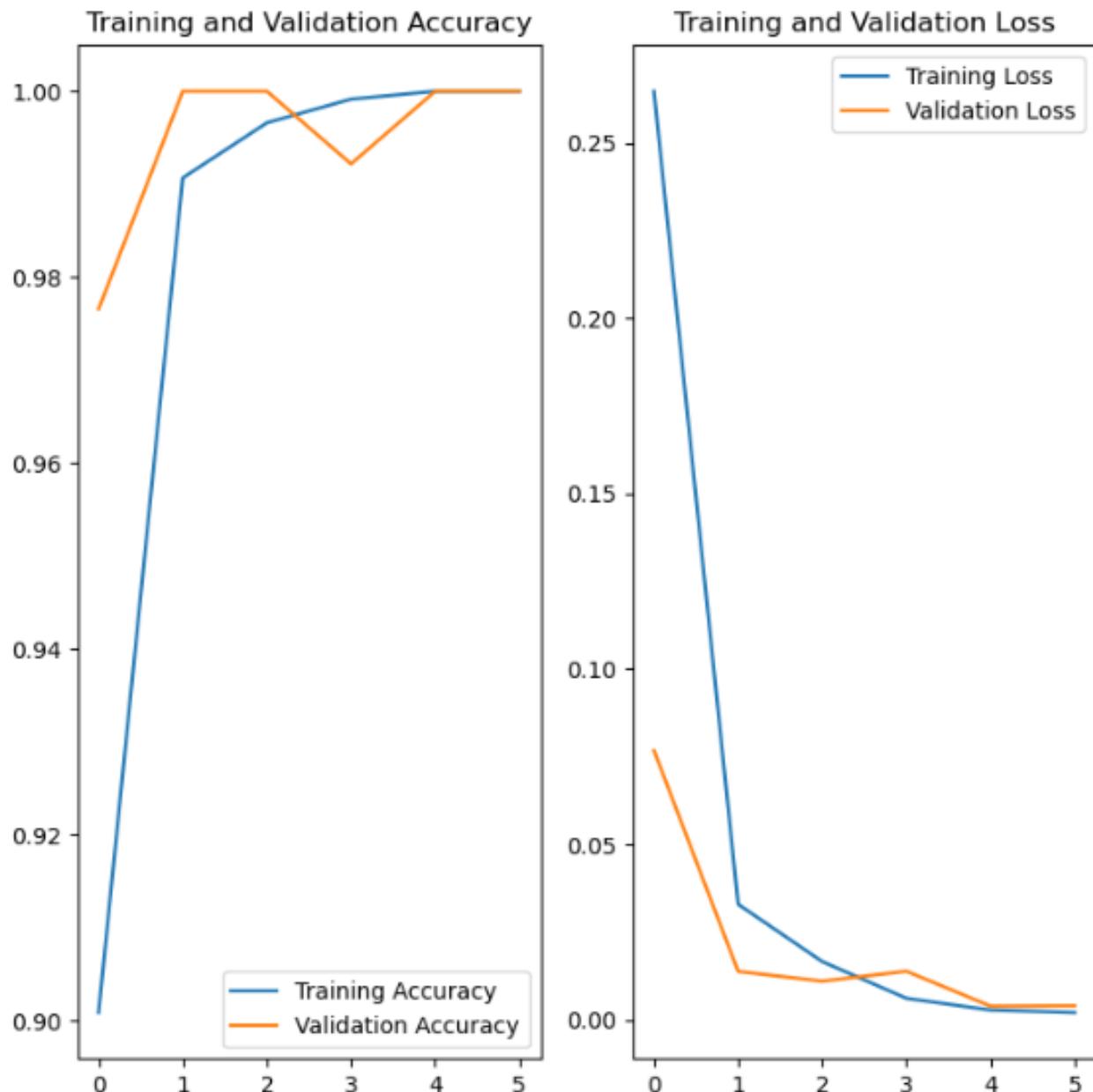
(e) 6

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=6
```

```
scores=model.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 9s 1s/step - loss: 0.0064 - accuracy: 1.0000  
[0.006428112741559744, 1.0]
```

Average Time per Epoch: 70.67 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.98%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.99%

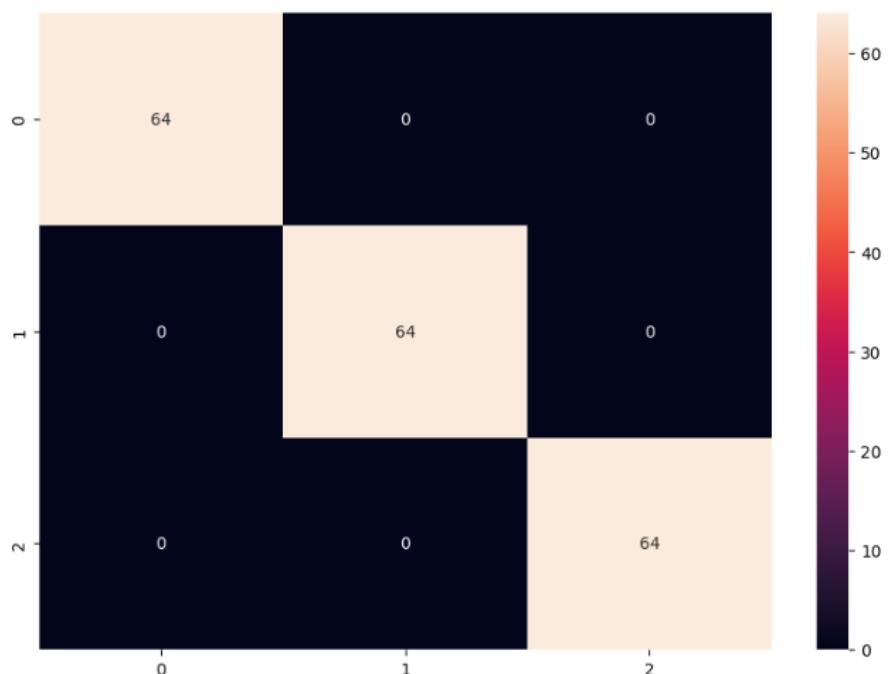


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	1.00	1.00	1.00	64
1	1.00	1.00	1.00	64
2	1.00	1.00	1.00	64
accuracy			1.00	192
macro avg	1.00	1.00	1.00	192
weighted avg	1.00	1.00	1.00	192



BATCH SIZE

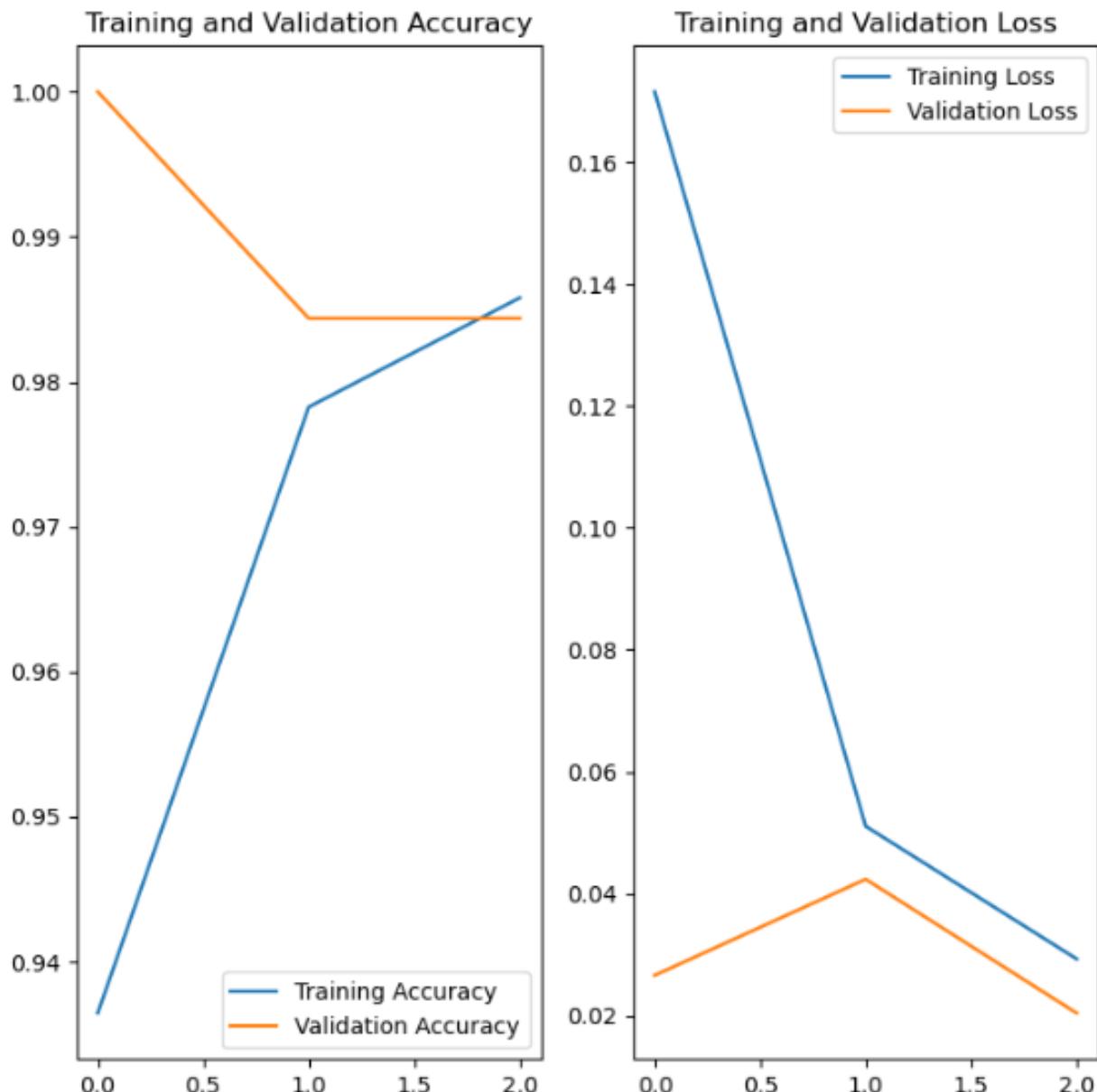
(a) 16

```
IMAGE_SIZE=224  
BATCH_SIZE=16  
CHANNELS=3  
EPOCHS=3
```

```
scores=model.evaluate(test_ds)  
scores
```

```
10/10 [=====] - 8s 703ms/step - loss: 0.0421 - accuracy: 0.9812  
[0.0420585460960865, 0.981249988079071]
```

Average Time per Epoch: 69.00 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.79%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



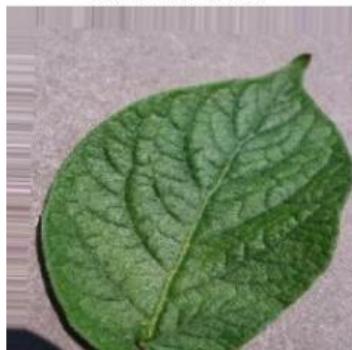
Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%

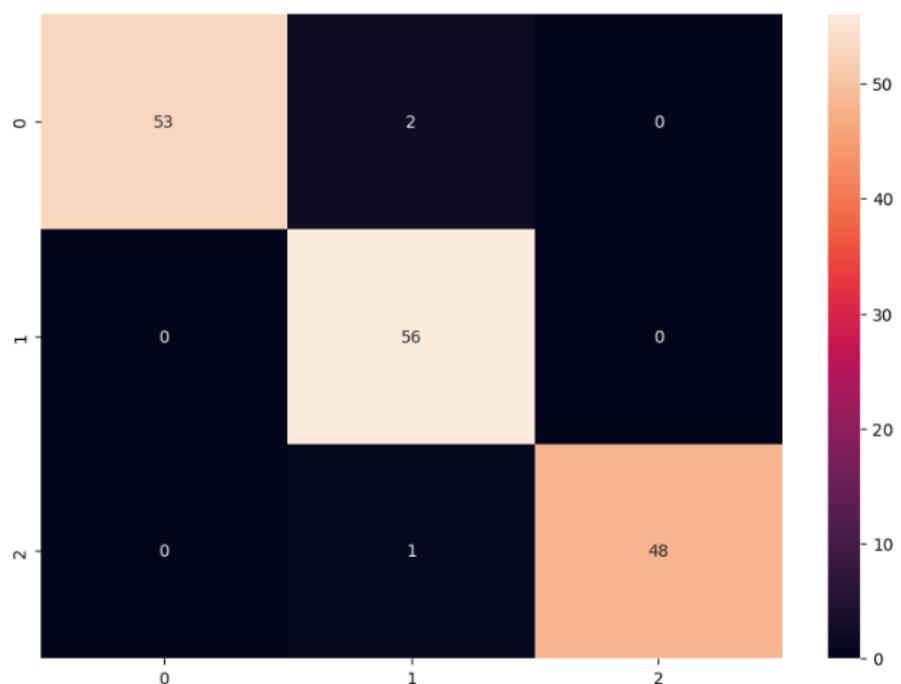


Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	1.00	0.96	0.98	55
1	0.95	1.00	0.97	56
2	1.00	0.98	0.99	49
accuracy			0.98	160
macro avg	0.98	0.98	0.98	160
weighted avg	0.98	0.98	0.98	160

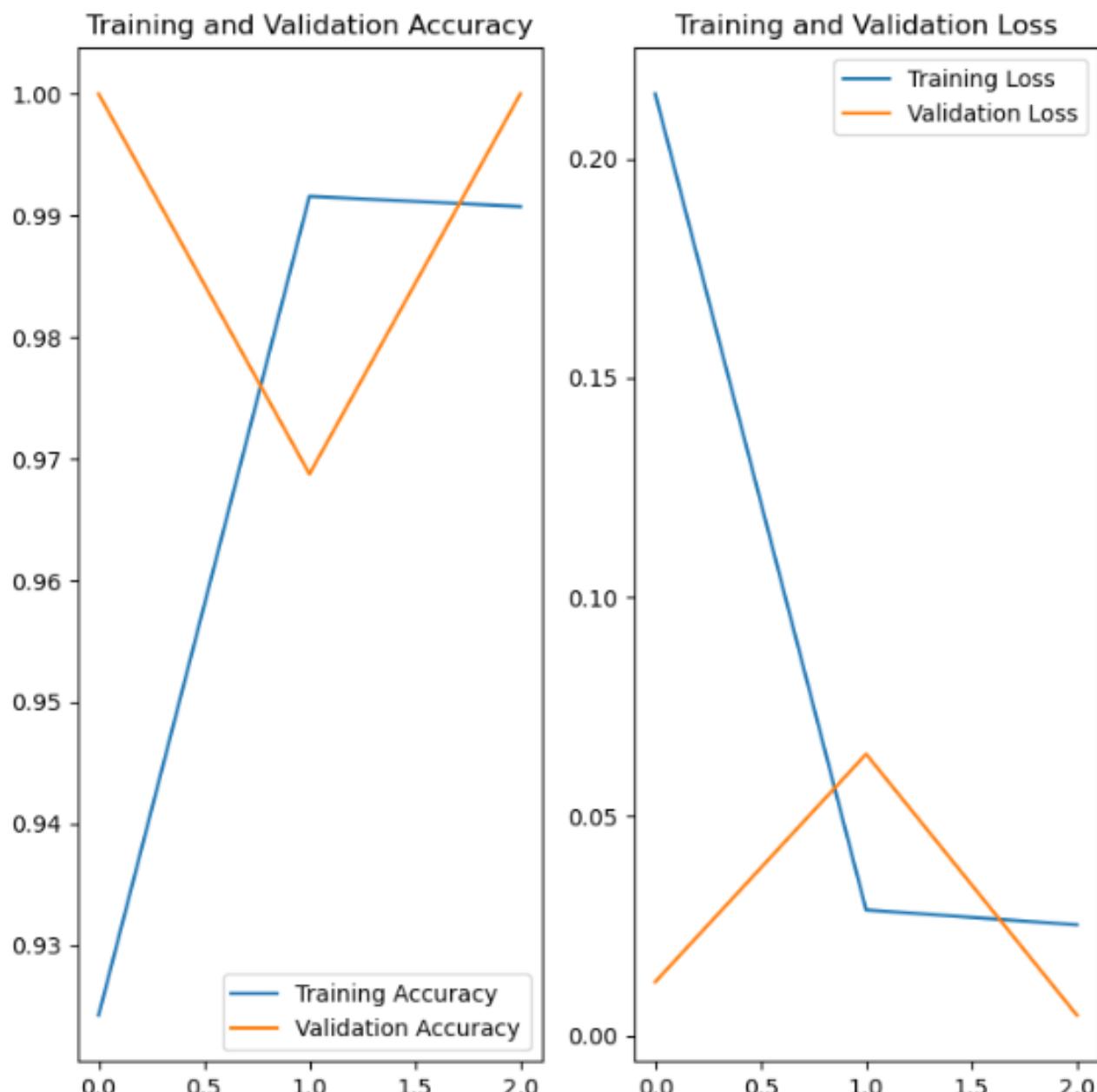


(b) 24

```
IMAGE_SIZE=224  
BATCH_SIZE=24  
CHANNELS=3  
EPOCHS=3
```

```
scores=model.evaluate(test_ds)  
scores  
  
7/7 [=====] - 9s 1s/step - loss: 0.0056 - accuracy: 1.0000  
[0.005552625749260187, 1.0]
```

Average Time per Epoch: 70.00 s



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 98.07%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.79%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.99%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.99%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 94.14%

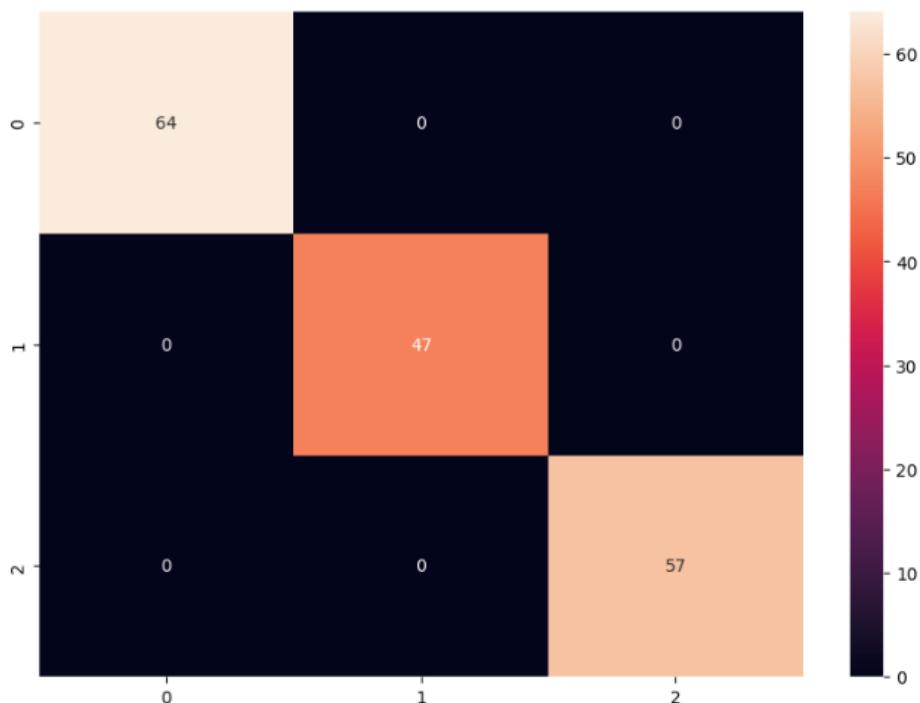


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 98.69%



Classification Report:

	precision	recall	f1-score	support
0	1.00	1.00	1.00	64
1	1.00	1.00	1.00	47
2	1.00	1.00	1.00	57
accuracy			1.00	168
macro avg	1.00	1.00	1.00	168
weighted avg	1.00	1.00	1.00	168



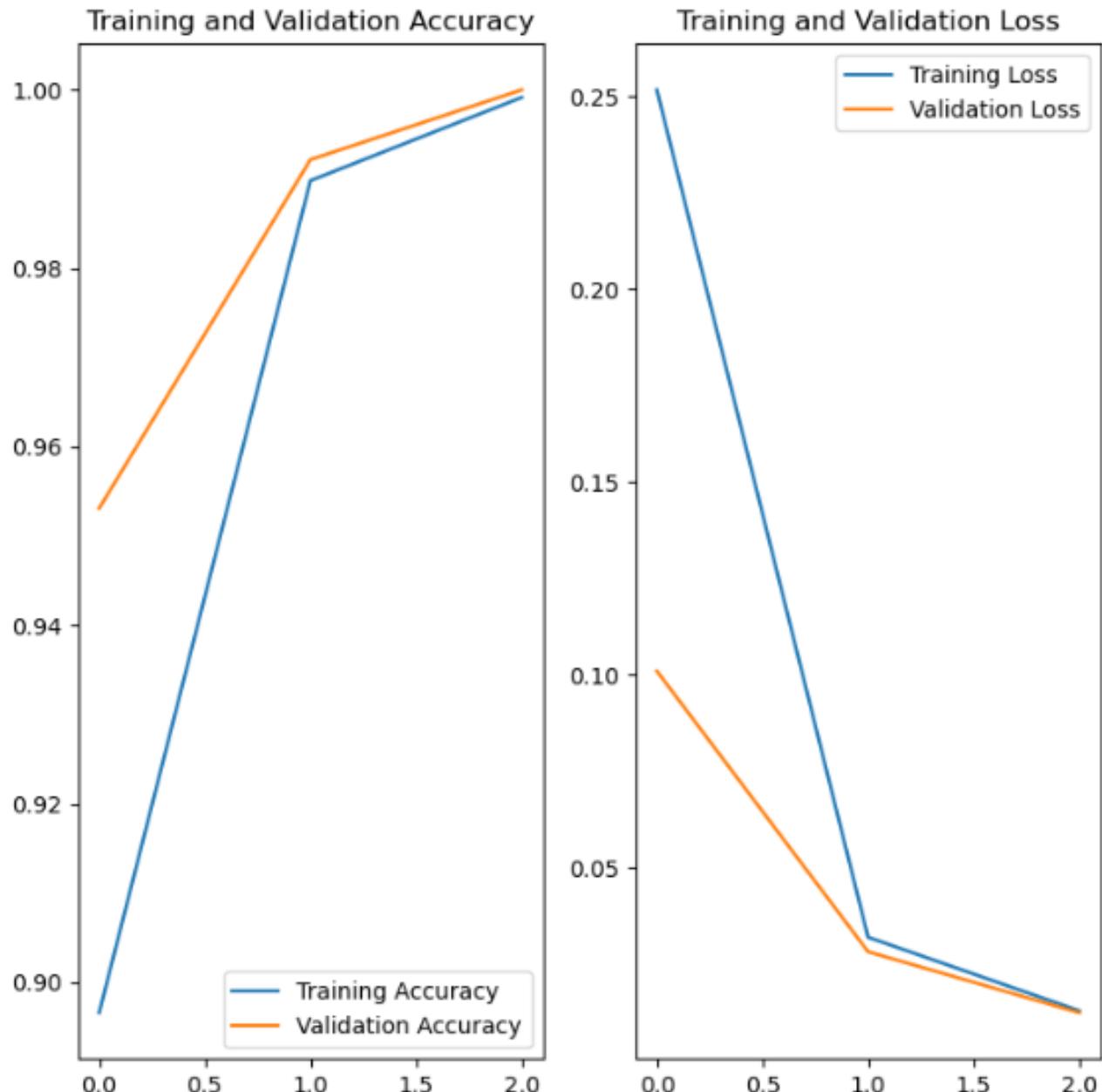
(c) 32

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=3
```

```
scores=model.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 11s 2s/step - loss: 0.0076 - accuracy: 1.0000  
[0.00757090887054801, 1.0]
```

Average Time per Epoch: 73.00 s



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.98%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.99%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



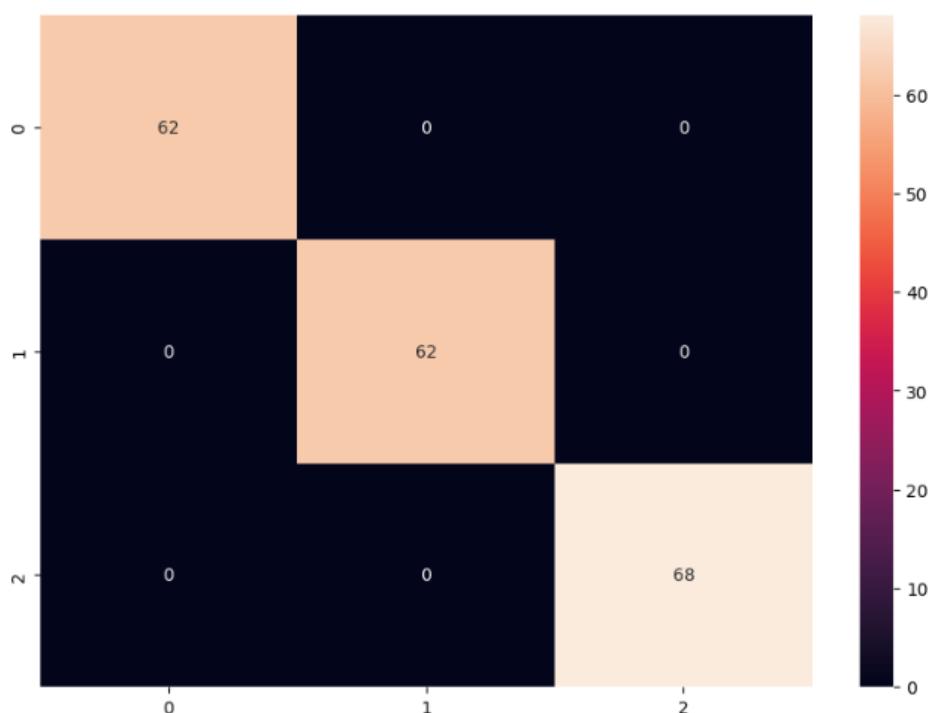
Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Classification Report:					
	precision	recall	f1-score	support	
0	1.00	1.00	1.00	62	
1	1.00	1.00	1.00	62	
2	1.00	1.00	1.00	68	
accuracy			1.00	192	
macro avg	1.00	1.00	1.00	192	
weighted avg	1.00	1.00	1.00	192	



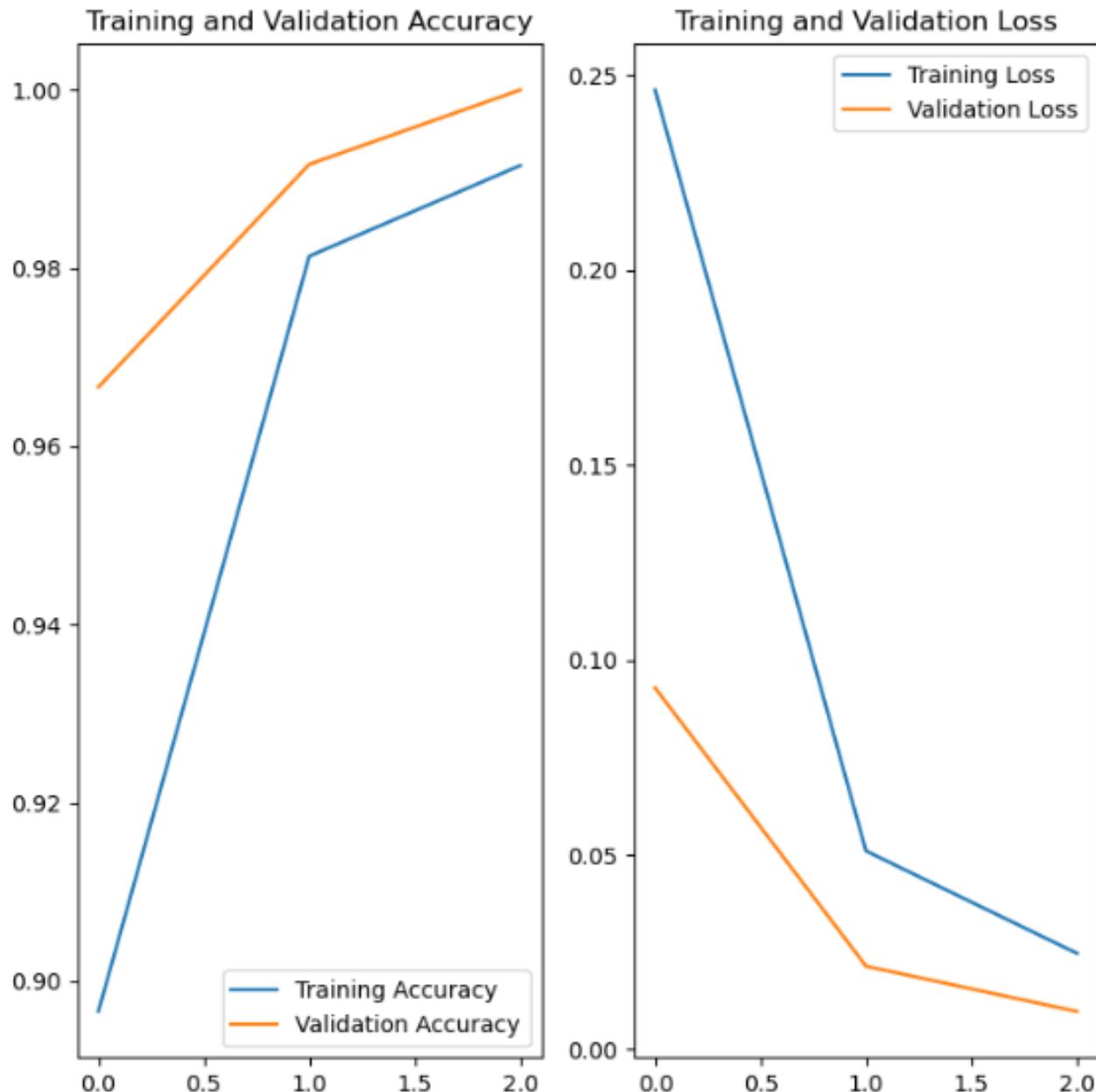
(d) 40

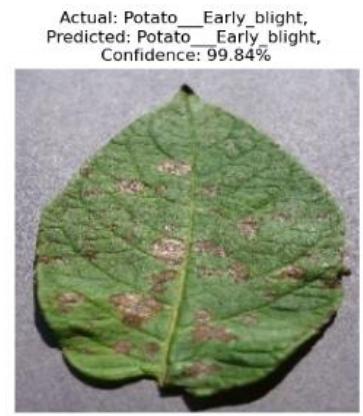
```
IMAGE_SIZE=224  
BATCH_SIZE=40  
CHANNELS=3  
EPOCHS=3
```

```
scores=model.evaluate(test_ds)  
scores
```

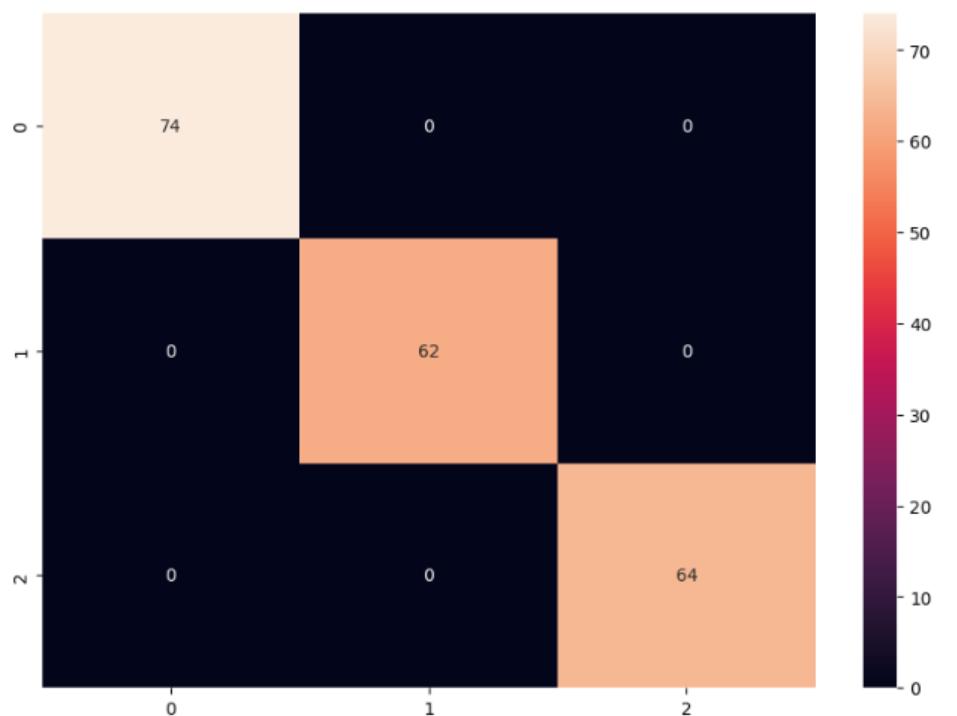
```
5/5 [=====] - 9s 2s/step - loss: 0.0141 - accuracy: 1.0000  
[0.01411223690956831, 1.0]
```

Average Time per Epoch: 71.33 s





Classification Report:					
	precision	recall	f1-score	support	
0	1.00	1.00	1.00	74	
1	1.00	1.00	1.00	62	
2	1.00	1.00	1.00	64	
accuracy			1.00	200	
macro avg	1.00	1.00	1.00	200	
weighted avg	1.00	1.00	1.00	200	



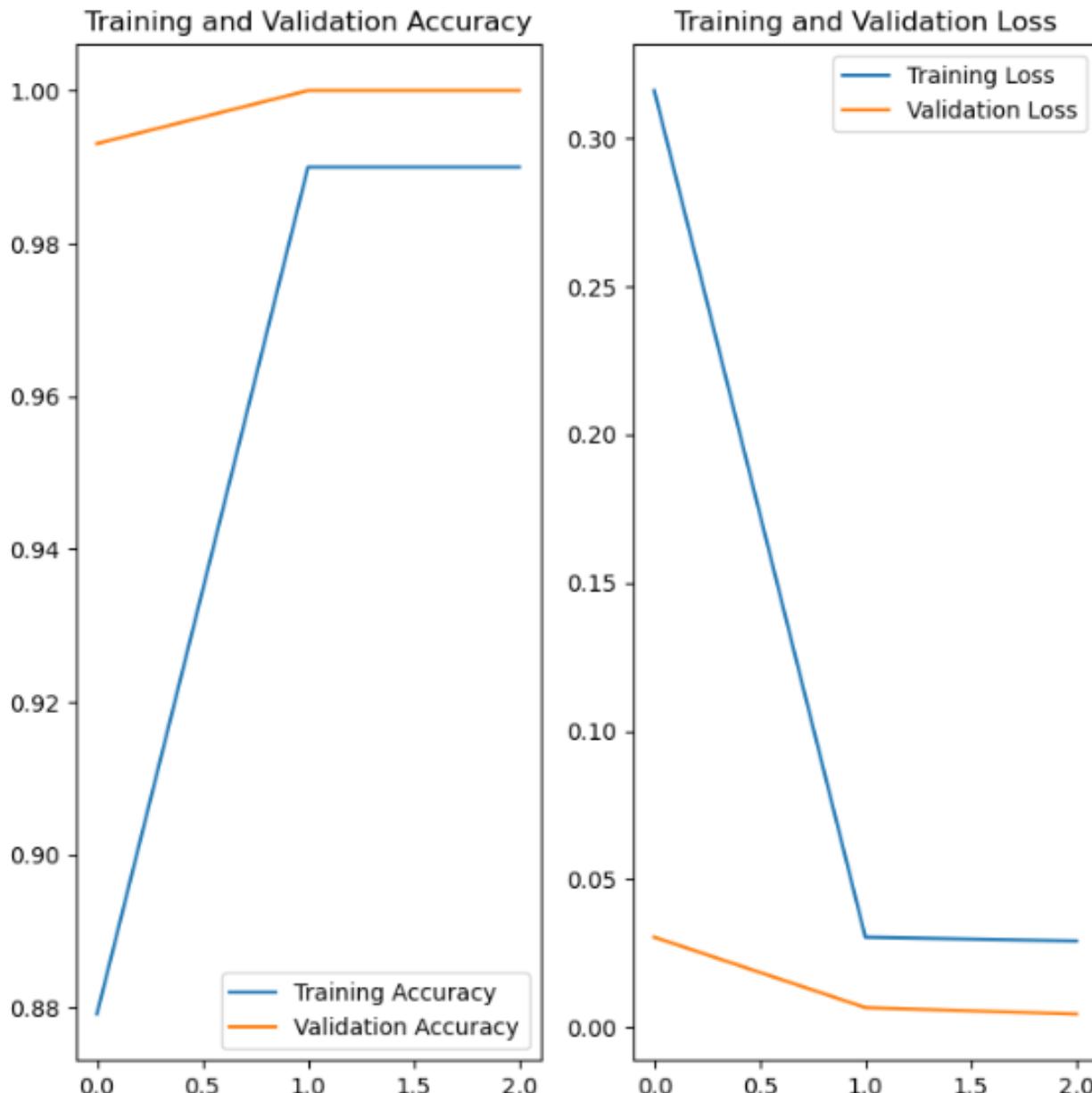
(e) 48

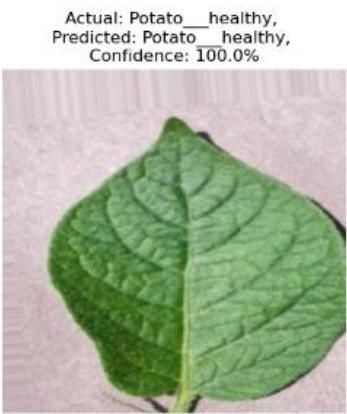
```
IMAGE_SIZE=224  
BATCH_SIZE=48  
CHANNELS=3  
EPOCHS=3
```

```
scores=model.evaluate(test_ds)  
scores
```

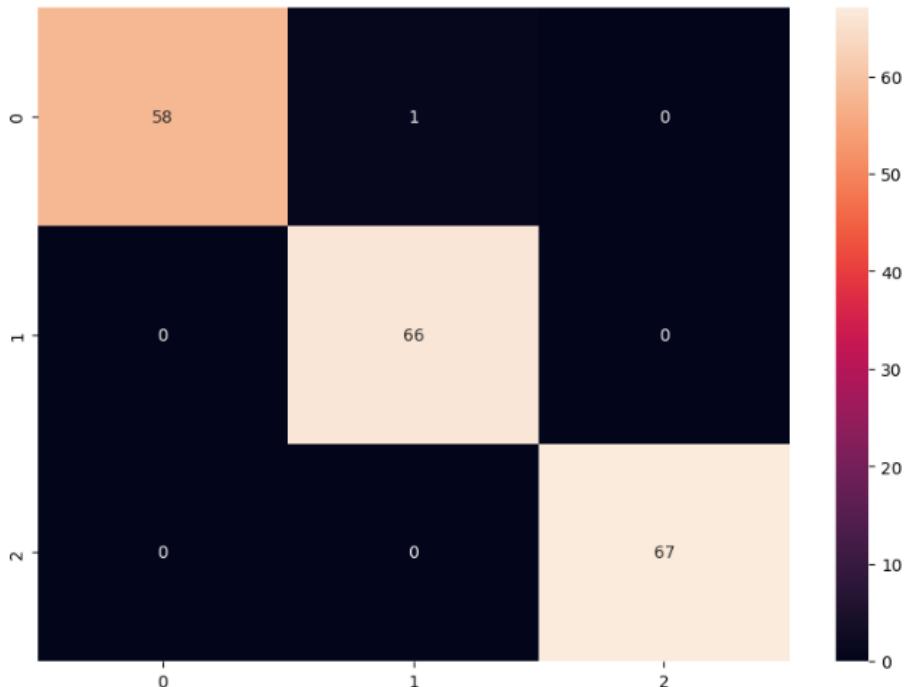
```
4/4 [=====] - 10s 2s/step - loss: 0.0179 - accuracy: 0.9948  
[0.01791291870176792, 0.9947916865348816]
```

Average Time per Epoch: 71.67 s





Classification Report:					
	precision	recall	f1-score	support	
0	1.00	0.98	0.99	59	
1	0.99	1.00	0.99	66	
2	1.00	1.00	1.00	67	
accuracy			0.99	192	
macro avg	1.00	0.99	0.99	192	
weighted avg	0.99	0.99	0.99	192	



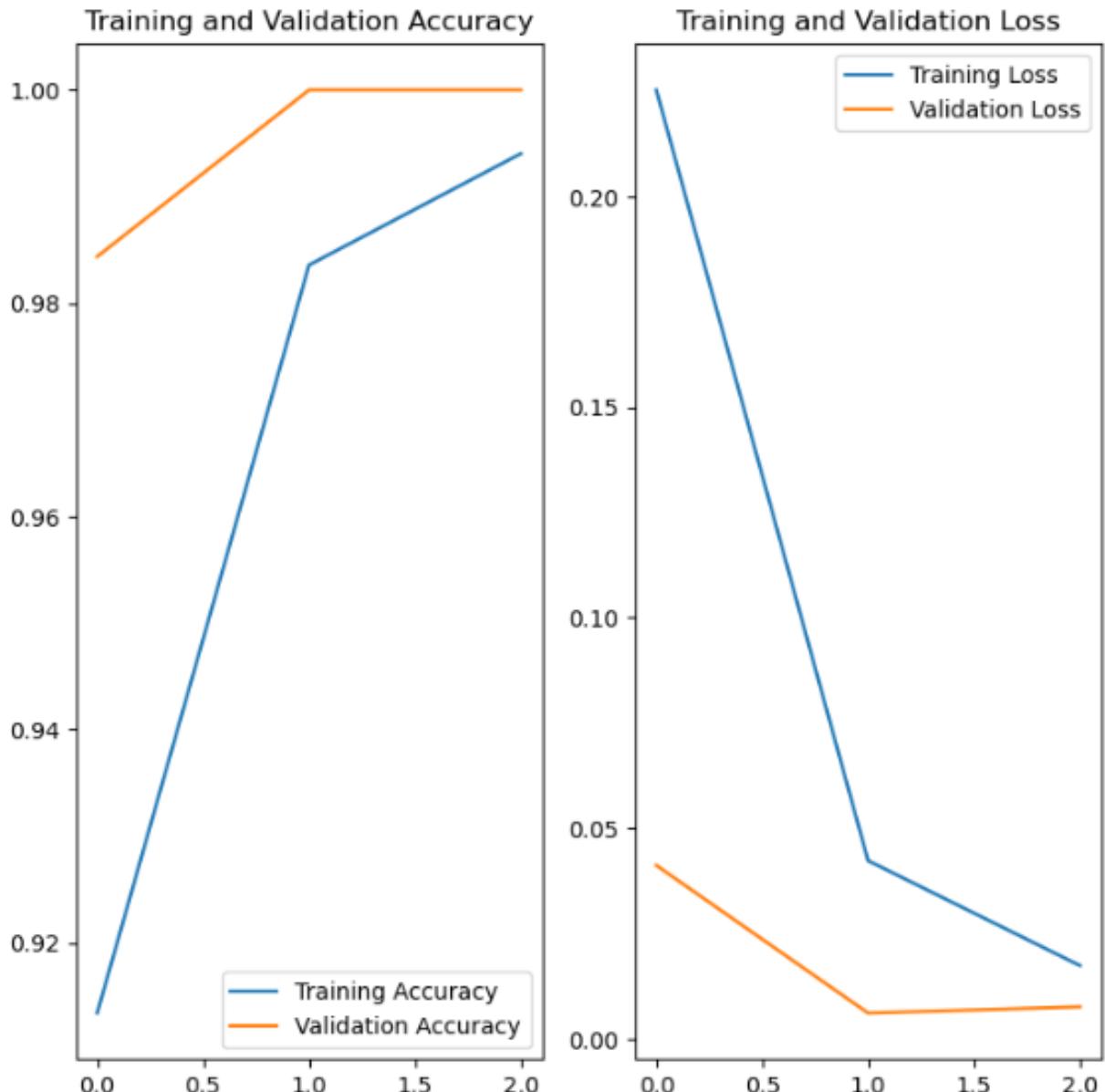
DATASET SPLIT RATIO

(a) 90:5:5

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=3
```

```
scores=model.evaluate(test_ds)  
scores  
  
3/3 [=====] - 5s 1s/step - loss: 0.0444 - accuracy: 0.9792  
[0.044393133372068405, 0.9791666865348816]
```

Average Time per Epoch: 85.67 s



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 98.55%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.96%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.97%

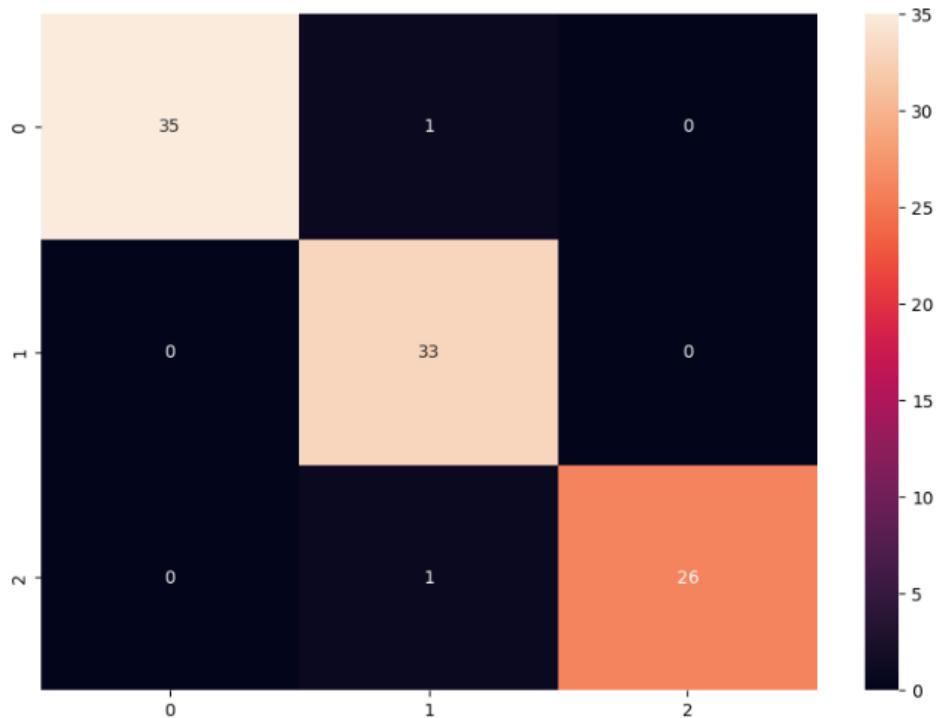


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	1.00	0.97	0.99	36
1	0.94	1.00	0.97	33
2	1.00	0.96	0.98	27
accuracy			0.98	96
macro avg	0.98	0.98	0.98	96
weighted avg	0.98	0.98	0.98	96

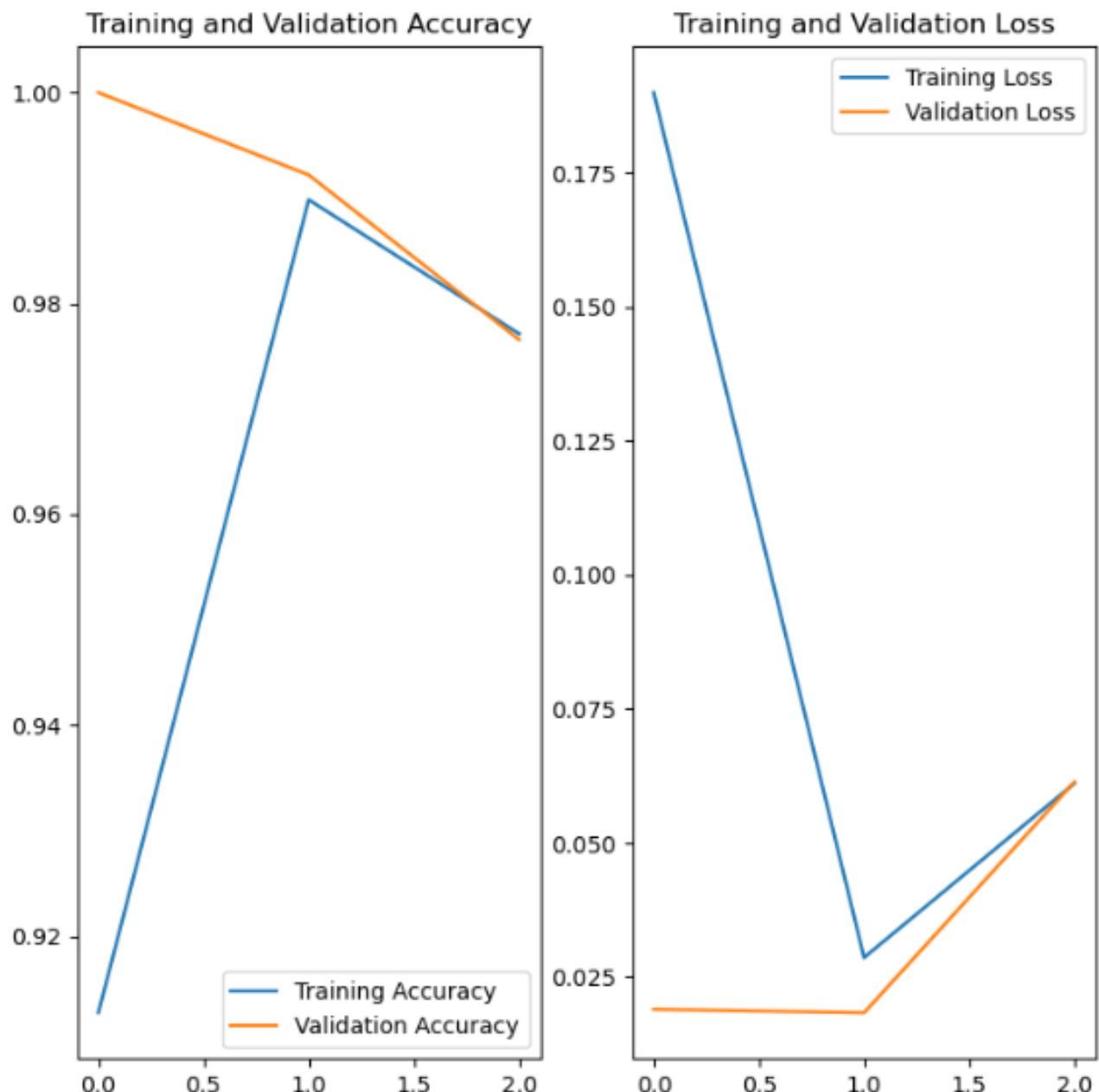


(b) 80:10:10

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=3
```

```
scores=model.evaluate(test_ds)  
scores  
  
6/6 [=====] - 8s 1s/step - loss: 0.0427 - accuracy: 0.9792  
[0.04270945489406586, 0.9791666865348816]
```

Average Time per Epoch: 78.33 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.99%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.94%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.99%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%

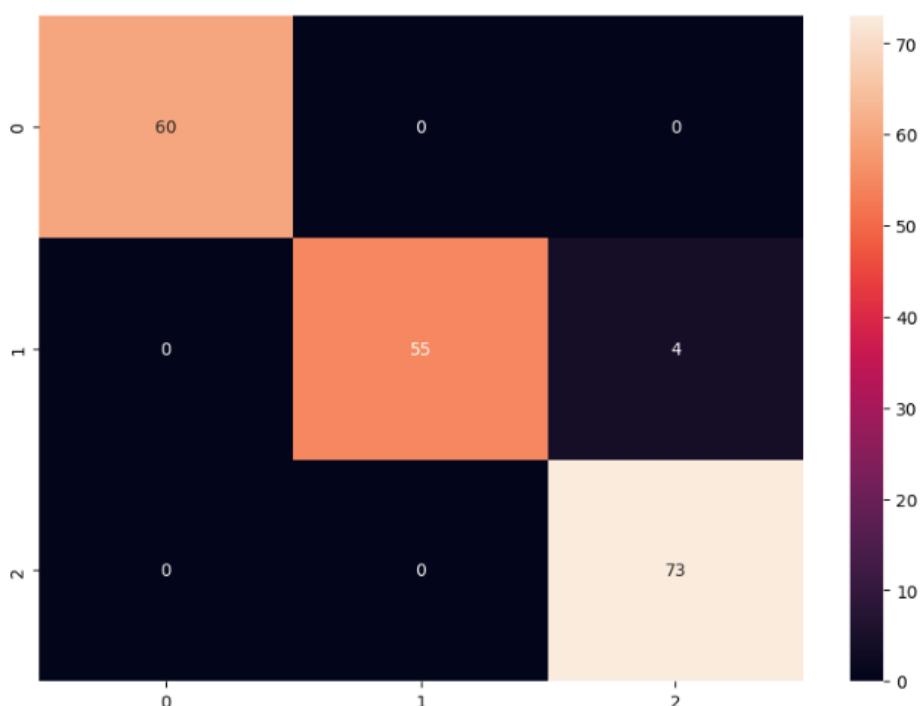


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	1.00	1.00	1.00	60
1	1.00	0.93	0.96	59
2	0.95	1.00	0.97	73
accuracy			0.98	192
macro avg	0.98	0.98	0.98	192
weighted avg	0.98	0.98	0.98	192



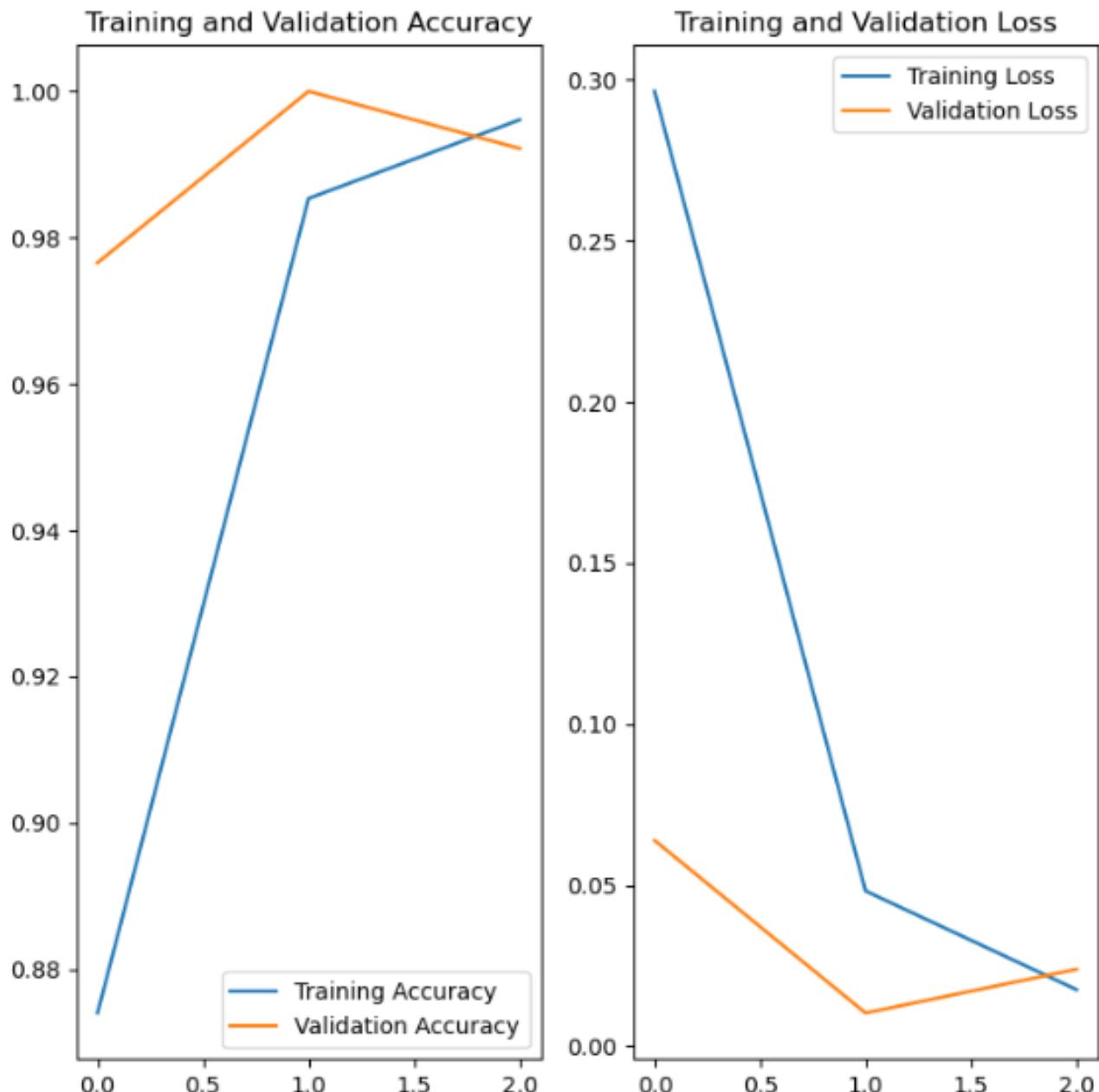
(c) 70:15:15

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=3
```

```
scores=model.evaluate(test_ds)  
scores
```

```
8/8 [=====] - 12s 1s/step - loss: 0.0144 - accuracy: 0.9961  
[0.014409877359867096, 0.99609375]
```

Average Time per Epoch: 71.00 s



Actual: Potato_Early_blight,
Predicted: Potato_Early blight,
Confidence: 99.97%



Actual: Potato_healthy,
Predicted: Potato_ healthy,
Confidence: 100.0%



Actual: Potato_ healthy,
Predicted: Potato_ healthy,
Confidence: 100.0%



Actual: Potato_ healthy,
Predicted: Potato_ healthy,
Confidence: 99.93%



Actual: Potato_Late_blight,
Predicted: Potato_Late blight,
Confidence: 99.92%

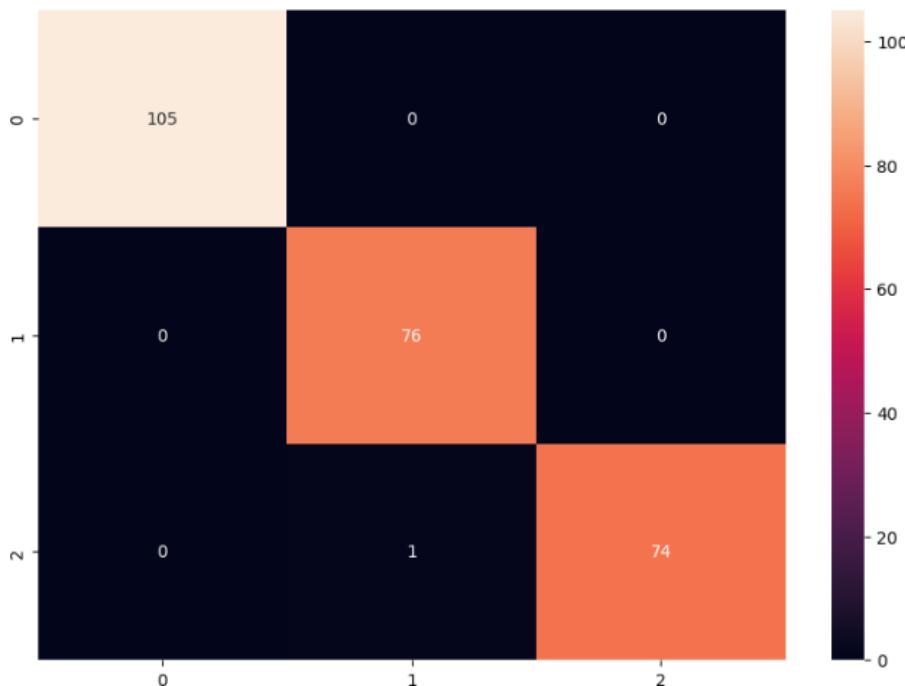


Actual: Potato_Early_blight,
Predicted: Potato_Early blight,
Confidence: 99.98%



Classification Report:

	precision	recall	f1-score	support
0	1.00	1.00	1.00	105
1	0.99	1.00	0.99	76
2	1.00	0.99	0.99	75
accuracy			1.00	256
macro avg	1.00	1.00	1.00	256
weighted avg	1.00	1.00	1.00	256



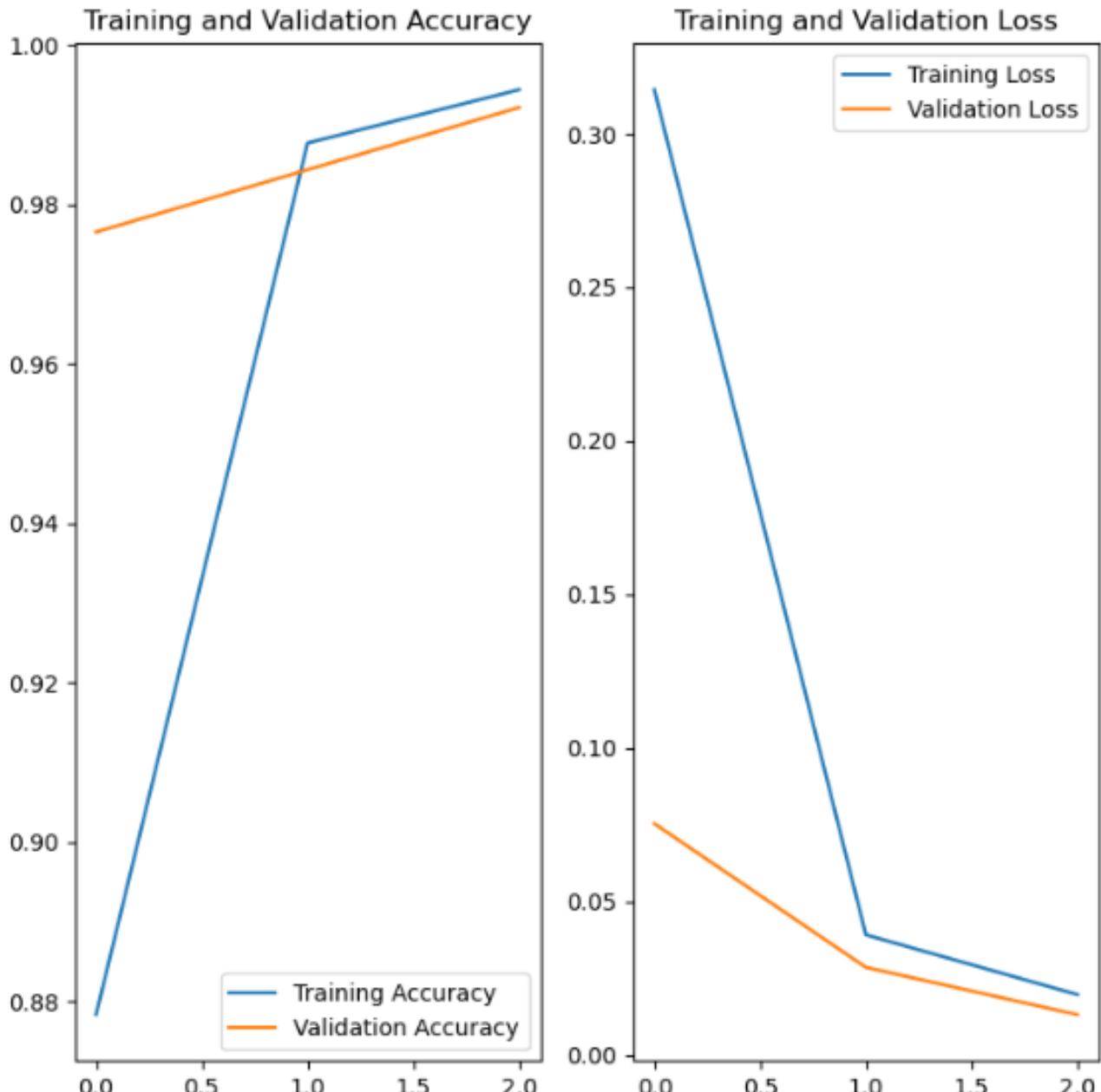
(d) 60:20:20

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=3
```

```
scores=model.evaluate(test_ds)  
scores
```

```
10/10 [=====] - 17s 2s/step - loss: 0.0173 - accuracy: 0.9937  
[0.017272980883717537, 0.9937499761581421]
```

Average Time per Epoch: 62.33 s



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 87.12%

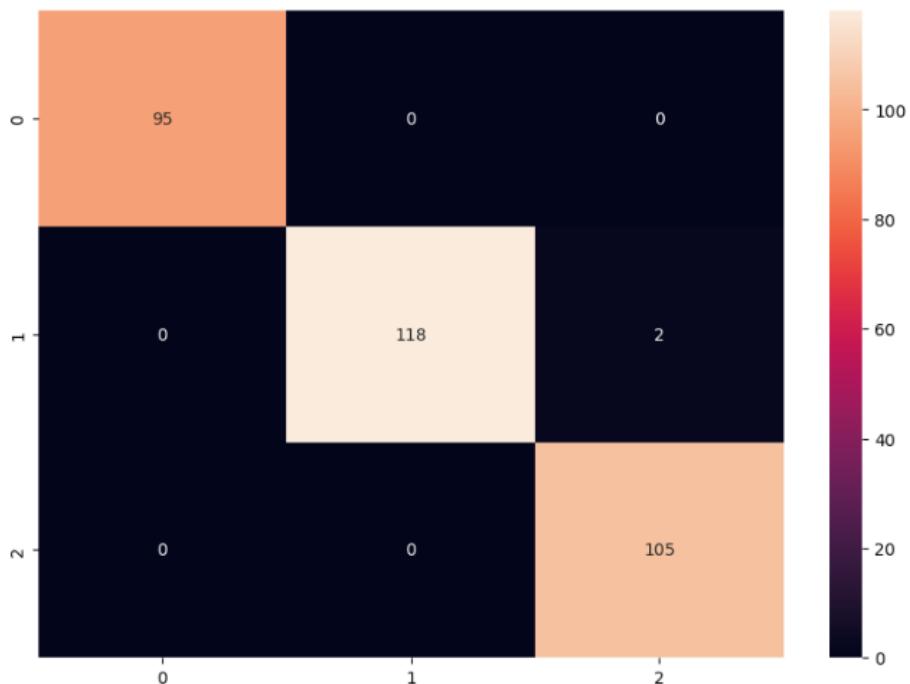


Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.83%



Classification Report:

	precision	recall	f1-score	support
0	1.00	1.00	1.00	95
1	1.00	0.98	0.99	120
2	0.98	1.00	0.99	105
accuracy			0.99	320
macro avg	0.99	0.99	0.99	320
weighted avg	0.99	0.99	0.99	320



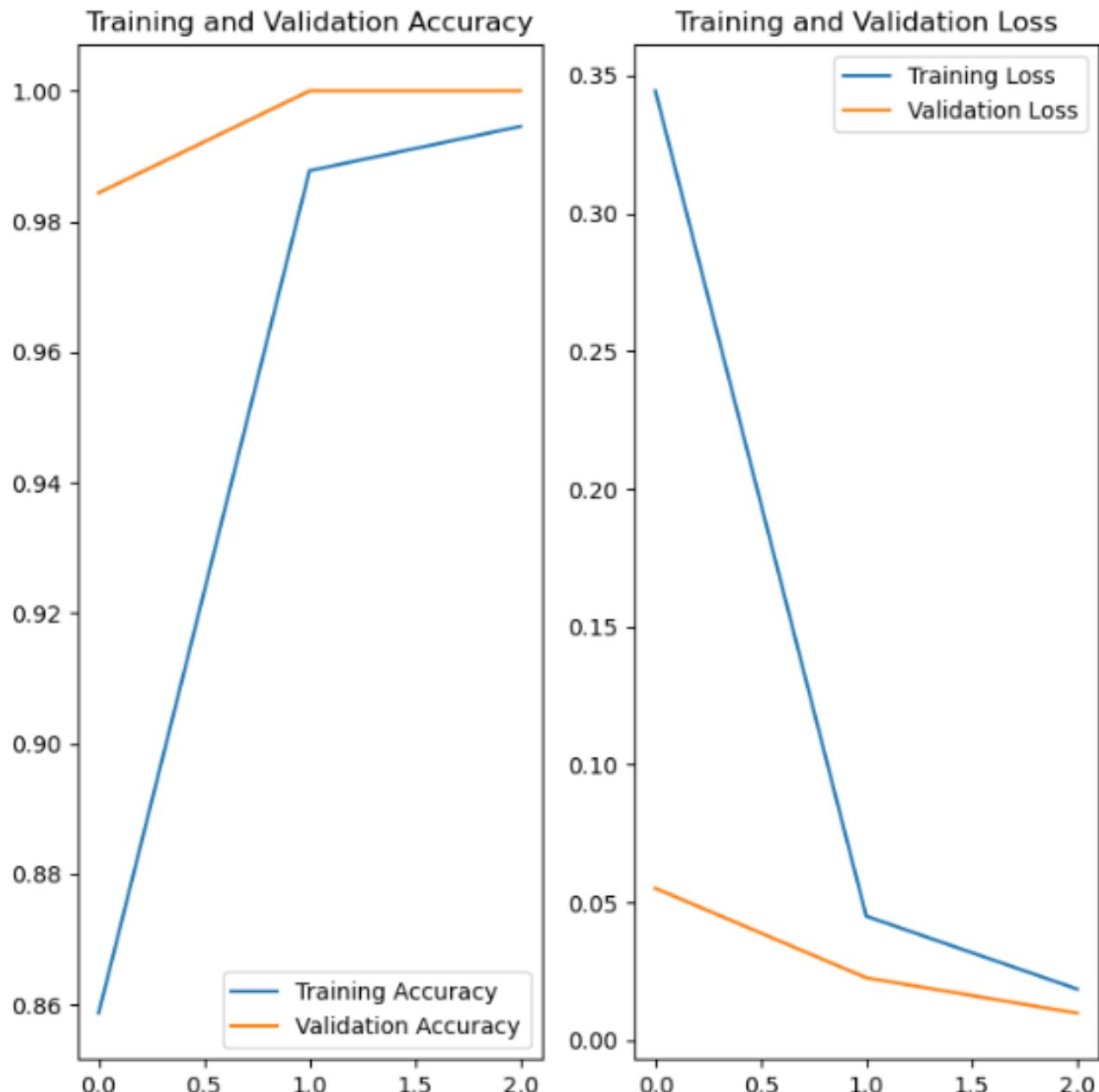
(e) 50:25:25

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=3
```

```
scores=model.evaluate(test_ds)  
scores
```

```
13/13 [=====] - 22s 2s/step - loss: 0.0417 - accuracy: 0.9854  
[0.04167511314153671, 0.9854369163513184]
```

Average Time per Epoch: 48.67 s



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.95%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 98.91%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 97.77%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.83%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 97.55%

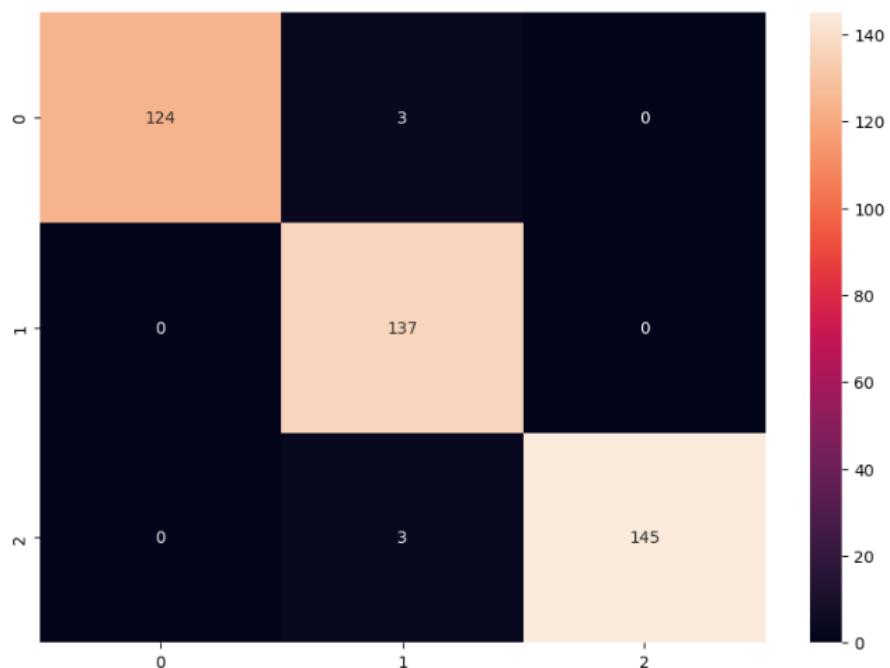


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	1.00	0.98	0.99	127
1	0.96	1.00	0.98	137
2	1.00	0.98	0.99	148
accuracy			0.99	412
macro avg	0.99	0.99	0.99	412
weighted avg	0.99	0.99	0.99	412



Model 3: VGG16

BASE MODEL

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=3
```

```
scores=model_from_vgg16.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 22s 4s/step - loss: 0.0016 - accuracy: 1.0000  
[0.0016248138854280114, 1.0]
```

Average Time per Epoch: 174.00 s

```
history2.history['loss']
```

```
[7.628593444824219, 0.7219506502151489, 0.13680094480514526]
```

```
history2.history['accuracy']
```

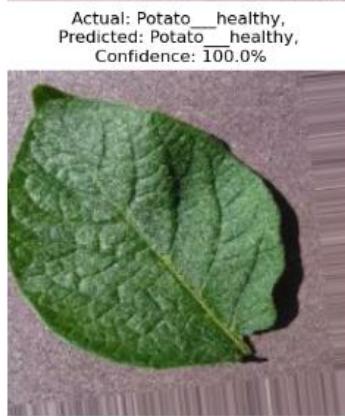
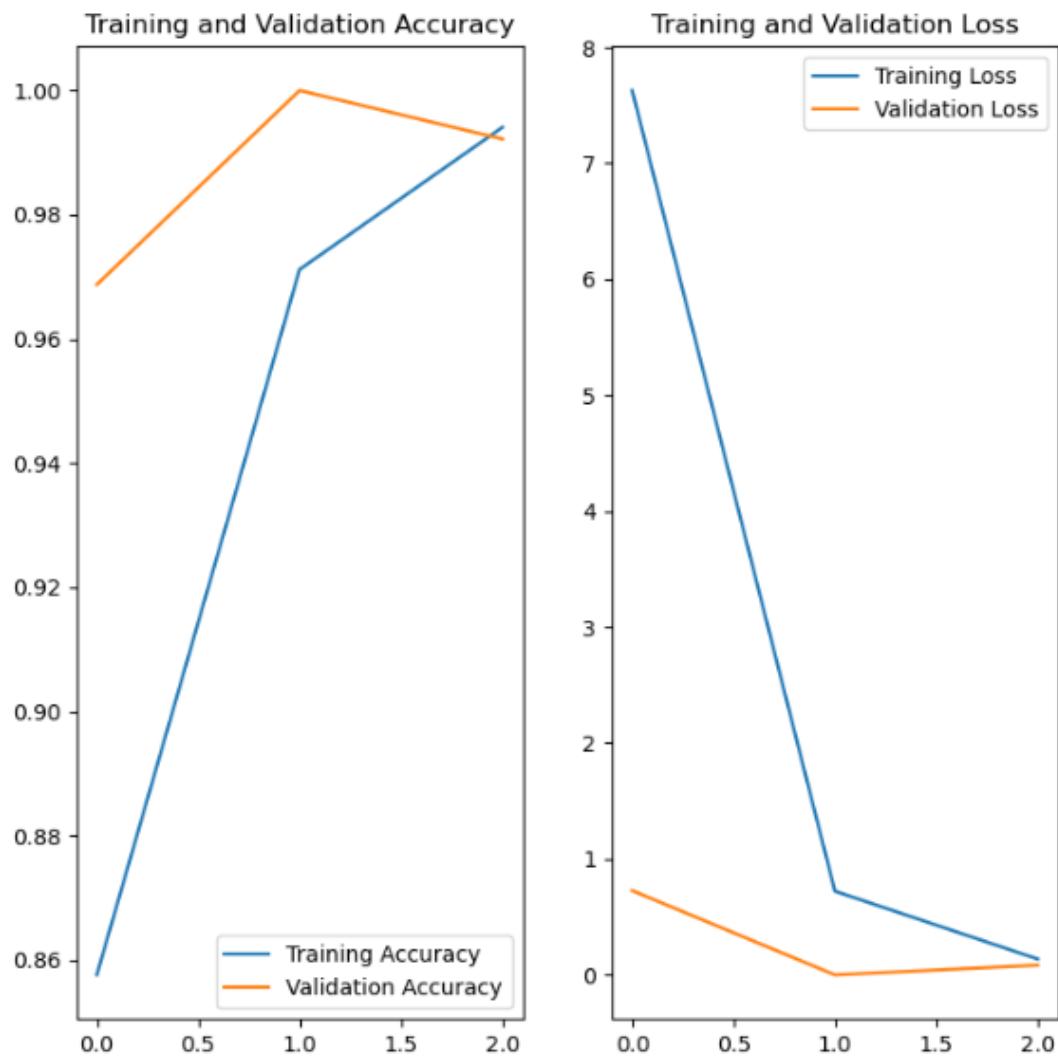
```
[0.8576270937919617, 0.9711864590644836, 0.9940677881240845]
```

```
history2.history['val_loss']
```

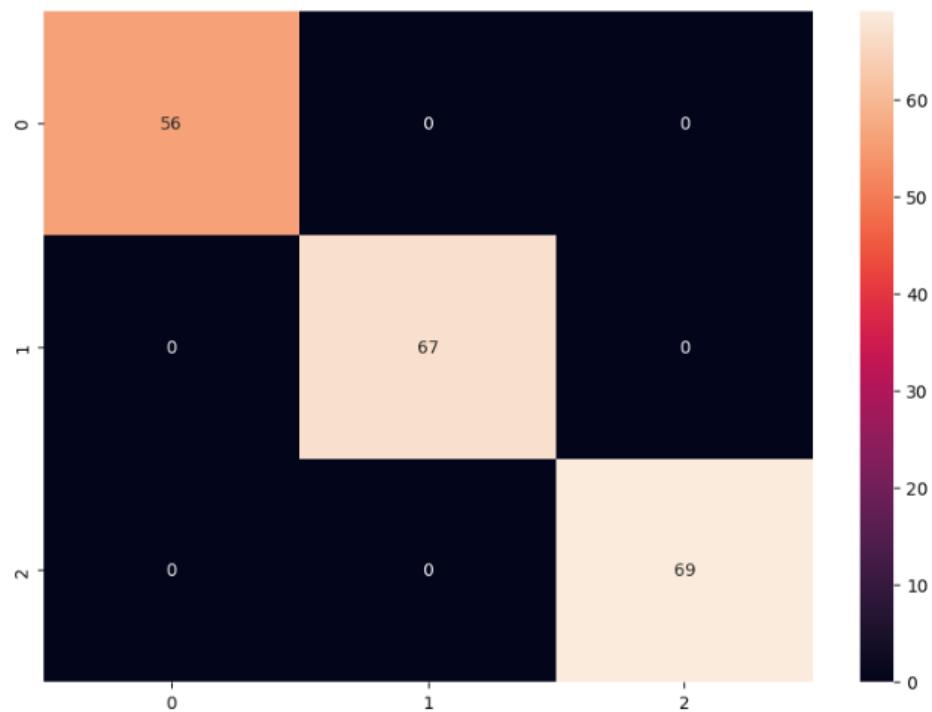
```
[0.7270026803016663, 9.313225191043273e-10, 0.08402279019355774]
```

```
history2.history['val_accuracy']
```

```
[0.96875, 1.0, 0.9921875]
```



Classification Report:					
	precision	recall	f1-score	support	
0	1.00	1.00	1.00	56	
1	1.00	1.00	1.00	67	
2	1.00	1.00	1.00	69	
accuracy			1.00	192	
macro avg	1.00	1.00	1.00	192	
weighted avg	1.00	1.00	1.00	192	



NO. OF EPOCHS

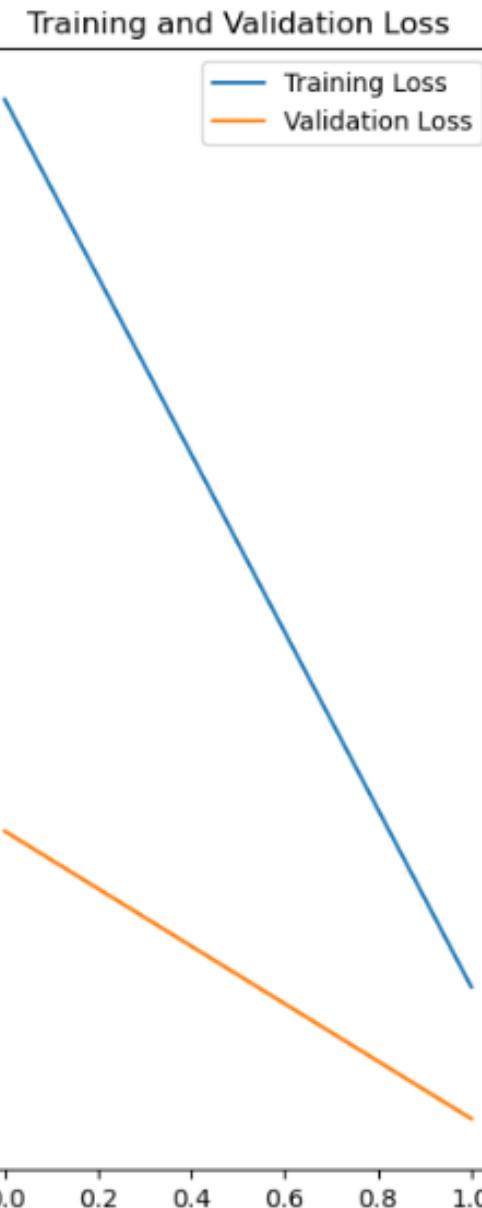
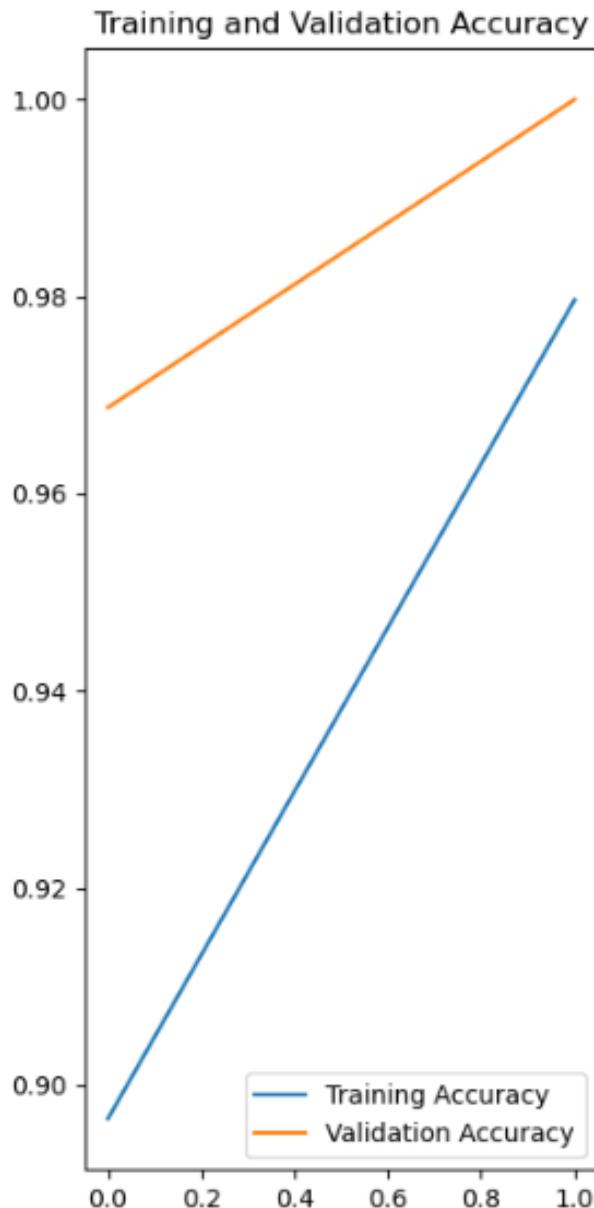
(a) 2

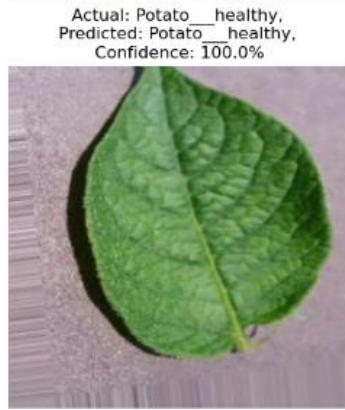
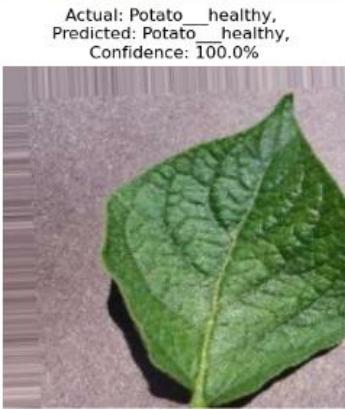
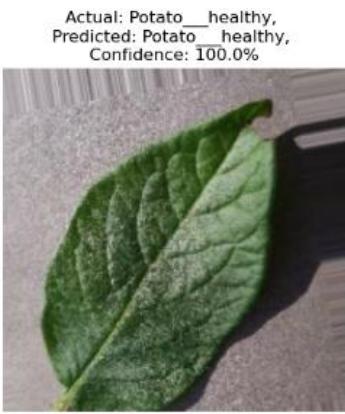
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=2
```

```
scores=model_from_vgg16.evaluate(test_ds)  
scores
```

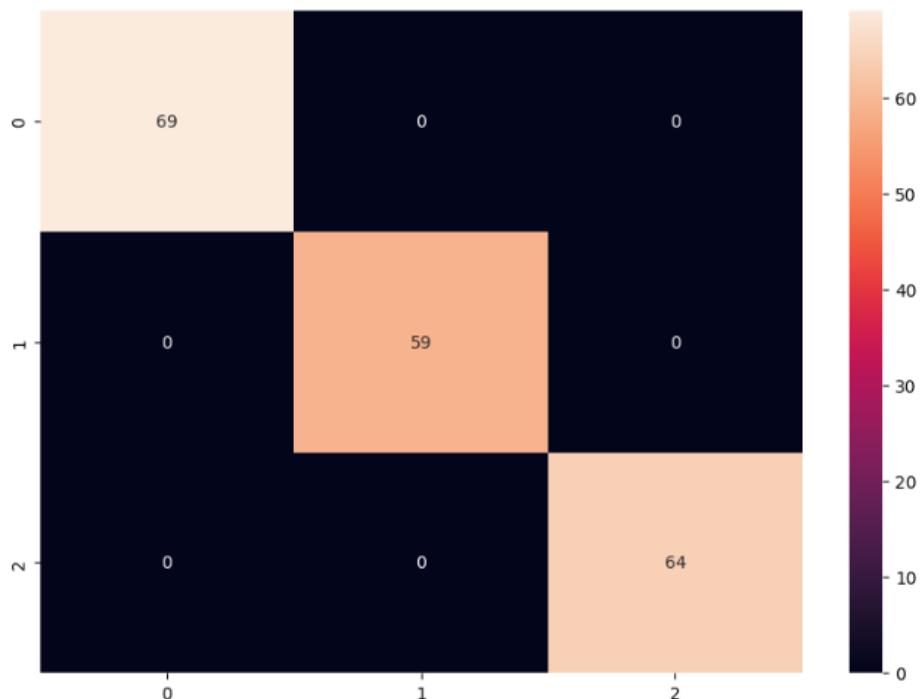
```
6/6 [=====] - 23s 4s/step - loss: 0.0000e+00 - accuracy: 1.0000  
[0.0, 1.0]
```

Average Time per Epoch: 169.50 s





Classification Report:					
	precision	recall	f1-score	support	
0	1.00	1.00	1.00	69	
1	1.00	1.00	1.00	59	
2	1.00	1.00	1.00	64	
accuracy			1.00	192	
macro avg	1.00	1.00	1.00	192	
weighted avg	1.00	1.00	1.00	192	



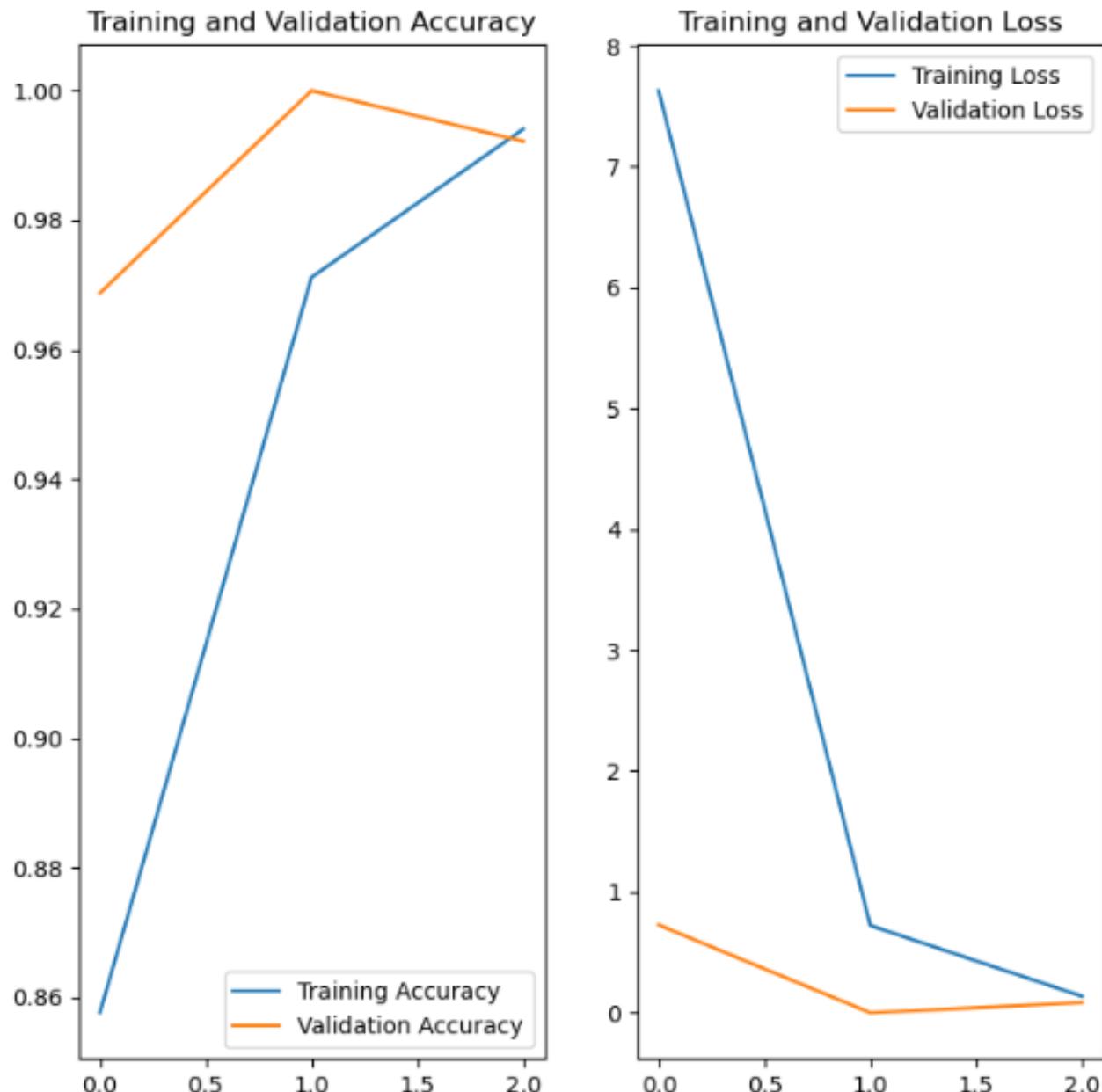
(b) 3

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=3
```

```
scores=model_from_vgg16.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 22s 4s/step - loss: 0.0016 - accuracy: 1.0000  
[0.0016248138854280114, 1.0]
```

Average Time per Epoch: 174.00 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%

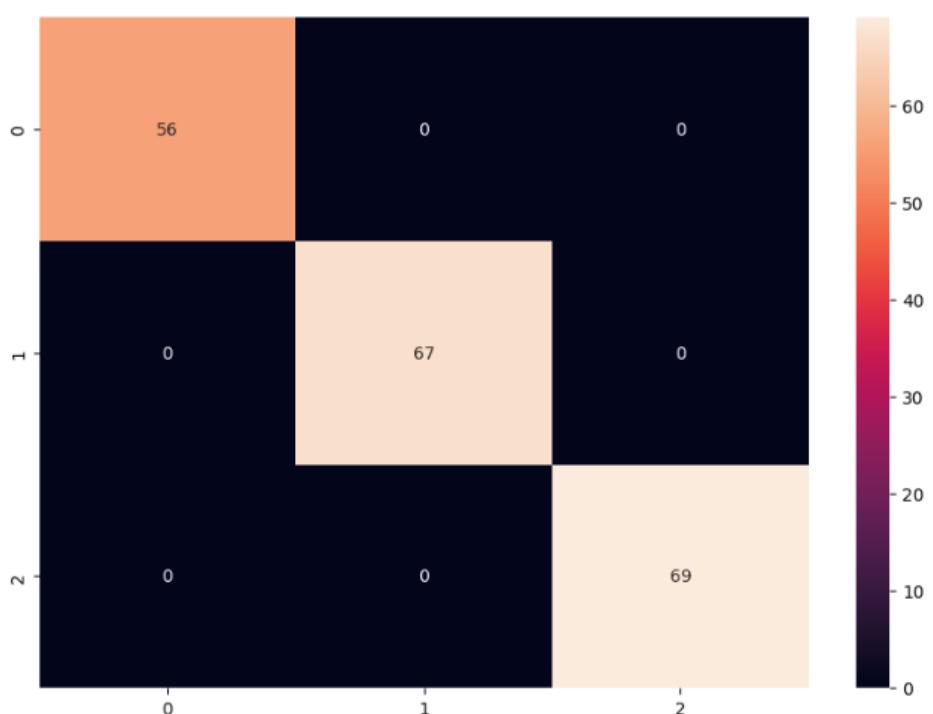


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	1.00	1.00	1.00	56
1	1.00	1.00	1.00	67
2	1.00	1.00	1.00	69
accuracy			1.00	192
macro avg	1.00	1.00	1.00	192
weighted avg	1.00	1.00	1.00	192



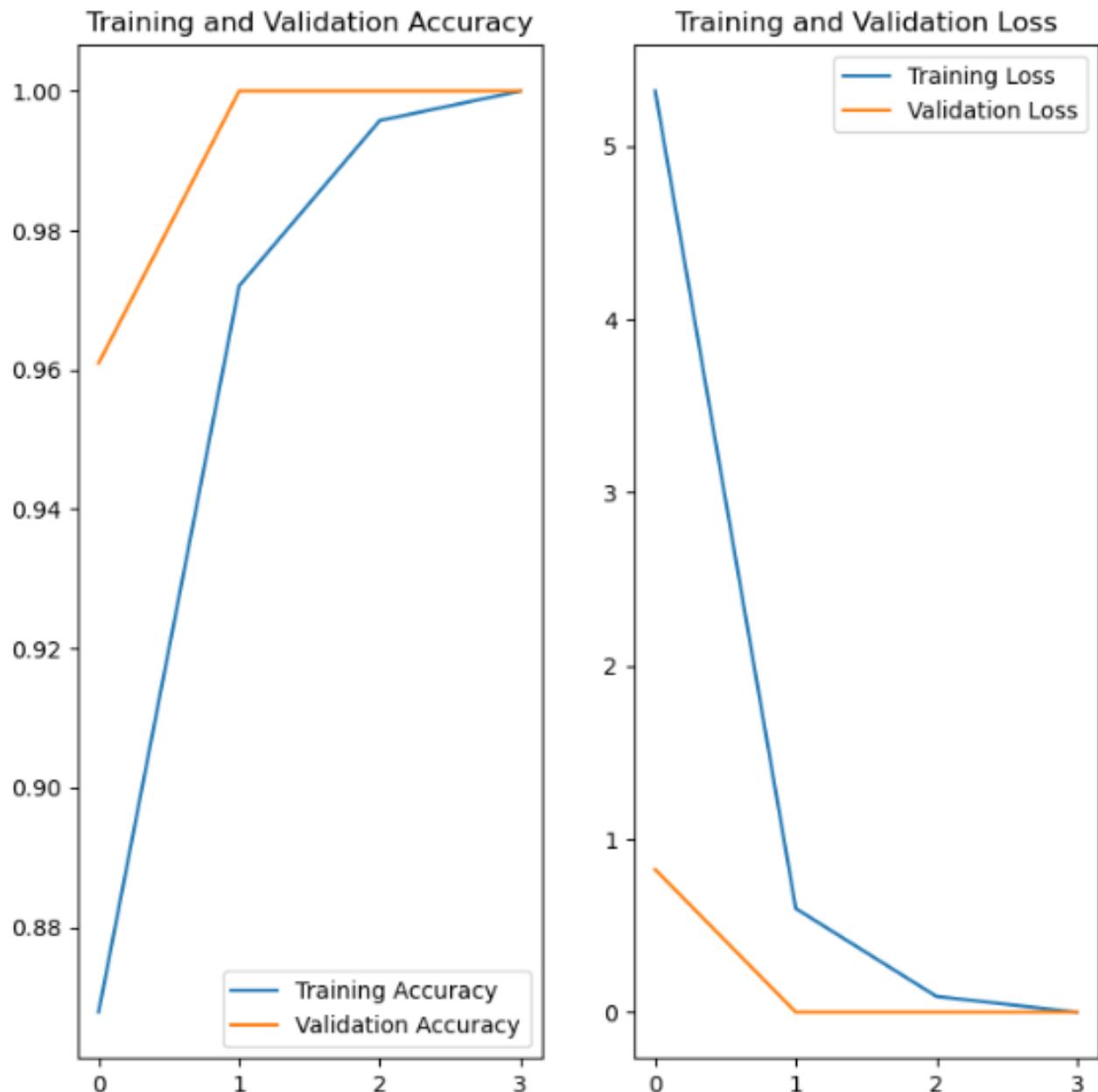
(c) 4

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=4
```

```
scores=model_from_vgg16.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 25s 4s/step - loss: 0.1364 - accuracy: 0.9896  
[0.1363646537065506, 0.9895833134651184]
```

Average Time per Epoch: 171.50 s



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%

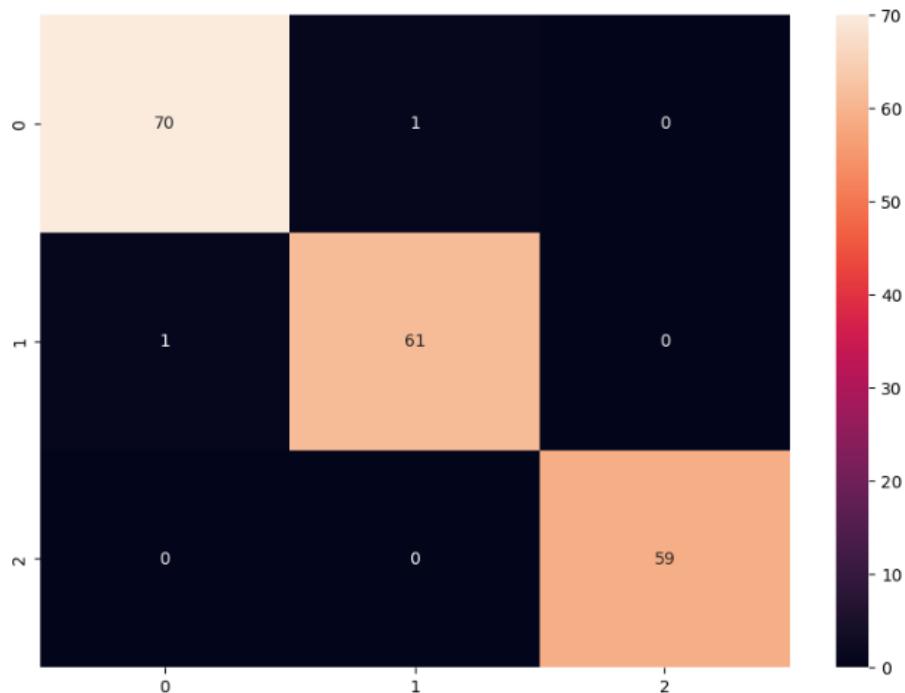


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	0.99	0.99	0.99	71
1	0.98	0.98	0.98	62
2	1.00	1.00	1.00	59
accuracy			0.99	192
macro avg	0.99	0.99	0.99	192
weighted avg	0.99	0.99	0.99	192



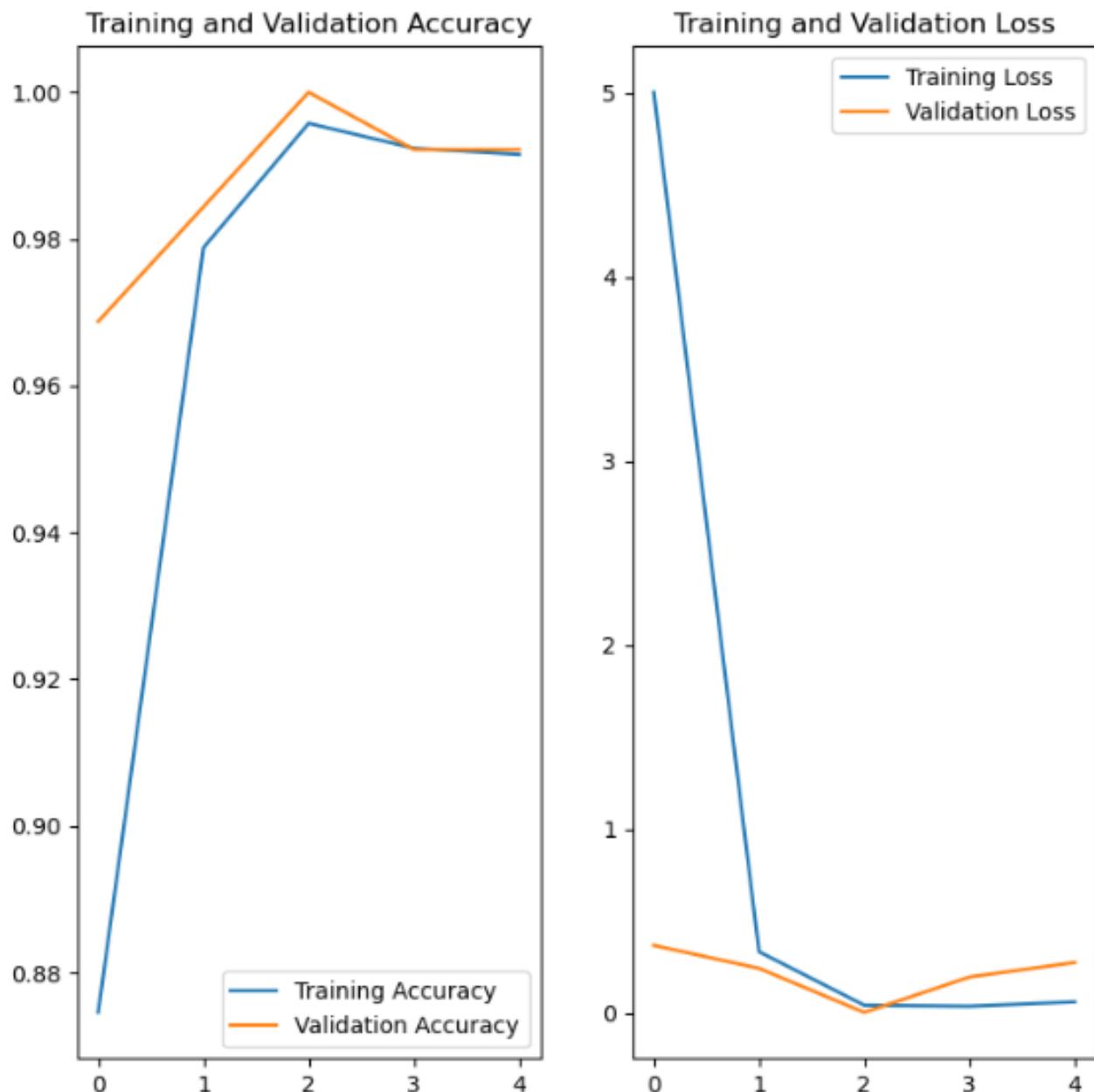
(d) 5

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=5
```

```
scores=model_from_vgg16.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 18s 3s/step - loss: 0.0237 - accuracy: 0.9948  
[0.023650309070944786, 0.9947916865348816]
```

Average Time per Epoch: 178.00 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%

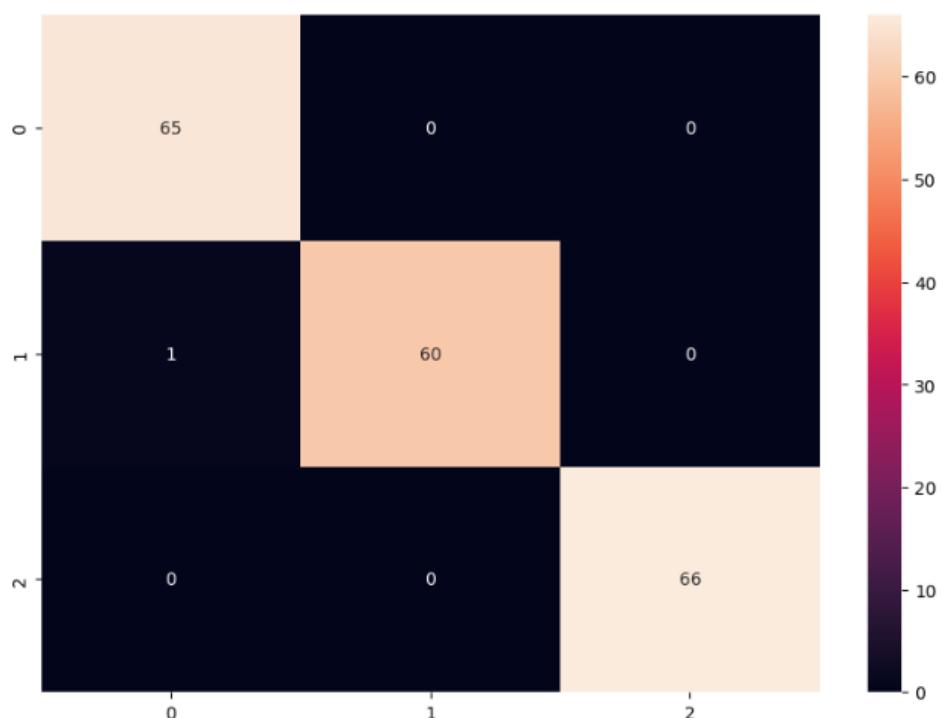


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	0.98	1.00	0.99	65
1	1.00	0.98	0.99	61
2	1.00	1.00	1.00	66
accuracy			0.99	192
macro avg	0.99	0.99	0.99	192
weighted avg	0.99	0.99	0.99	192



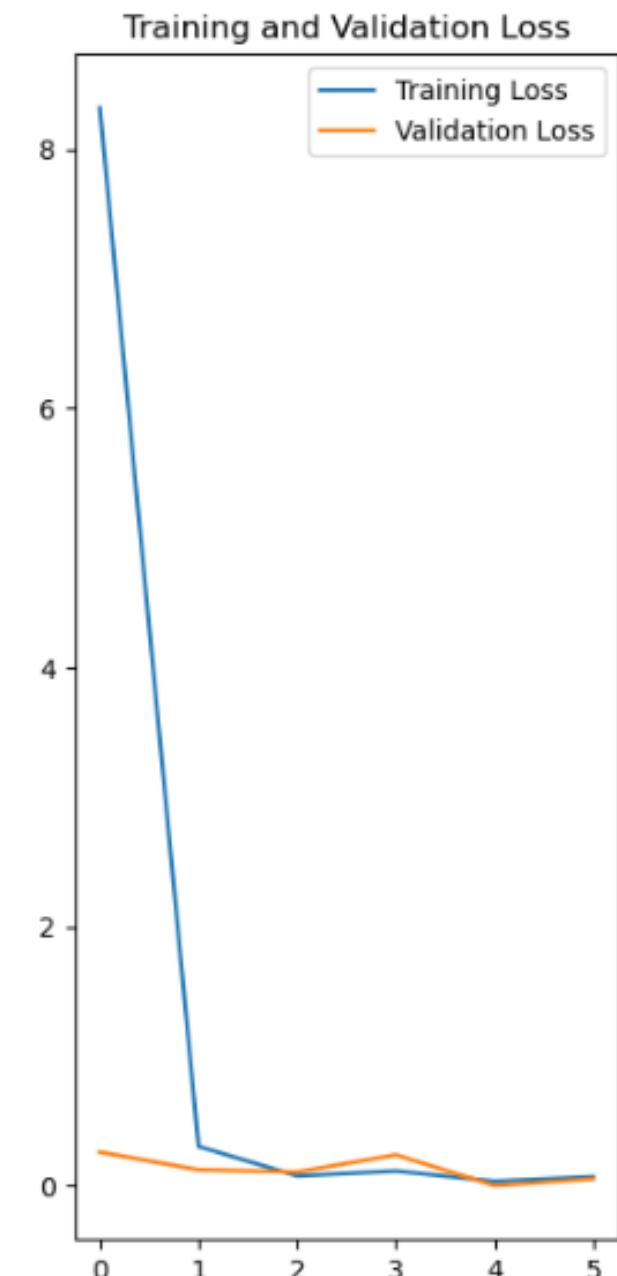
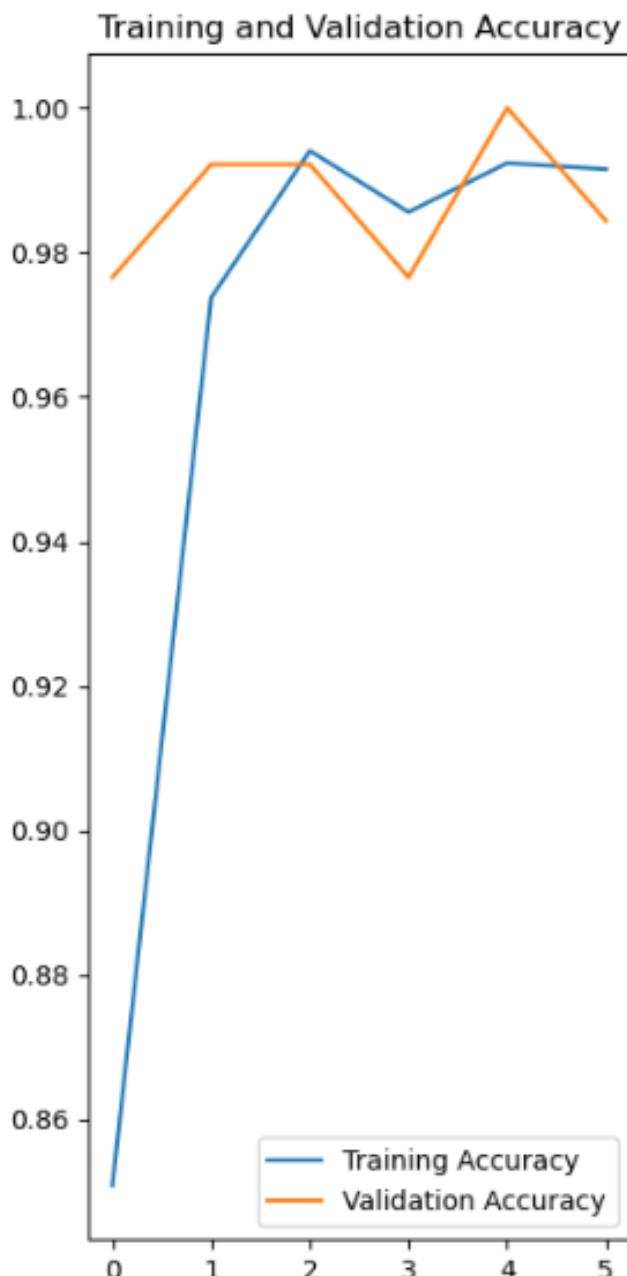
(e) 6

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=6
```

```
scores=model_from_vgg16.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 26s 4s/step - loss: 0.0199 - accuracy: 0.9948  
[0.019895659759640694, 0.9947916865348816]
```

Average Time per Epoch: 170.50 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%

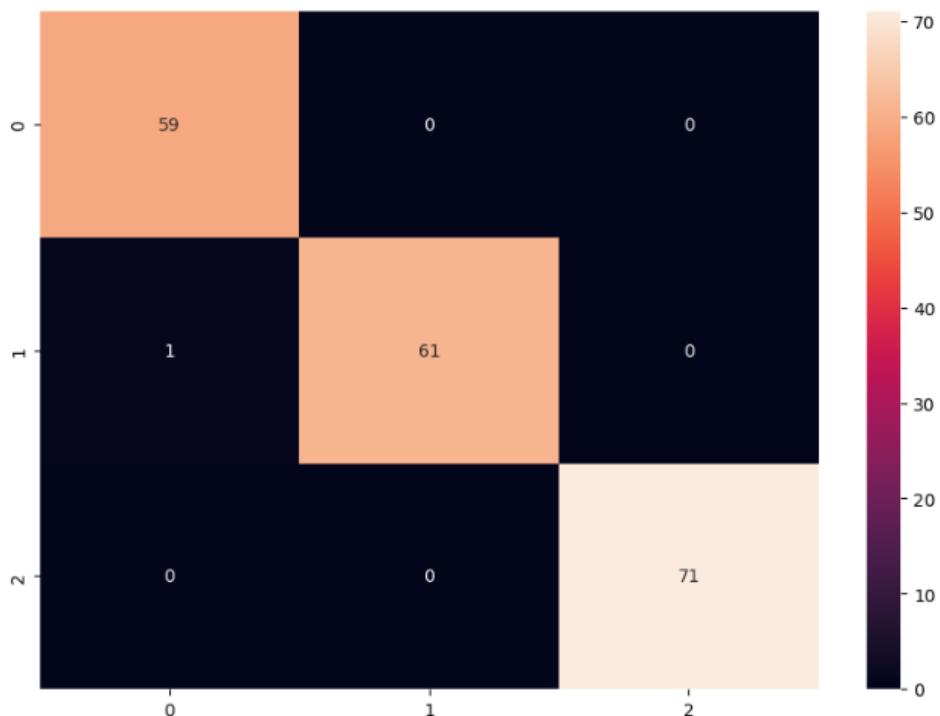


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	0.98	1.00	0.99	59
1	1.00	0.98	0.99	62
2	1.00	1.00	1.00	71
accuracy			0.99	192
macro avg	0.99	0.99	0.99	192
weighted avg	0.99	0.99	0.99	192



BATCH SIZE

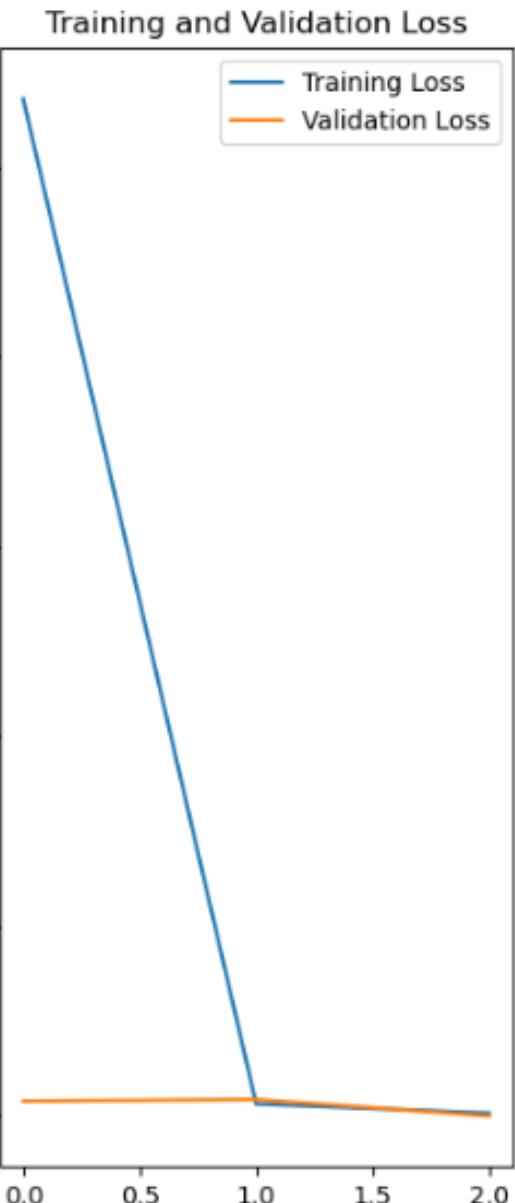
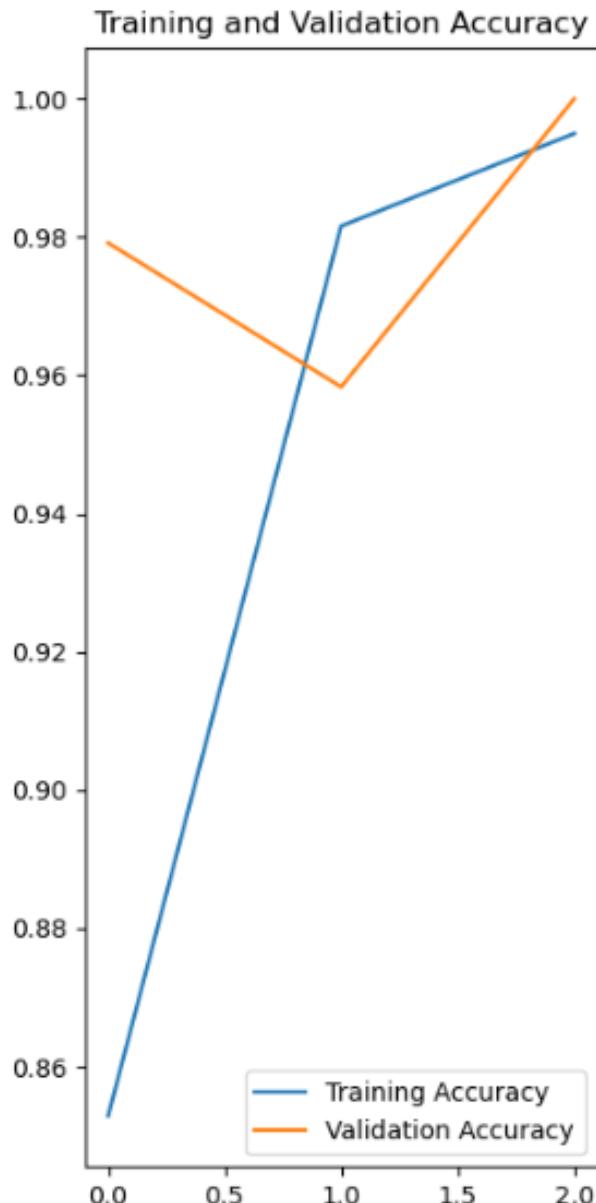
(a) 16

```
IMAGE_SIZE=224  
BATCH_SIZE=16  
CHANNELS=3  
EPOCHS=3
```

```
scores=model_from_vgg16.evaluate(test_ds)  
scores
```

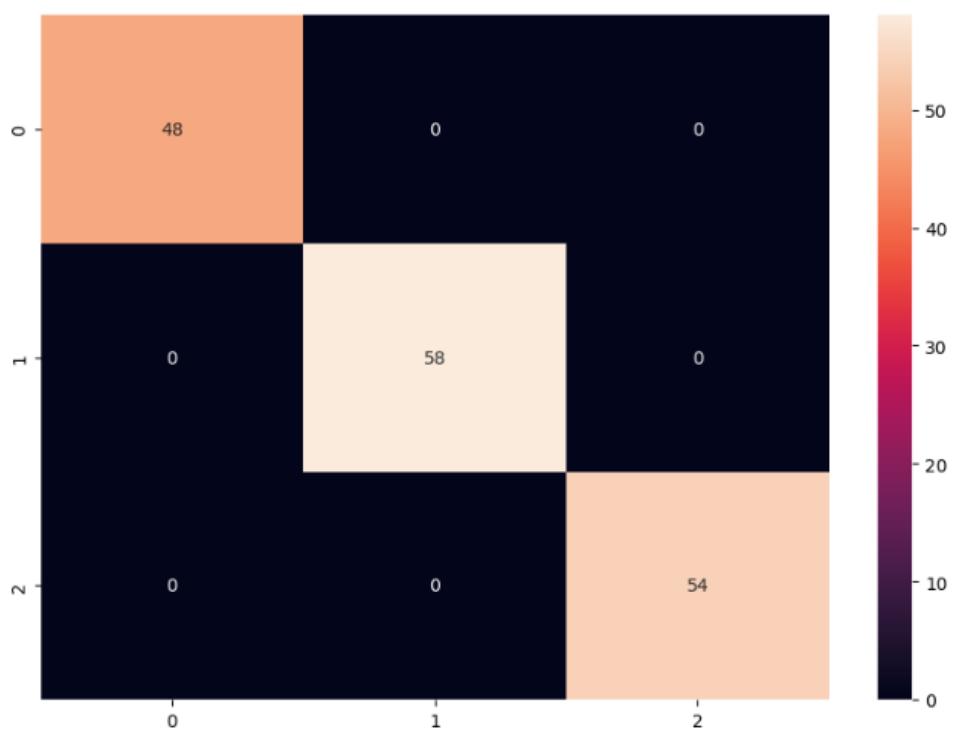
```
10/10 [=====] - 17s 2s/step - loss: 1.0452e-05 - accuracy: 1.0000  
[1.0451751222717576e-05, 1.0]
```

Average Time per Epoch: 175.67 s





Classification Report:					
	precision	recall	f1-score	support	
0	1.00	1.00	1.00	48	
1	1.00	1.00	1.00	58	
2	1.00	1.00	1.00	54	
accuracy			1.00	160	
macro avg	1.00	1.00	1.00	160	
weighted avg	1.00	1.00	1.00	160	



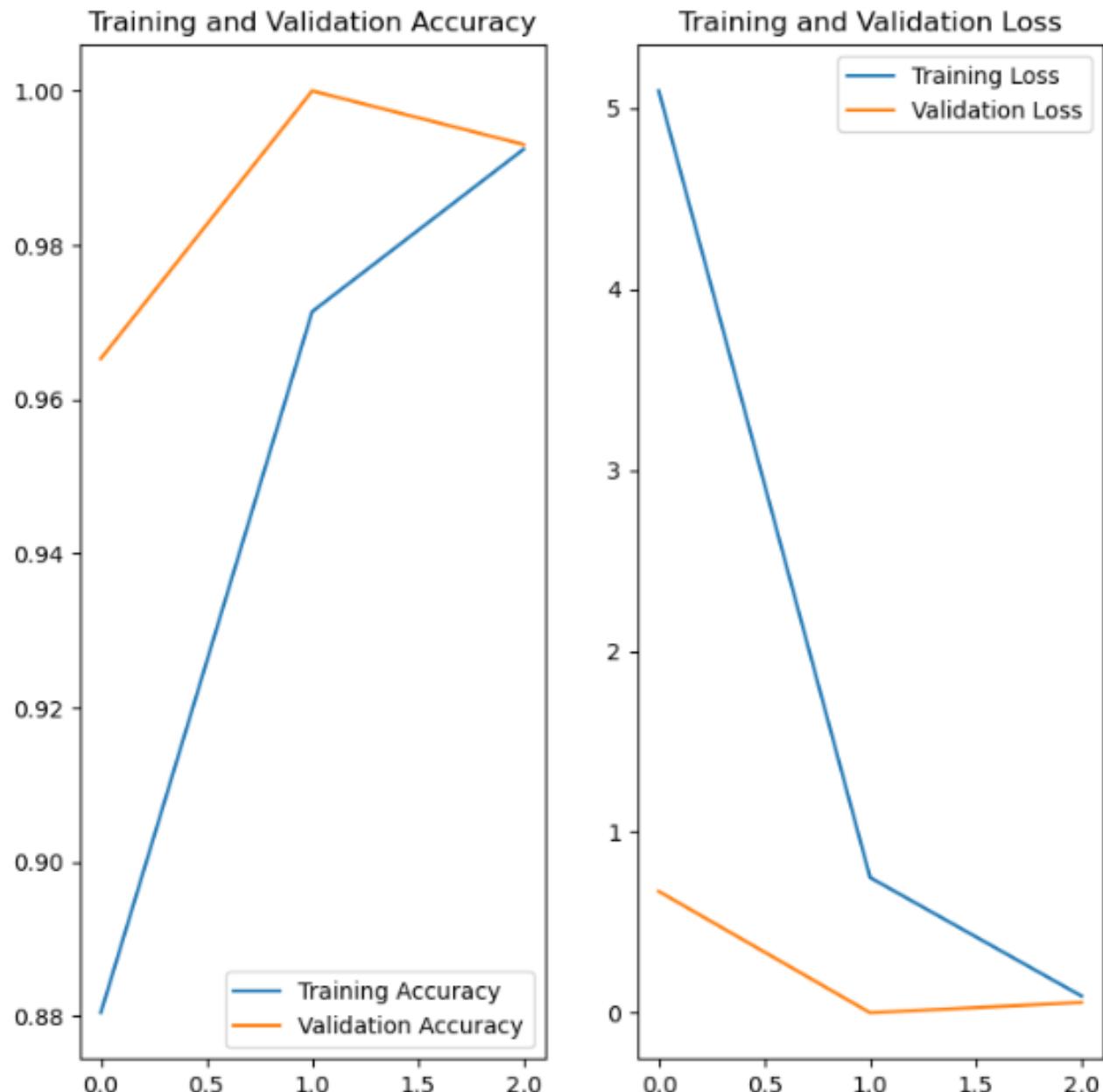
(b) 24

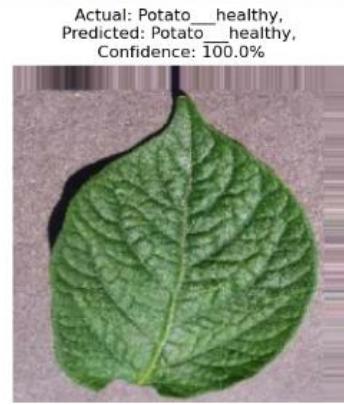
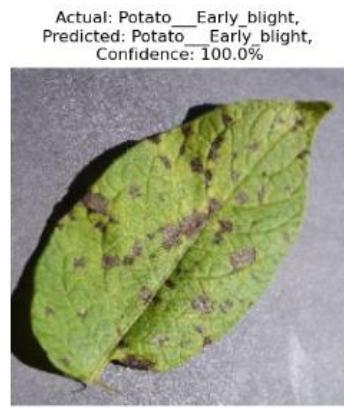
```
IMAGE_SIZE=224  
BATCH_SIZE=24  
CHANNELS=3  
EPOCHS=3
```

```
scores=model_from_vgg16.evaluate(test_ds)  
scores
```

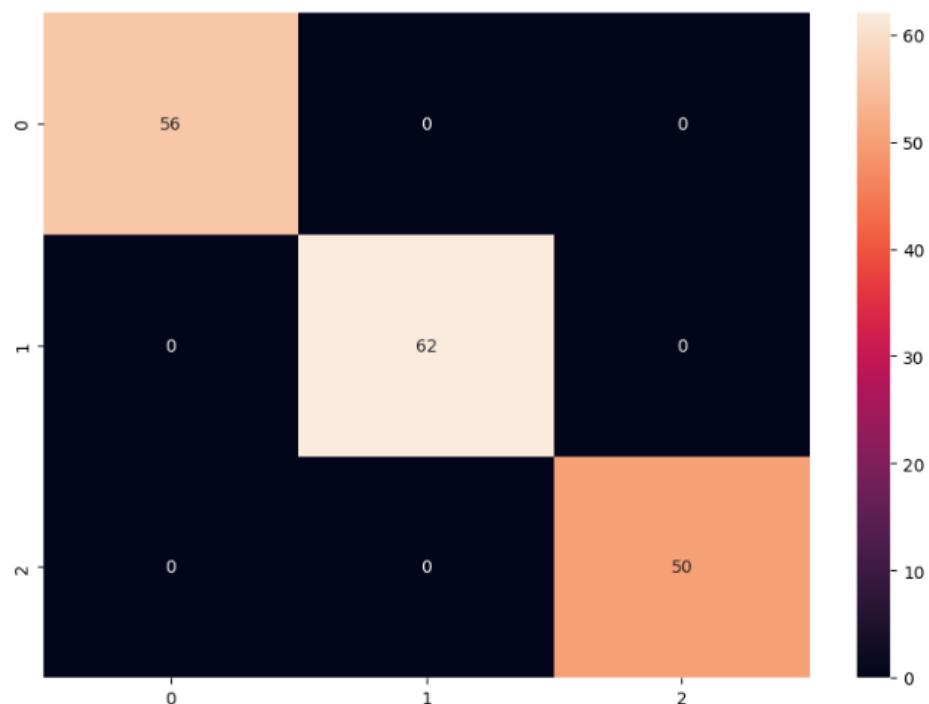
```
7/7 [=====] - 22s 3s/step - loss: 0.0000e+00 - accuracy: 1.0000  
[0.0, 1.0]
```

Average Time per Epoch: 173.00 s





Classification Report:					
	precision	recall	f1-score	support	
0	1.00	1.00	1.00	56	
1	1.00	1.00	1.00	62	
2	1.00	1.00	1.00	50	
accuracy			1.00	168	
macro avg	1.00	1.00	1.00	168	
weighted avg	1.00	1.00	1.00	168	



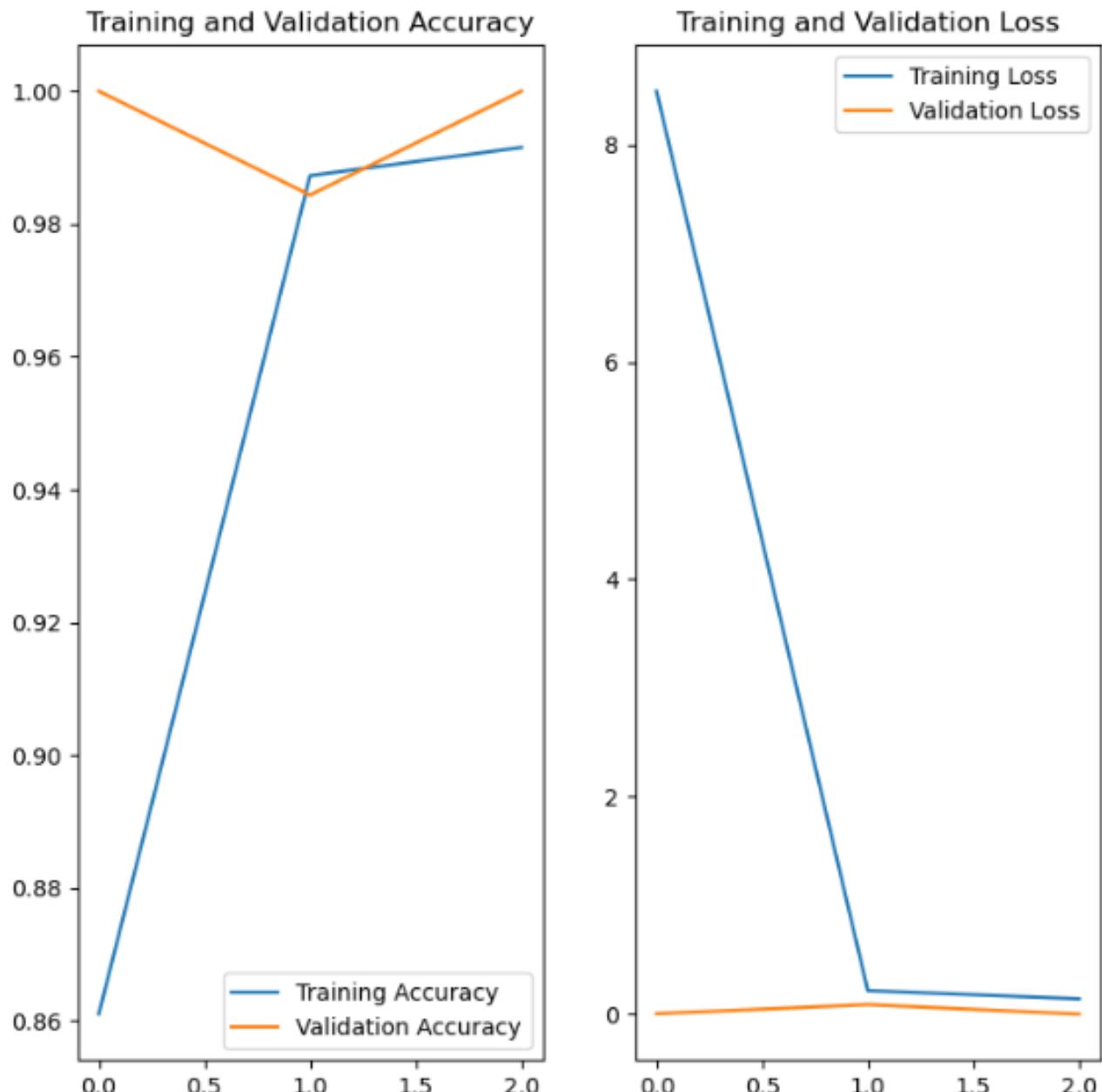
(c) 32

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=3
```

```
scores=model_from_vgg16.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 17s 3s/step - loss: 0.0013 - accuracy: 1.0000  
[0.0013398664304986596, 1.0]
```

Average Time per Epoch: 170.00 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%

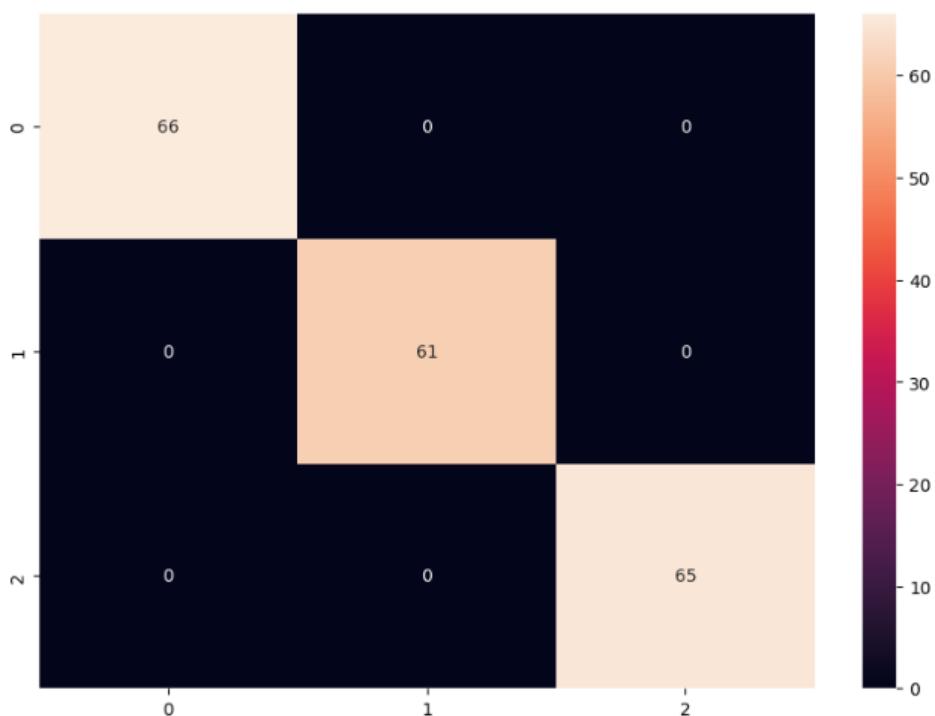


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	1.00	1.00	1.00	66
1	1.00	1.00	1.00	61
2	1.00	1.00	1.00	65
accuracy			1.00	192
macro avg	1.00	1.00	1.00	192
weighted avg	1.00	1.00	1.00	192



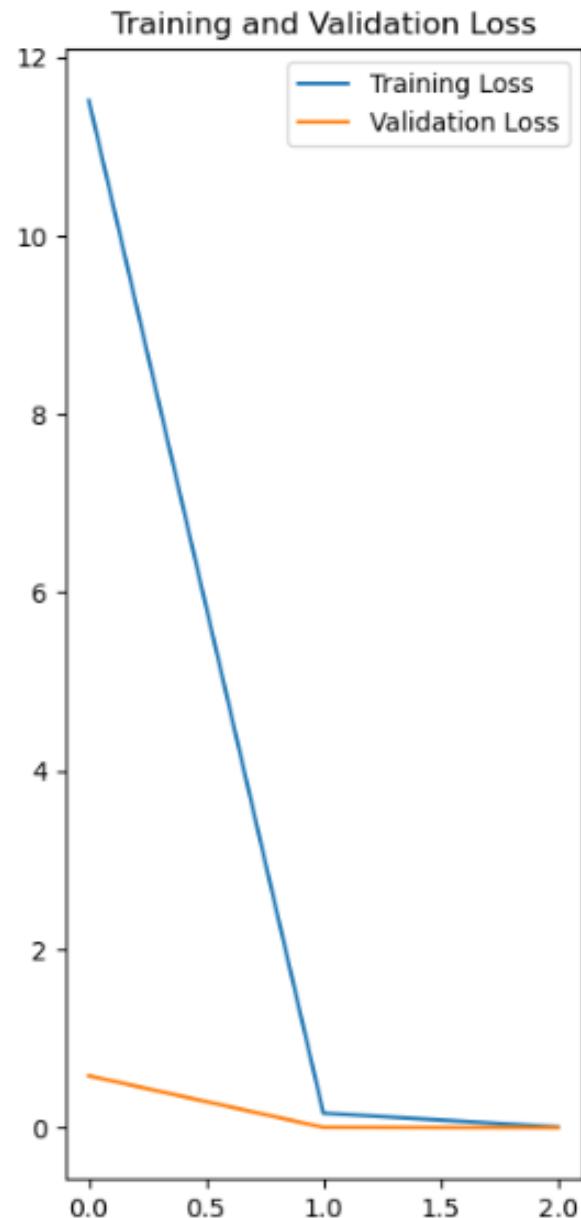
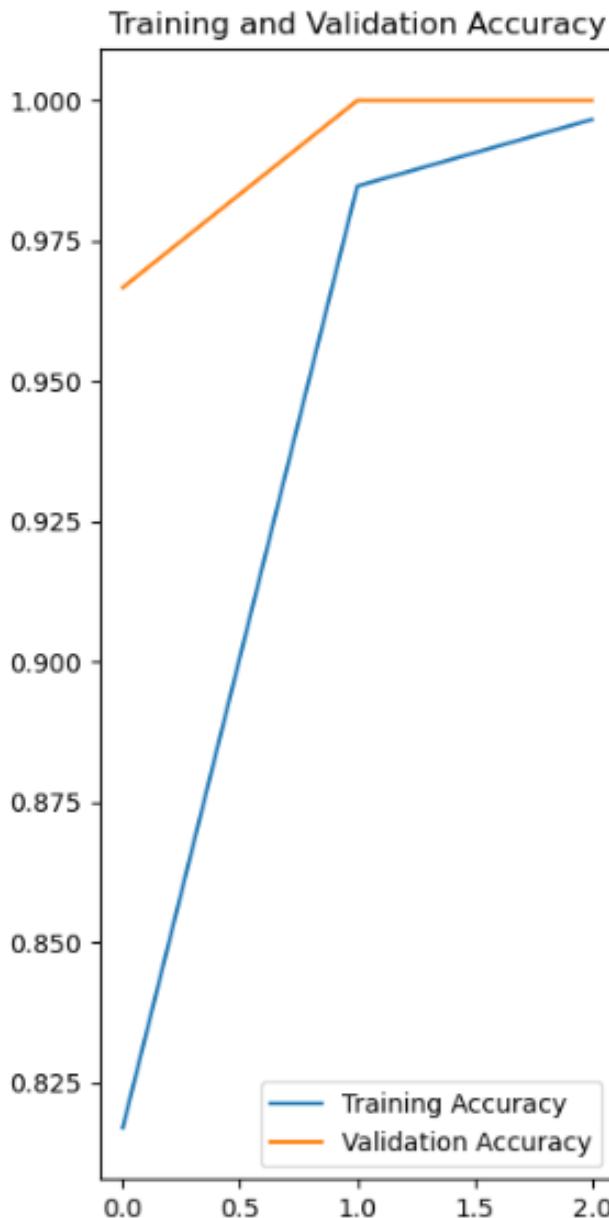
(d) 40

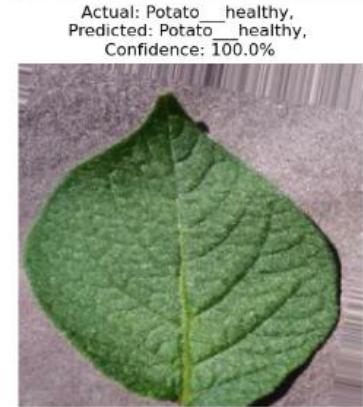
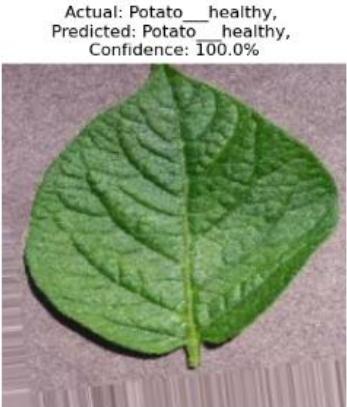
```
IMAGE_SIZE=224  
BATCH_SIZE=40  
CHANNELS=3  
EPOCHS=3
```

```
scores=model_from_vgg16.evaluate(test_ds)  
scores
```

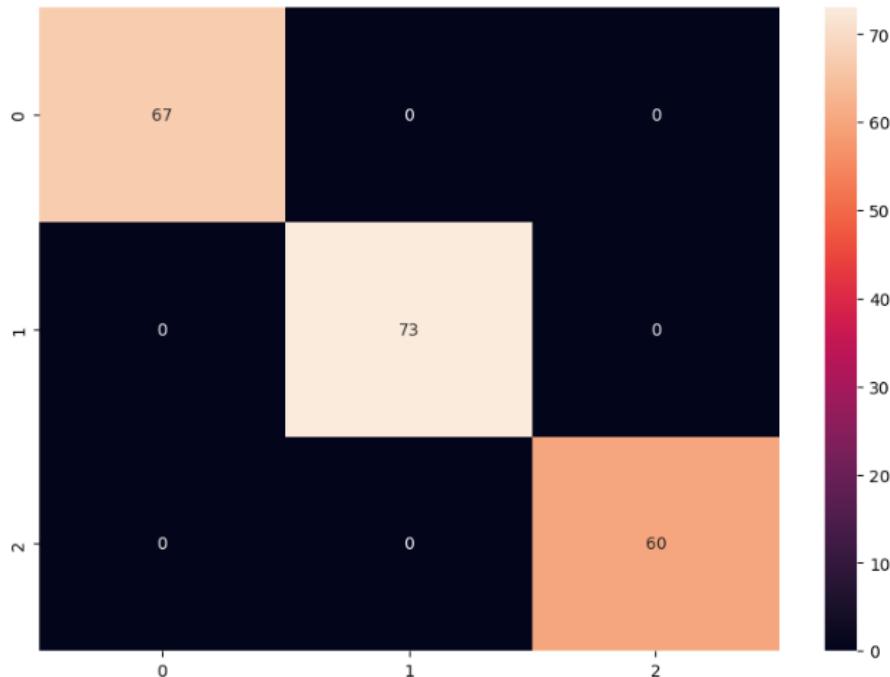
```
5/5 [=====] - 26s 5s/step - loss: 8.1418e-07 - accuracy: 1.0000  
[8.141832381625136e-07, 1.0]
```

Average Time per Epoch: 167.33 s





Classification Report:					
	precision	recall	f1-score	support	
0	1.00	1.00	1.00	67	
1	1.00	1.00	1.00	73	
2	1.00	1.00	1.00	60	
accuracy			1.00	200	
macro avg	1.00	1.00	1.00	200	
weighted avg	1.00	1.00	1.00	200	



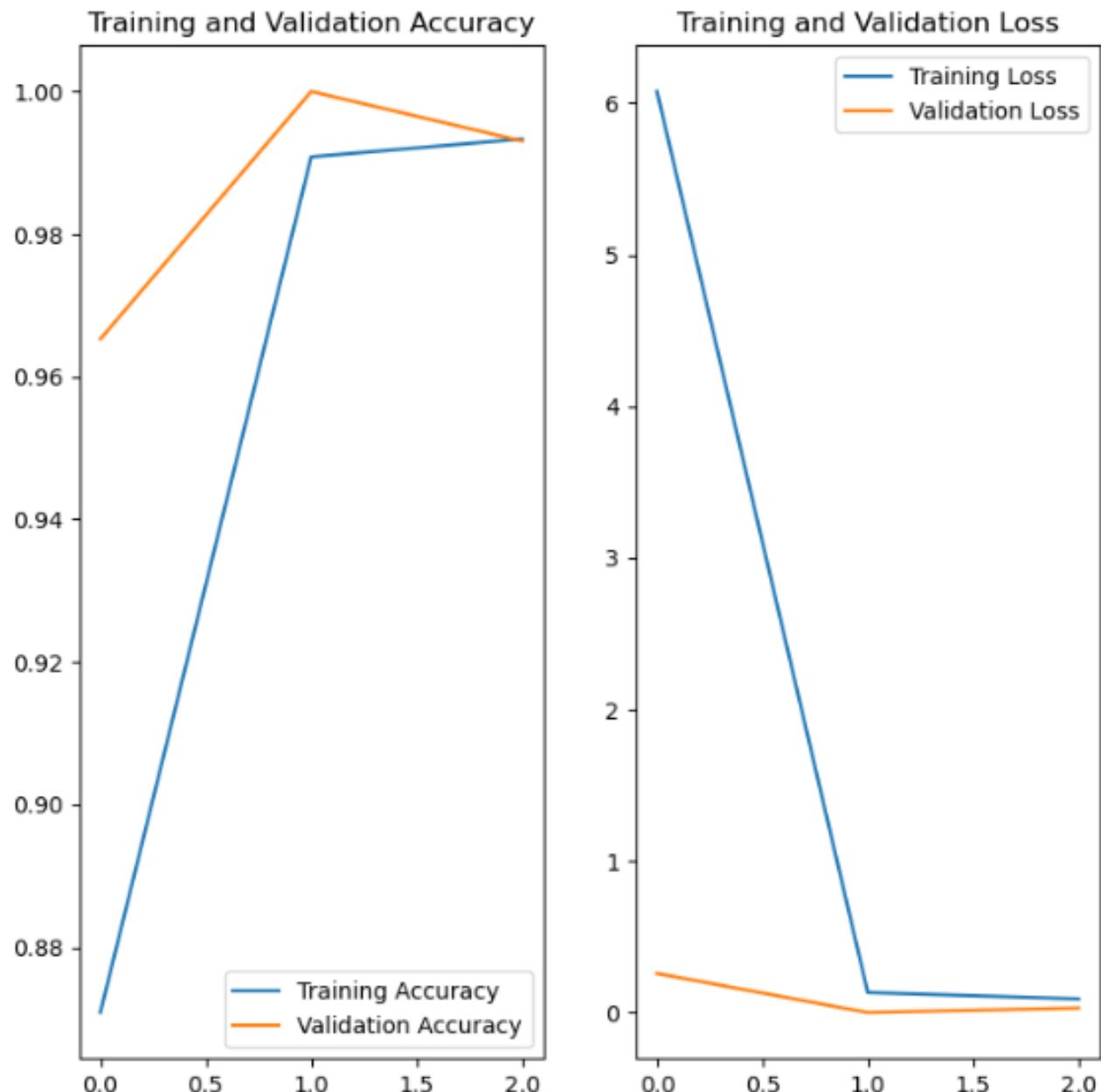
(e) 48

```
IMAGE_SIZE=224  
BATCH_SIZE=48  
CHANNELS=3  
EPOCHS=3
```

```
scores=model_from_vgg16.evaluate(test_ds)  
scores
```

```
4/4 [=====] - 17s 4s/step - loss: 0.0035 - accuracy: 1.0000  
[0.0034668713342398405, 1.0]
```

Average Time per Epoch: 171.67 s



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%

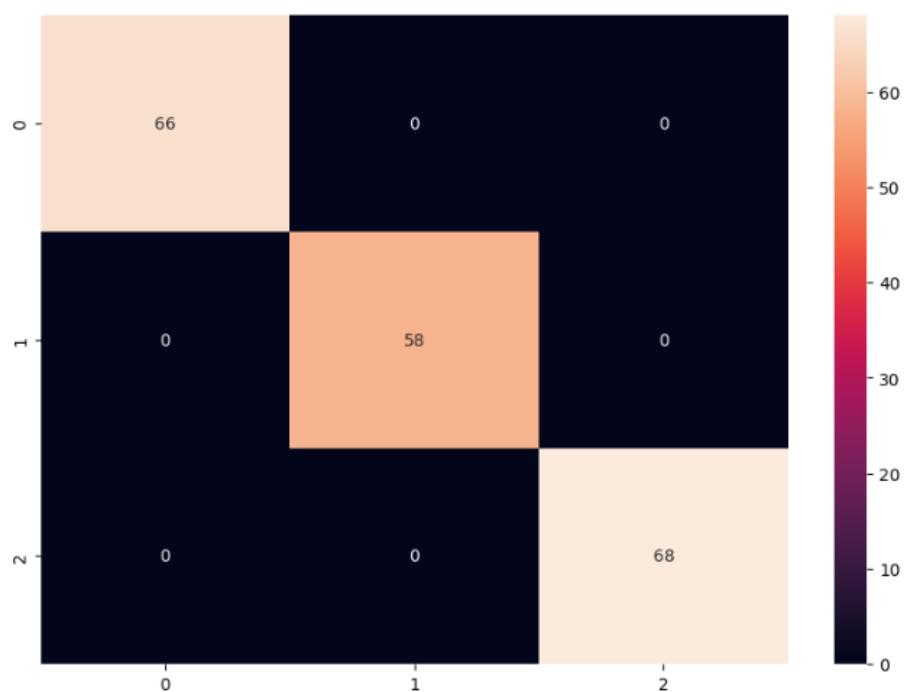


Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	1.00	1.00	1.00	66
1	1.00	1.00	1.00	58
2	1.00	1.00	1.00	68
accuracy			1.00	192
macro avg	1.00	1.00	1.00	192
weighted avg	1.00	1.00	1.00	192



DATASET SPLIT RATIO

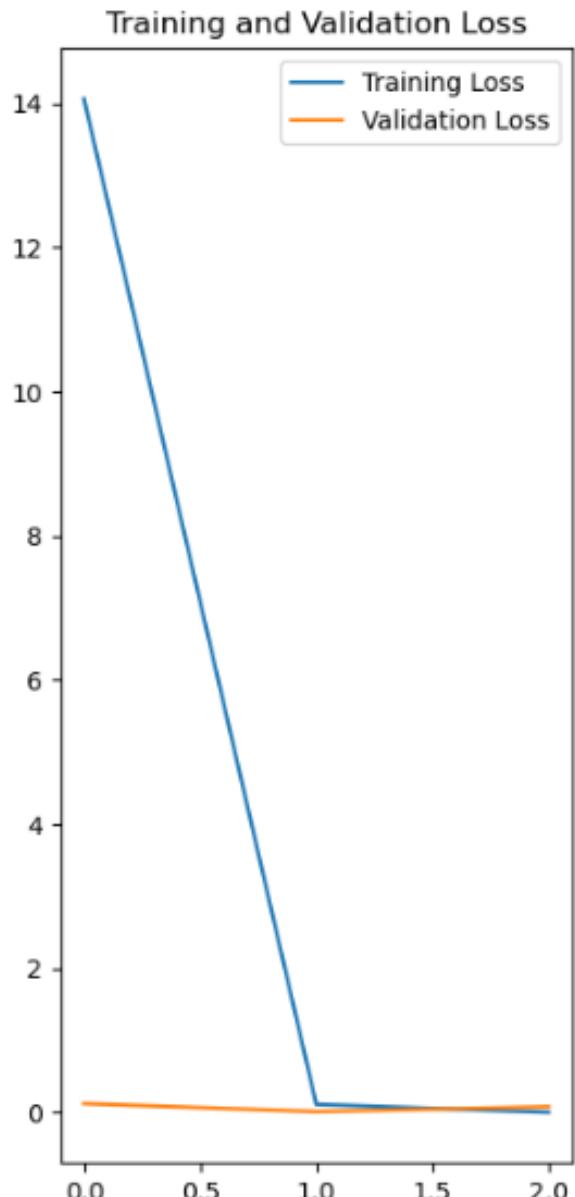
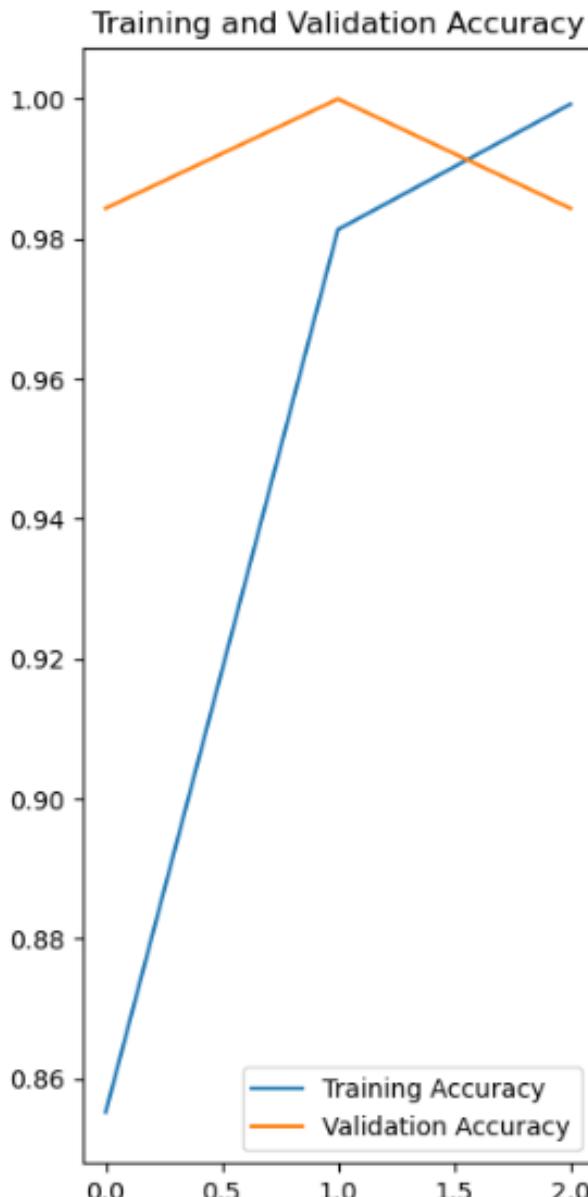
(a) 90:5:5

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=3
```

```
scores=model_from_vgg16.evaluate(test_ds)  
scores
```

```
3/3 [=====] - 9s 3s/step - loss: 8.4001e-05 - accuracy: 1.0000  
[8.400086517212912e-05, 1.0]
```

Average Time per Epoch: 180.00 s



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%

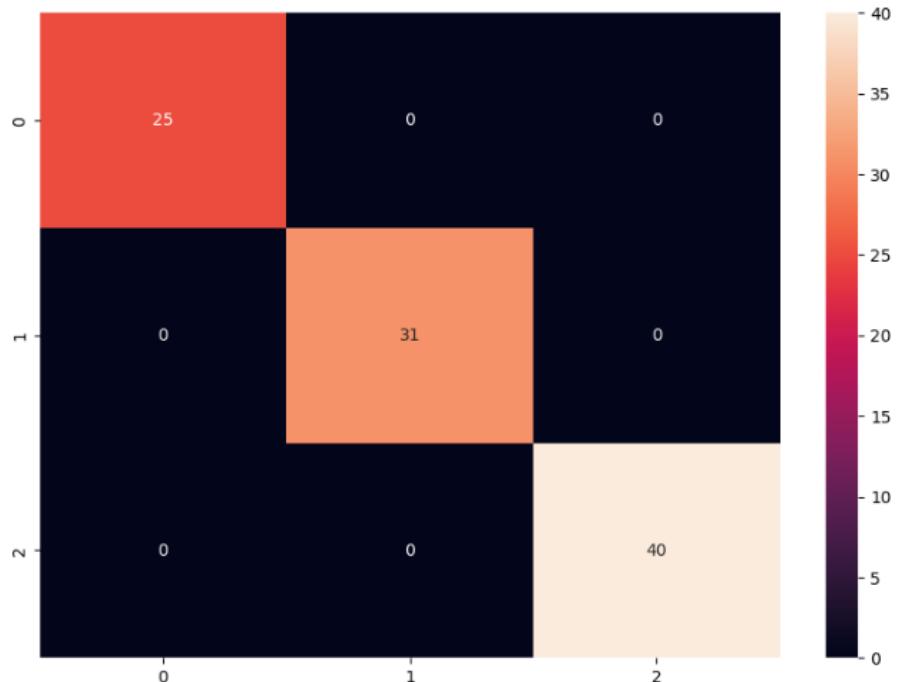


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	1.00	1.00	1.00	25
1	1.00	1.00	1.00	31
2	1.00	1.00	1.00	40
accuracy			1.00	96
macro avg	1.00	1.00	1.00	96
weighted avg	1.00	1.00	1.00	96



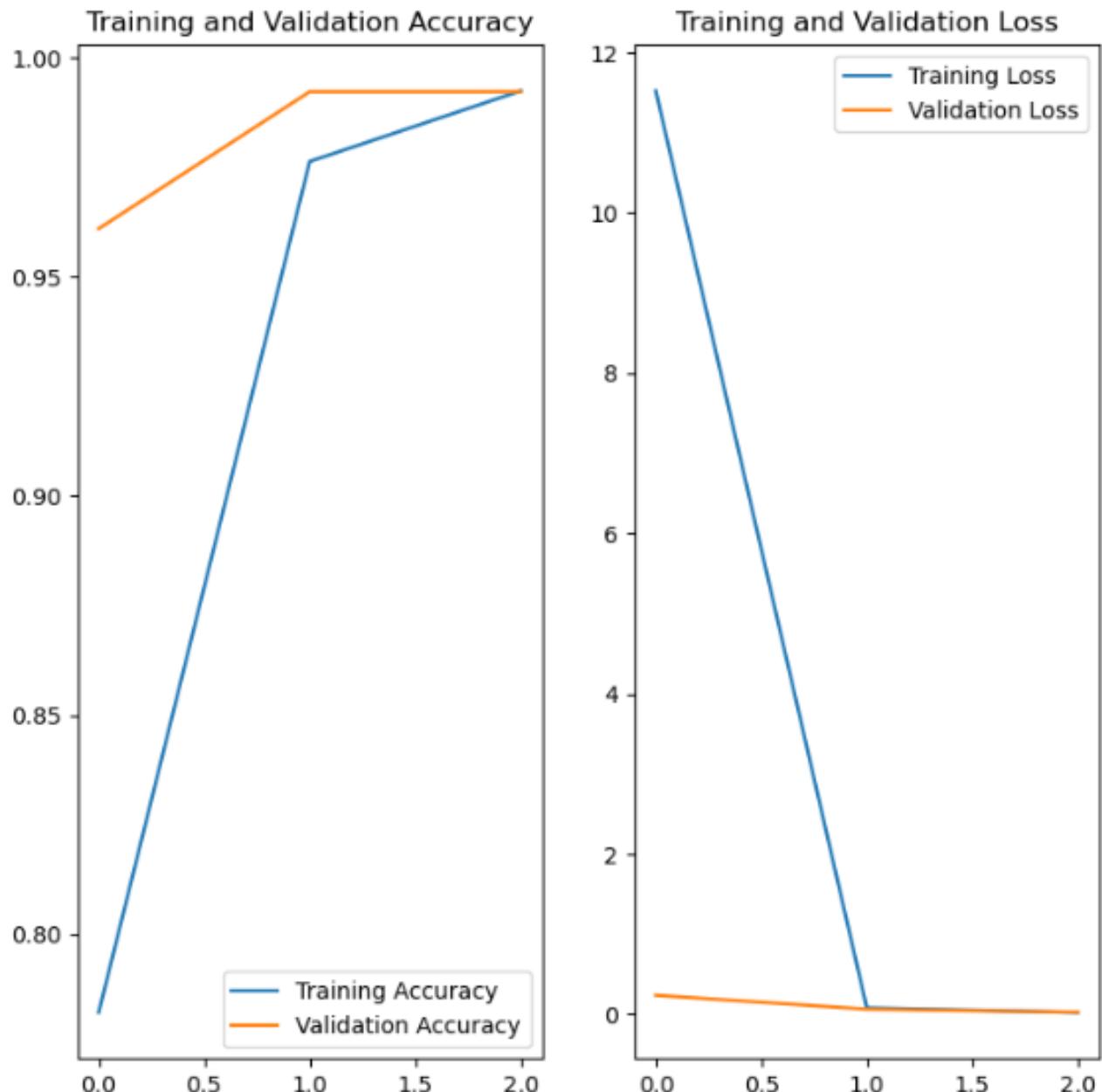
(b) 80:10:10

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=3
```

```
scores=model_from_vgg16.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 19s 3s/step - loss: 0.2427 - accuracy: 0.9896  
[0.24267816543579102, 0.9895833134651184]
```

Average Time per Epoch: 167.33 s



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.62%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.92%



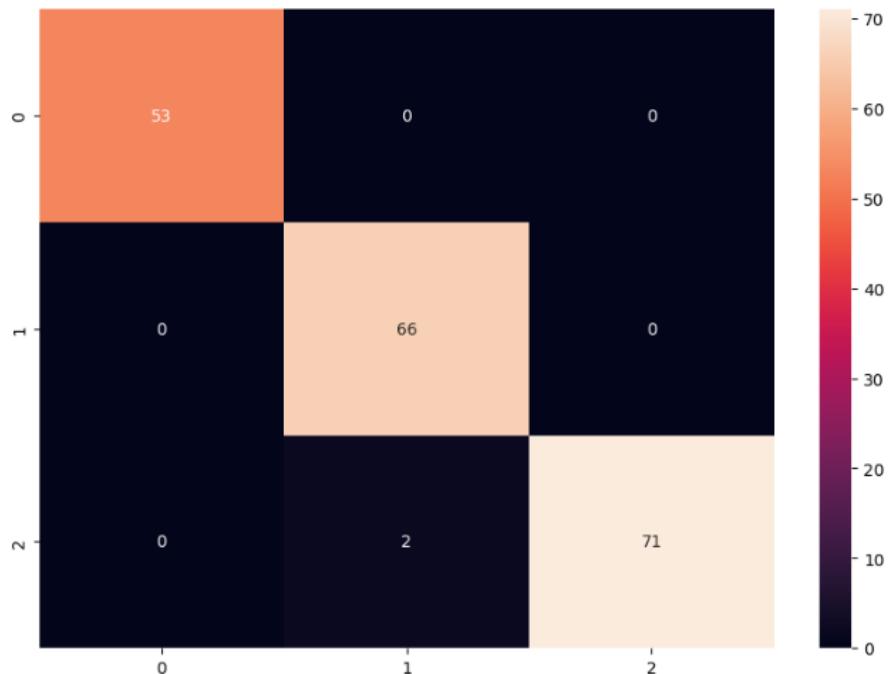
Actual: Potato_healthy,
Predicted: Potato_Late_blight,
Confidence: 99.94%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Classification Report:					
	precision	recall	f1-score	support	
0	1.00	1.00	1.00	53	
1	0.97	1.00	0.99	66	
2	1.00	0.97	0.99	73	
accuracy			0.99	192	
macro avg	0.99	0.99	0.99	192	
weighted avg	0.99	0.99	0.99	192	



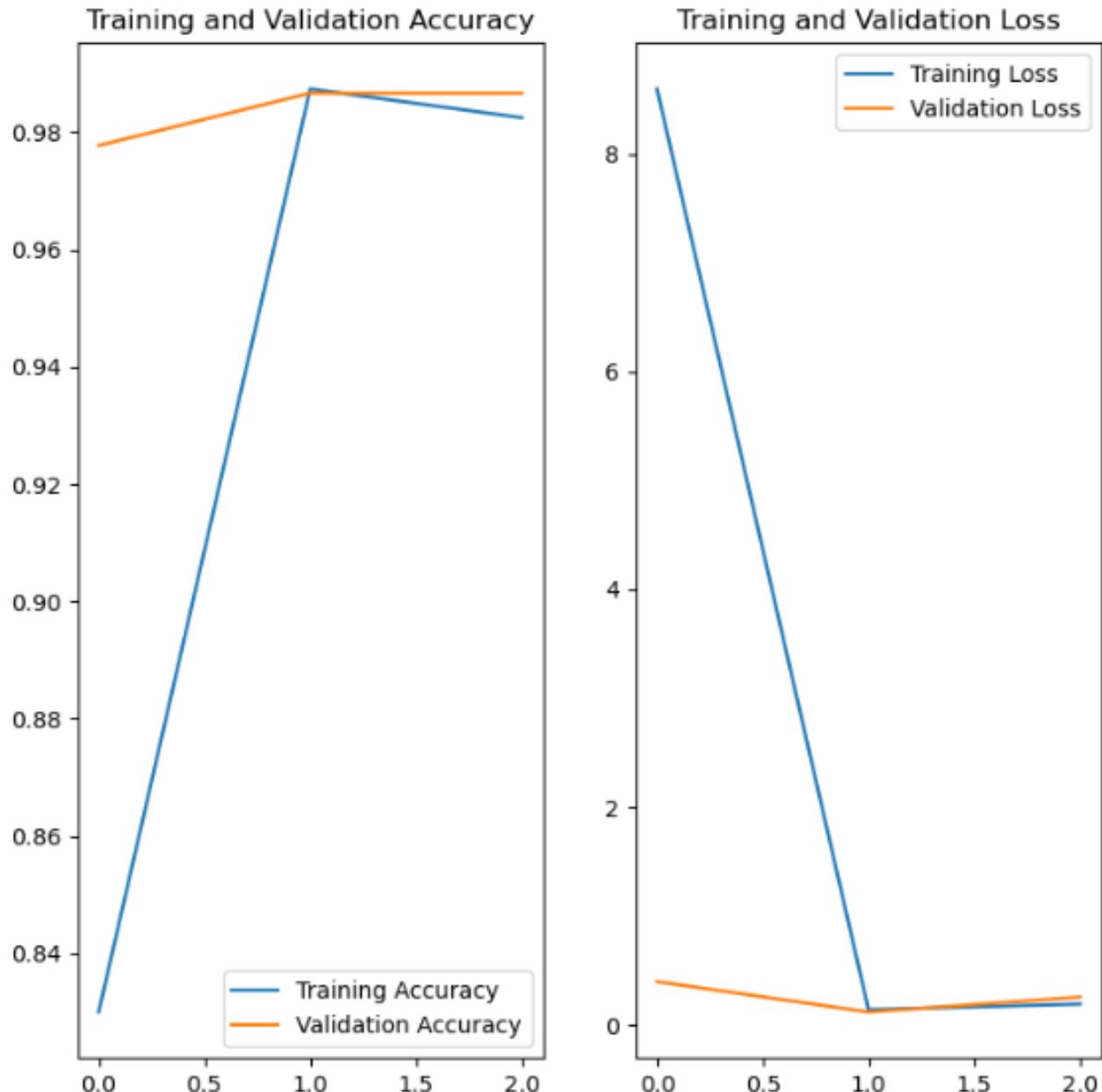
(c) 70:15:15

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=3
```

```
scores=model_from_vgg16.evaluate(test_ds)  
scores
```

```
8/8 [=====] - 33s 4s/step - loss: 0.2317 - accuracy: 0.9805  
[0.23167796432971954, 0.98046875]
```

Average Time per Epoch: 159.00 s



Actual: Potato_Early_blight,
Predicted: Potato_Late_blight,
Confidence: 96.81%



Actual: Potato_Late_blight,
Predicted: Potato_Early_blight,
Confidence: 95.27%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%

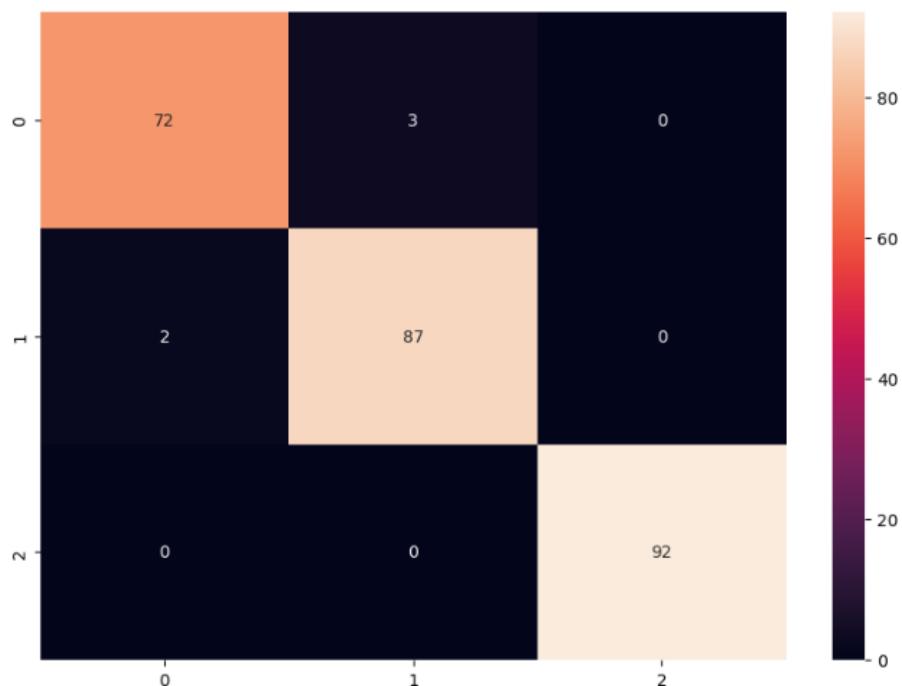


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	0.97	0.96	0.97	75
1	0.97	0.98	0.97	89
2	1.00	1.00	1.00	92
accuracy			0.98	256
macro avg	0.98	0.98	0.98	256
weighted avg	0.98	0.98	0.98	256



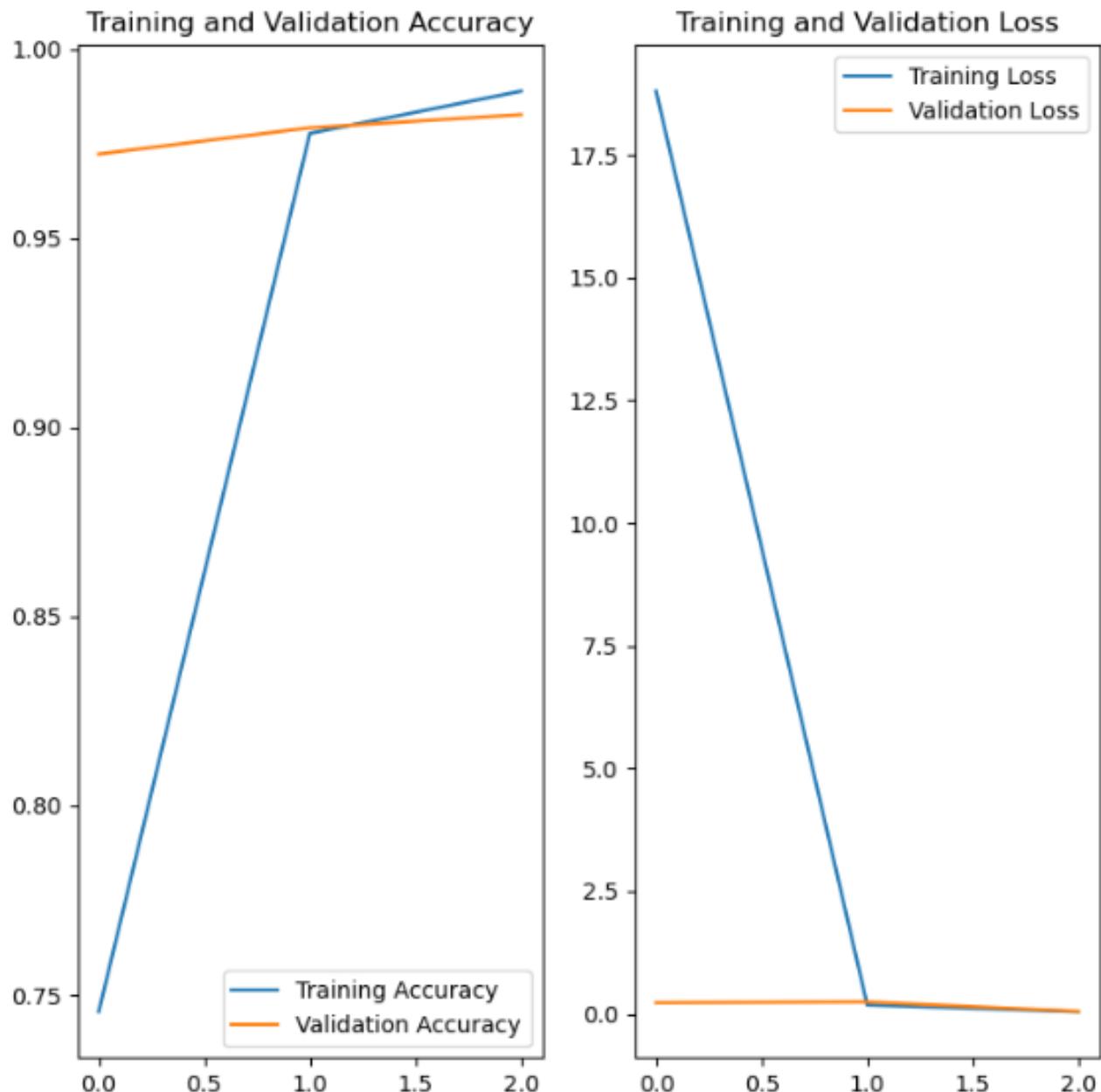
(d) 60:20:20

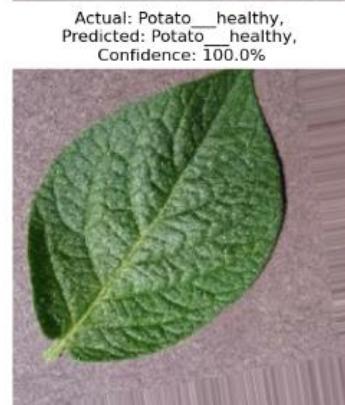
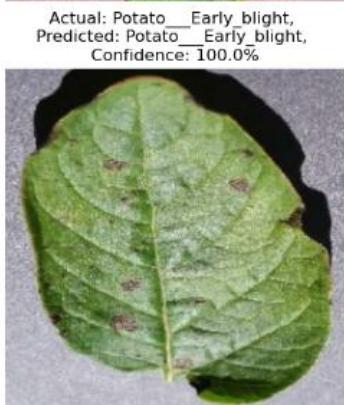
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=3
```

```
scores=model_from_vgg16.evaluate(test_ds)  
scores
```

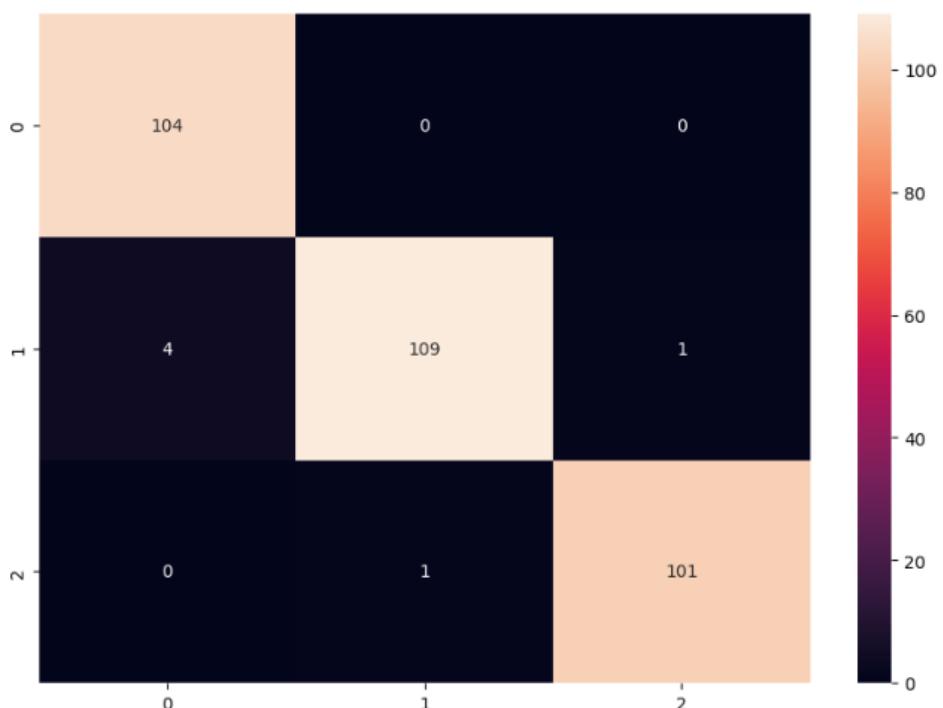
```
10/10 [=====] - 34s 3s/step - loss: 0.1401 - accuracy: 0.9812  
[0.1401095986366272, 0.981249988079071]
```

Average Time per Epoch: 151.67 s





Classification Report:				
	precision	recall	f1-score	support
0	0.96	1.00	0.98	104
1	0.99	0.96	0.97	114
2	0.99	0.99	0.99	102
accuracy			0.98	320
macro avg	0.98	0.98	0.98	320
weighted avg	0.98	0.98	0.98	320



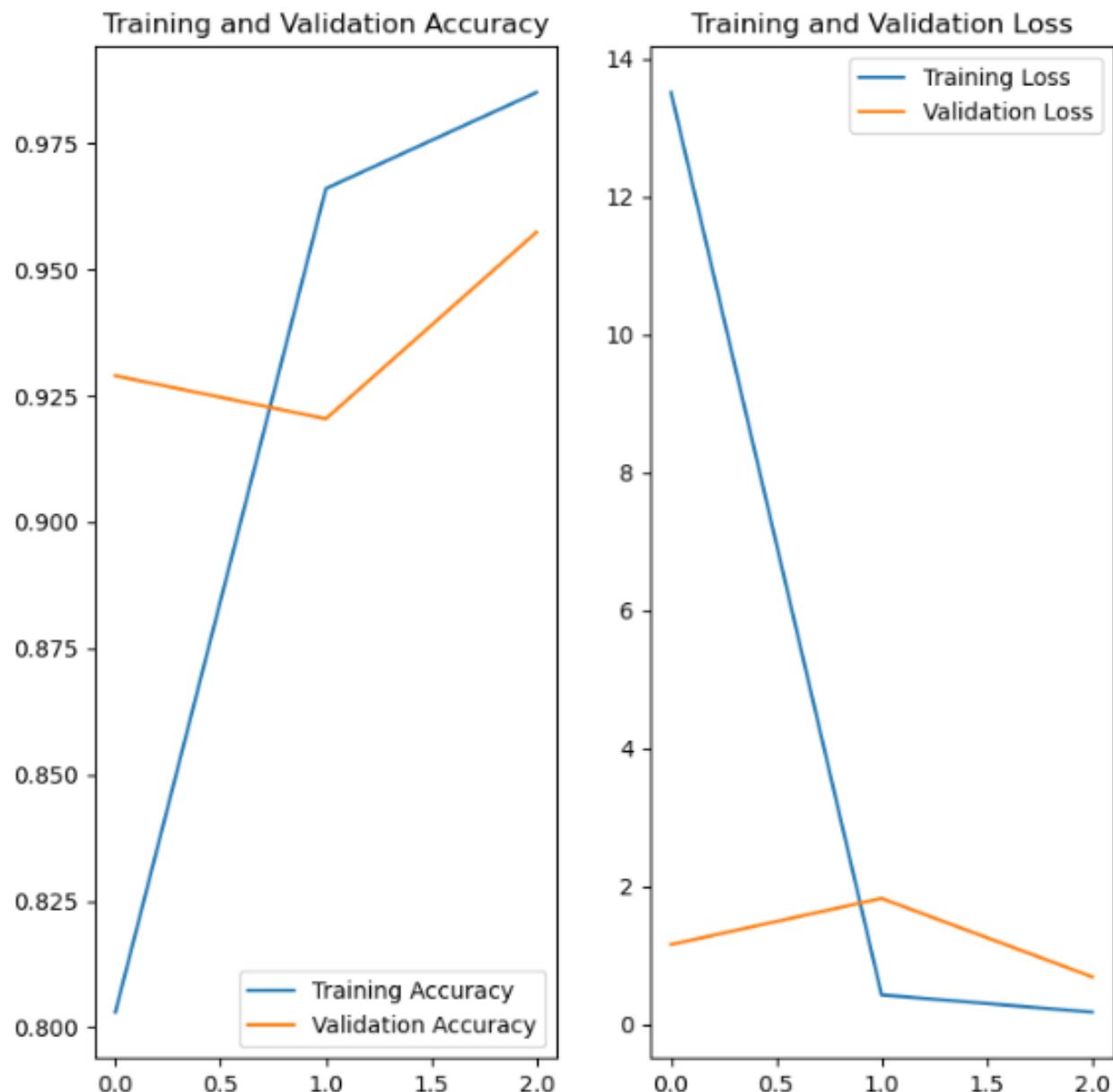
(e) 50:25:25

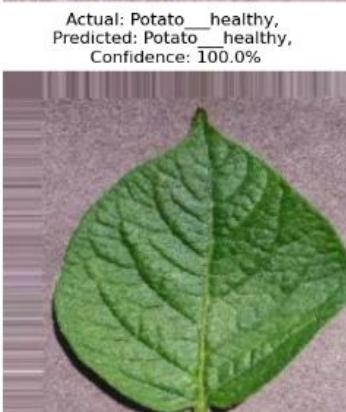
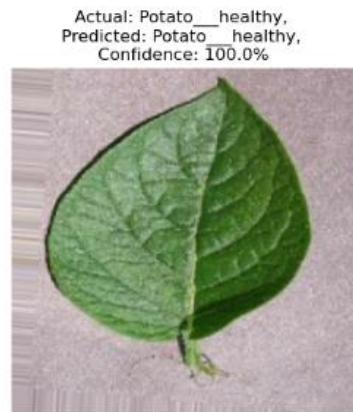
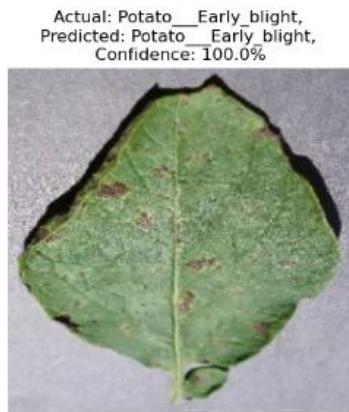
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=3
```

```
scores=model_from_vgg16.evaluate(test_ds)  
scores
```

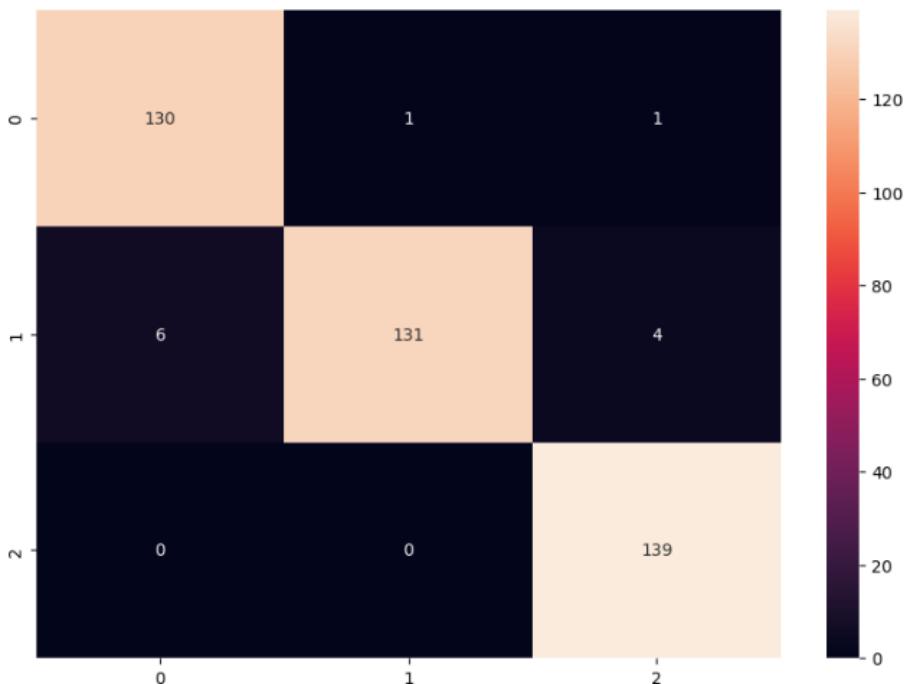
```
13/13 [=====] - 55s 4s/step - loss: 0.4901 - accuracy: 0.9709  
[0.4900628626346588, 0.9708737730979919]
```

Average Time per Epoch: 138.00 s





Classification Report:				
	precision	recall	f1-score	support
0	0.96	0.98	0.97	132
1	0.99	0.93	0.96	141
2	0.97	1.00	0.98	139
accuracy			0.97	412
macro avg	0.97	0.97	0.97	412
weighted avg	0.97	0.97	0.97	412



Model 4: VGG19

BASE MODEL

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=2
```

```
scores=model_from_vgg19.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 30s 5s/step - loss: 0.4938 - accuracy: 0.9792  
[0.4937702715396881, 0.9791666865348816]
```

Average Time per Epoch: 205.50 s

```
history3.history['loss']
```

```
[6.818243980407715, 0.14366549253463745]
```

```
history3.history['accuracy']
```

```
[0.8737288117408752, 0.9872881174087524]
```

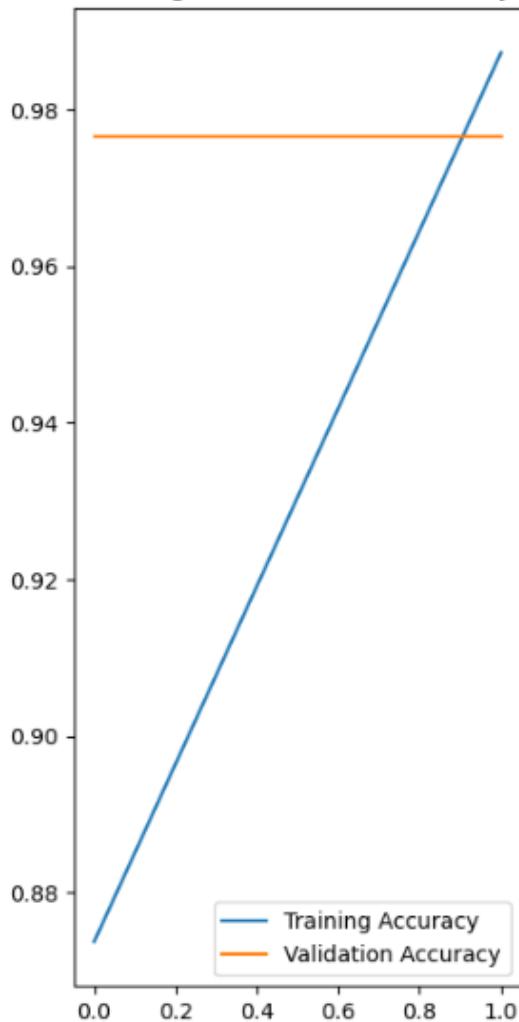
```
history3.history['val_loss']
```

```
[0.23339128494262695, 0.2837856113910675]
```

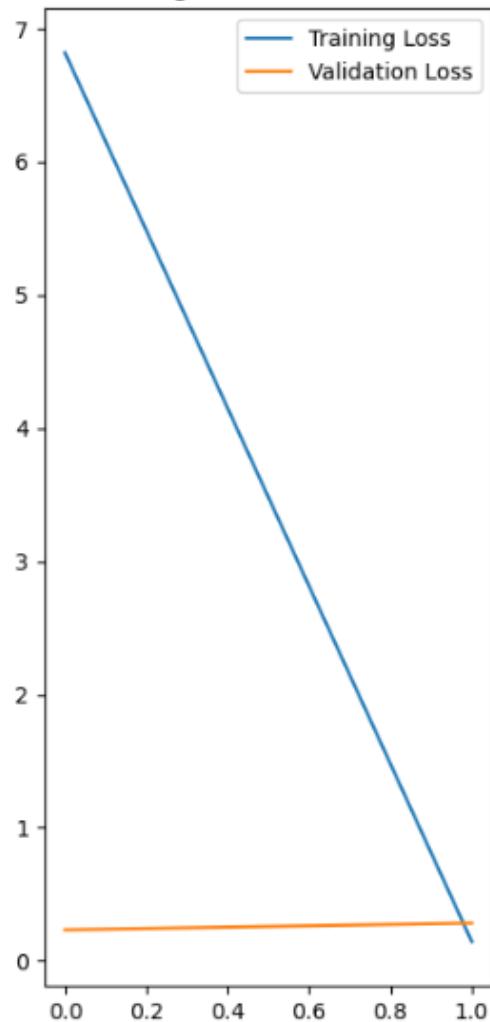
```
history3.history['val_accuracy']
```

```
[0.9765625, 0.9765625]
```

Training and Validation Accuracy



Training and Validation Loss



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



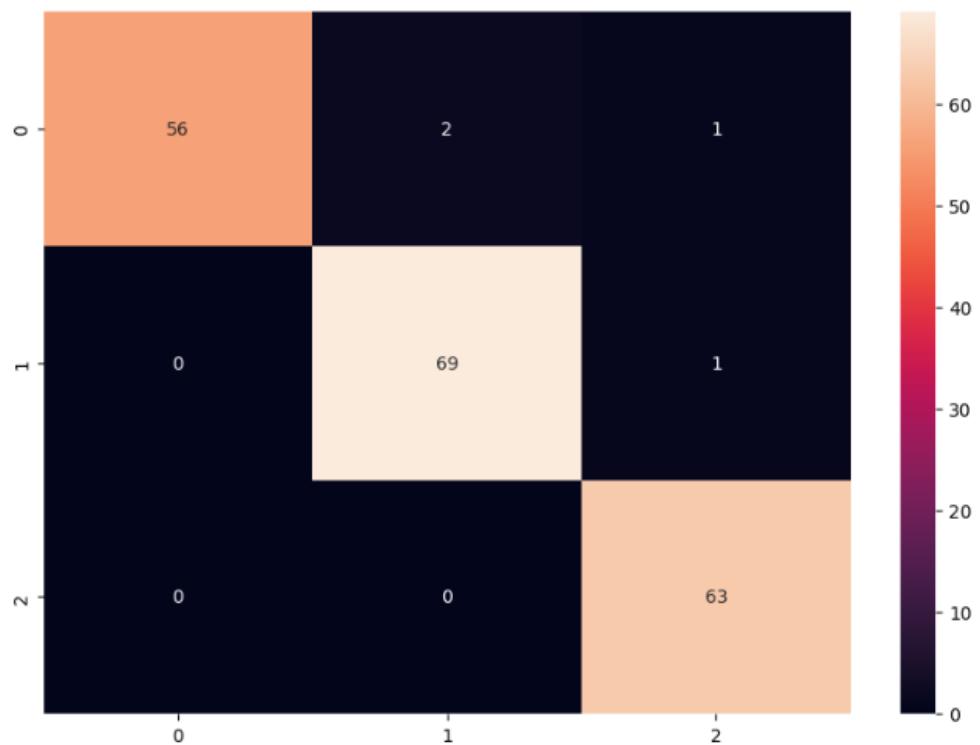
Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Classification Report:					
	precision	recall	f1-score	support	
0	1.00	0.95	0.97	59	
1	0.97	0.99	0.98	70	
2	0.97	1.00	0.98	63	
accuracy			0.98	192	
macro avg	0.98	0.98	0.98	192	
weighted avg	0.98	0.98	0.98	192	



NO. OF EPOCHS

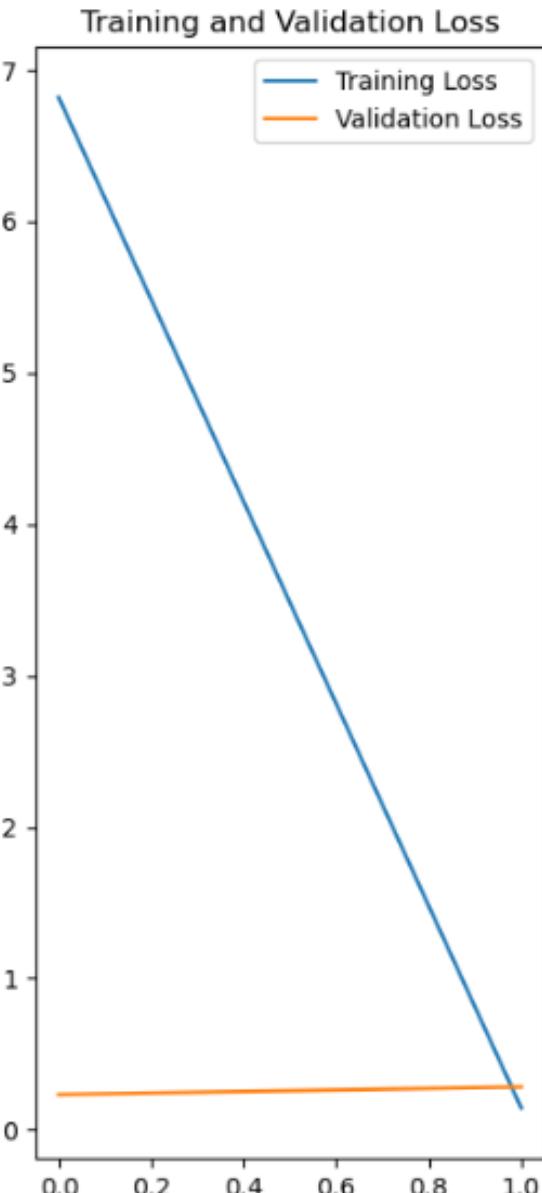
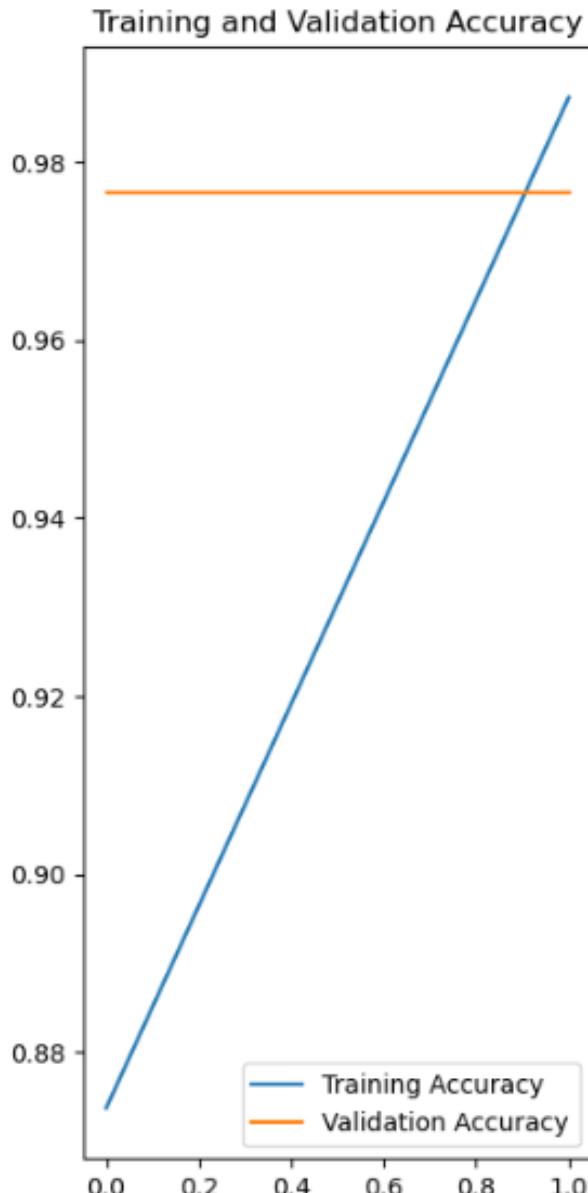
(a) 2

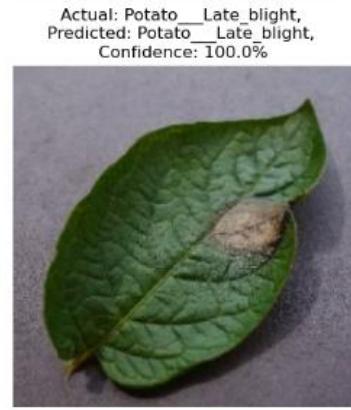
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=2
```

```
scores=model_from_vgg19.evaluate(test_ds)  
scores
```

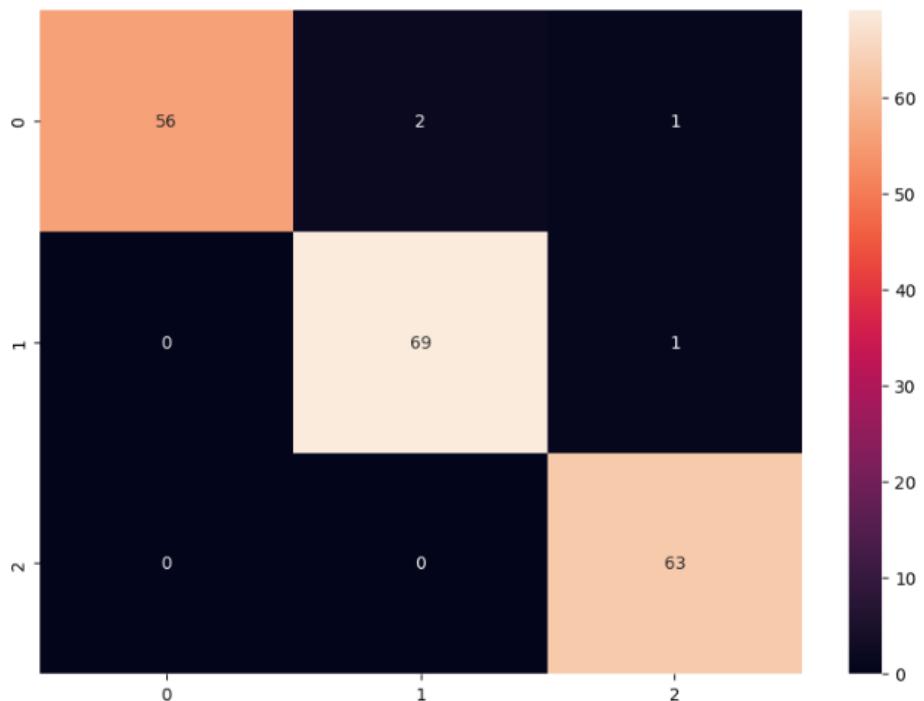
```
6/6 [=====] - 30s 5s/step - loss: 0.4938 - accuracy: 0.9792  
[0.4937702715396881, 0.9791666865348816]
```

Average Time per Epoch: 205.50 s





Classification Report:					
	precision	recall	f1-score	support	
0	1.00	0.95	0.97	59	
1	0.97	0.99	0.98	70	
2	0.97	1.00	0.98	63	
accuracy			0.98	192	
macro avg	0.98	0.98	0.98	192	
weighted avg	0.98	0.98	0.98	192	



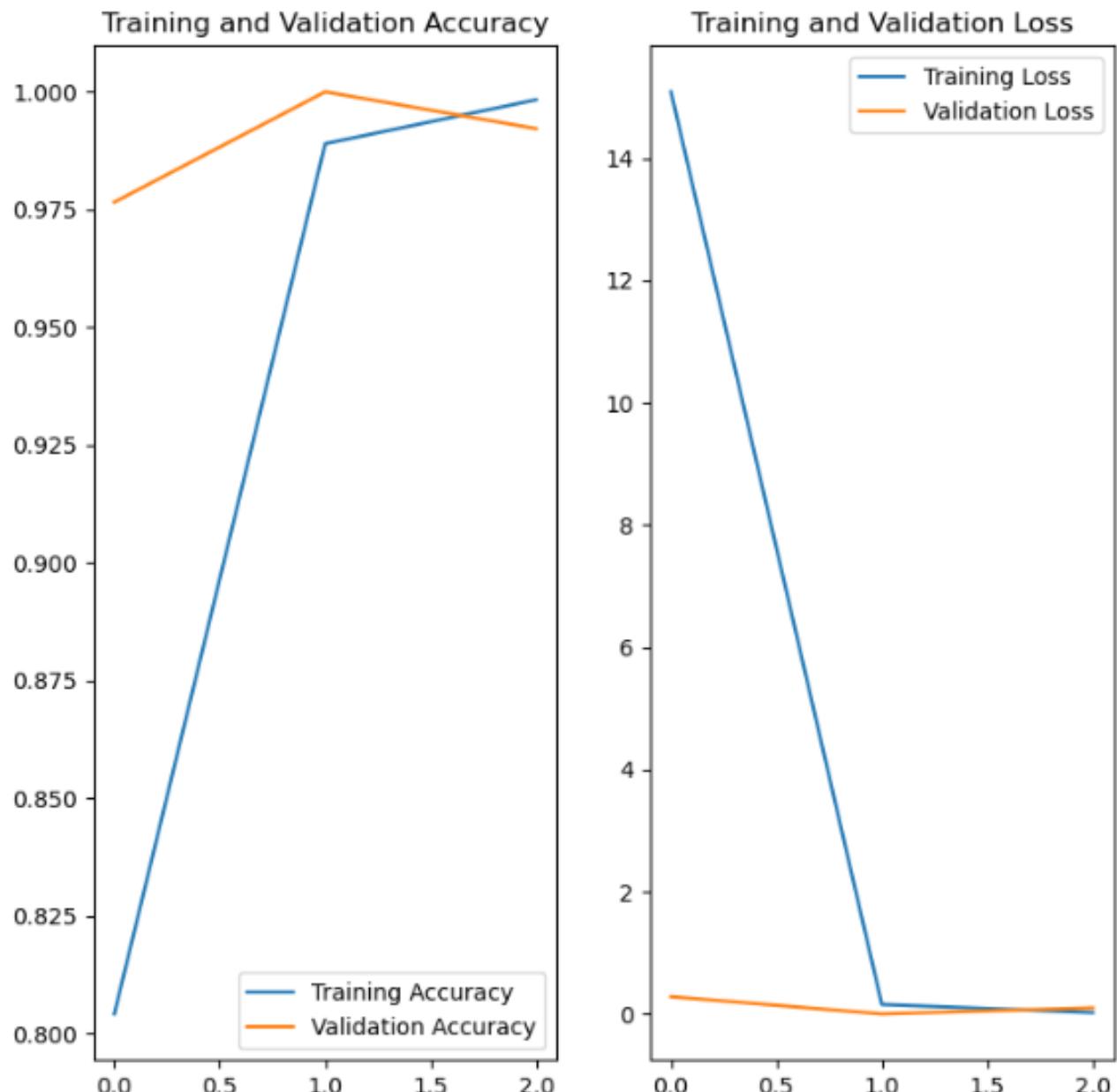
(b) 3

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=3
```

```
scores=model_from_vgg19.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 28s 5s/step - loss: 1.6950e-07 - accuracy: 1.0000  
[1.694981079936042e-07, 1.0]
```

Average Time per Epoch: 217.67 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%

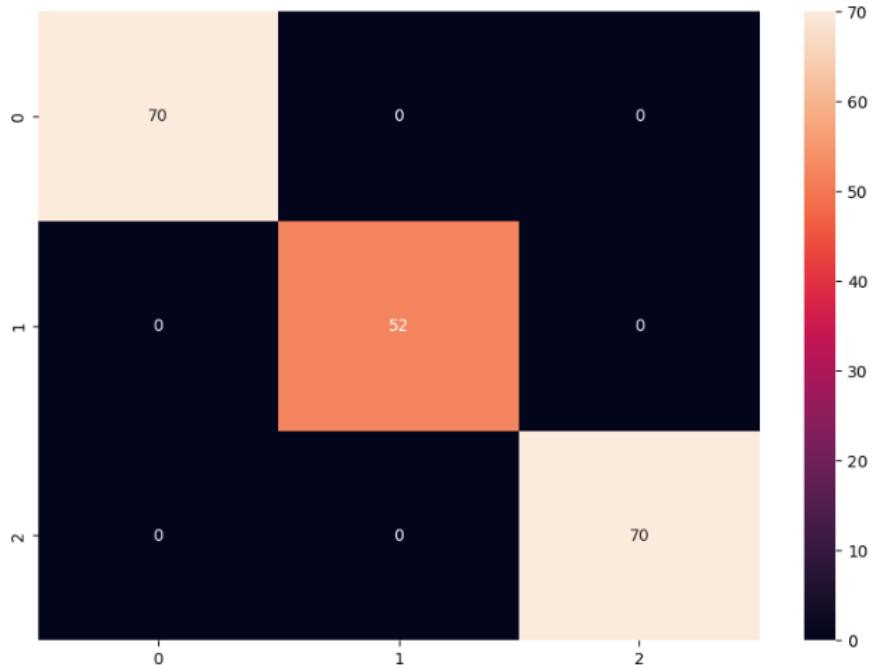


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	1.00	1.00	1.00	70
1	1.00	1.00	1.00	52
2	1.00	1.00	1.00	70
accuracy			1.00	192
macro avg	1.00	1.00	1.00	192
weighted avg	1.00	1.00	1.00	192



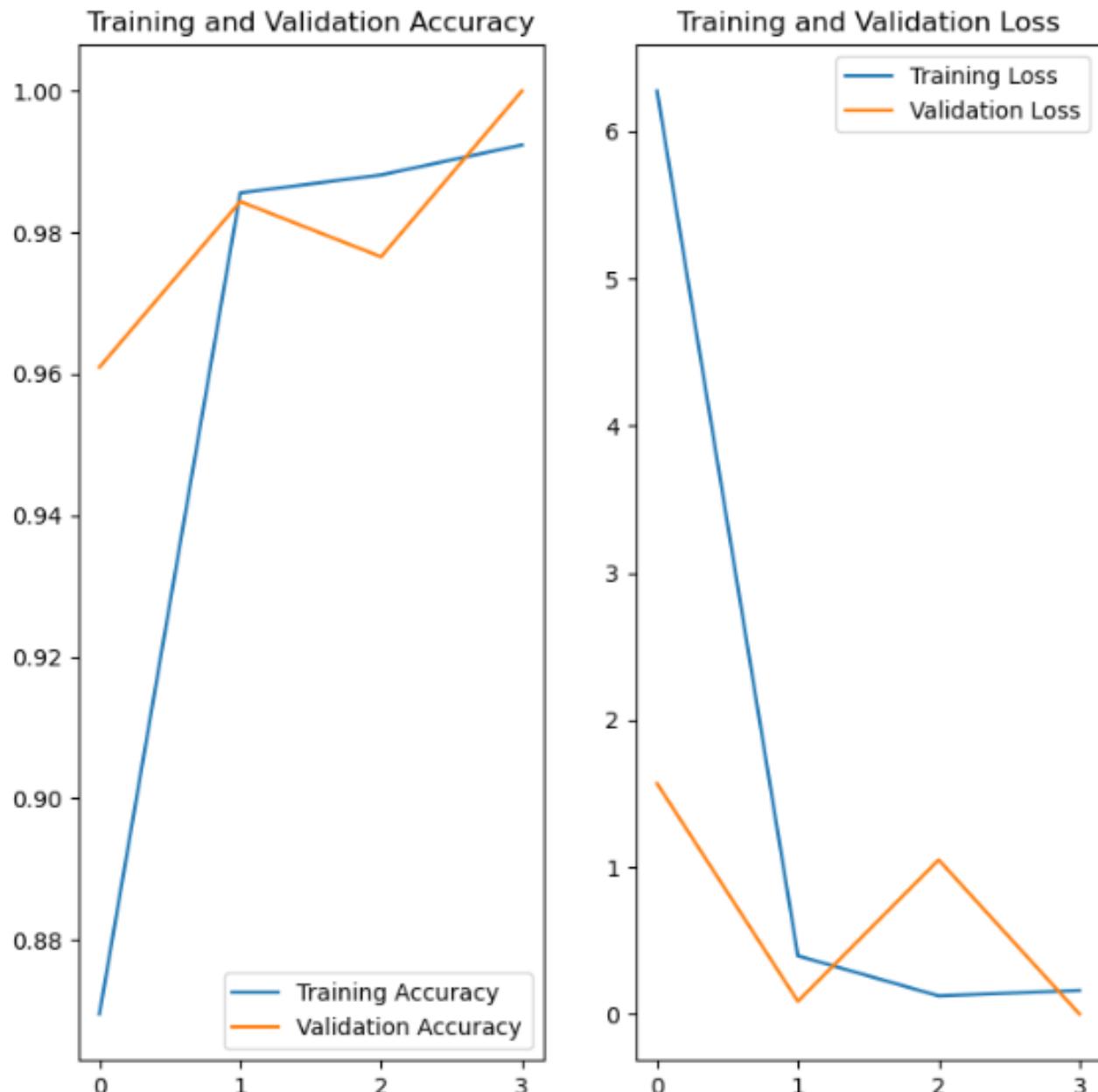
(c) 4

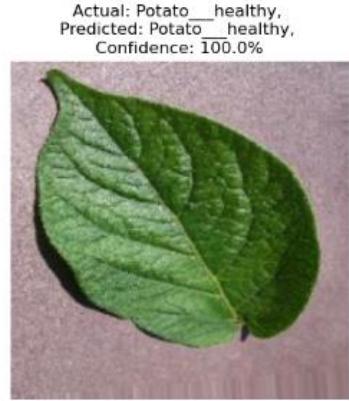
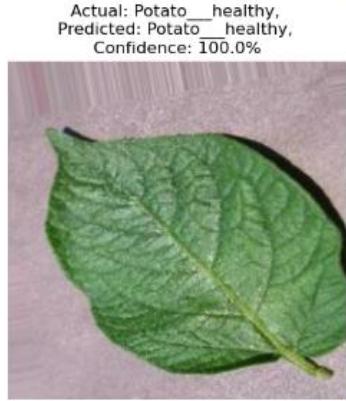
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=4
```

```
scores=model_from_vgg19.evaluate(test_ds)  
scores
```

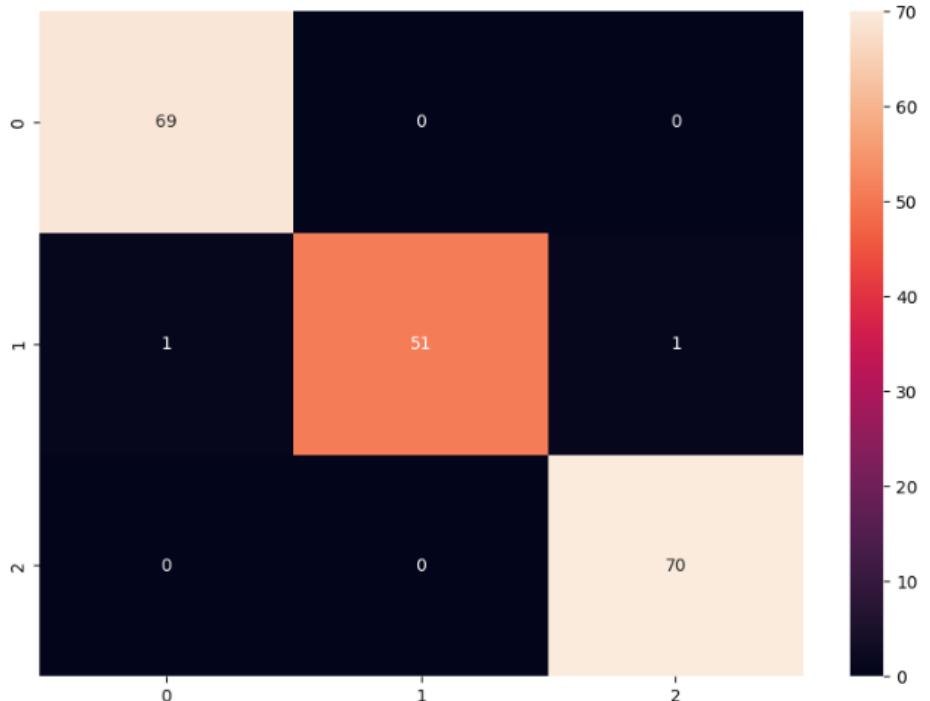
```
6/6 [=====] - 30s 5s/step - loss: 0.2015 - accuracy: 0.9896  
[0.20145006477832794, 0.9895833134651184]
```

Average Time per Epoch: 209.50 s





Classification Report:					
	precision	recall	f1-score	support	
0	0.99	1.00	0.99	69	
1	1.00	0.96	0.98	53	
2	0.99	1.00	0.99	70	
accuracy			0.99	192	
macro avg	0.99	0.99	0.99	192	
weighted avg	0.99	0.99	0.99	192	



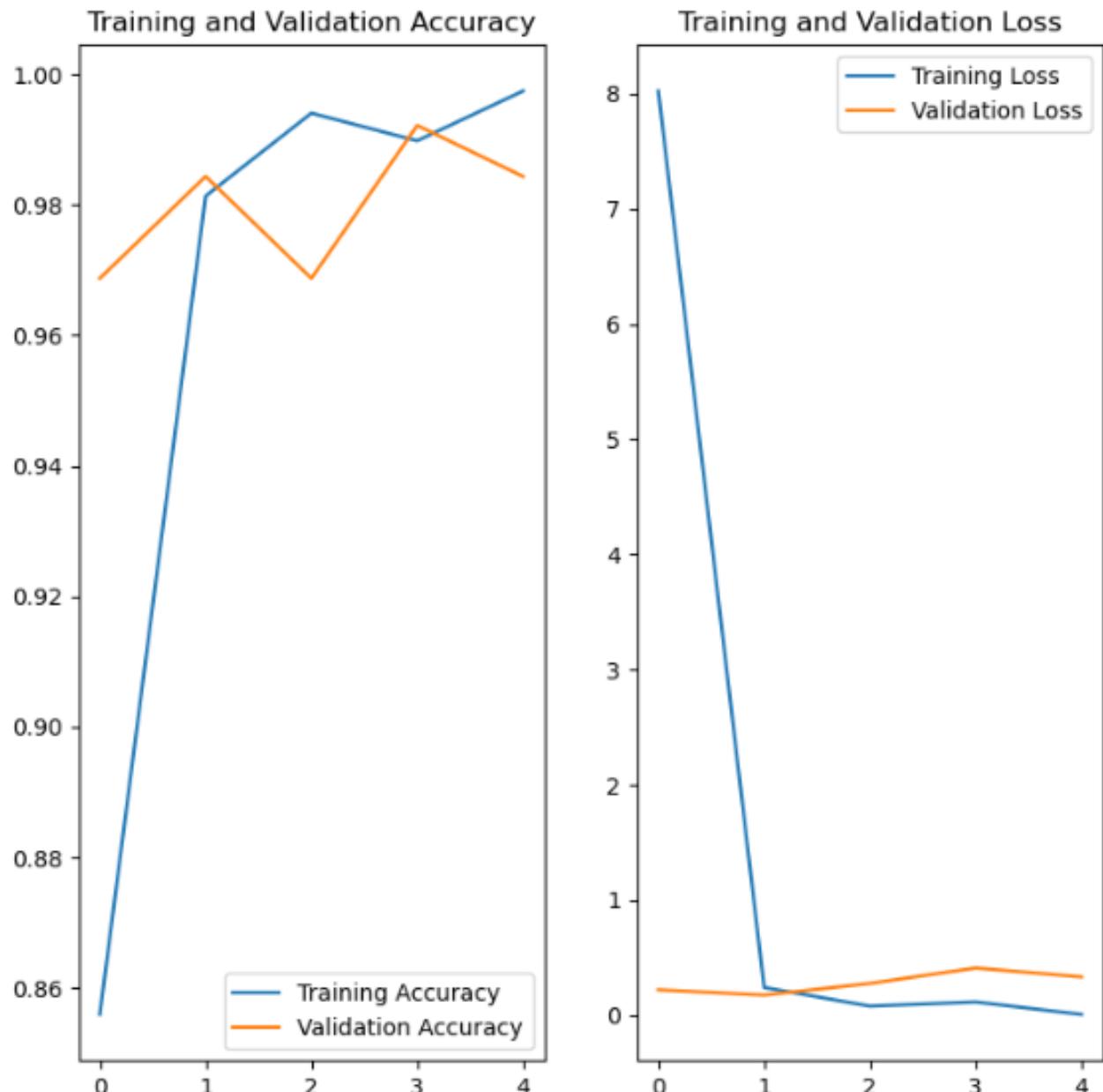
(d) 5

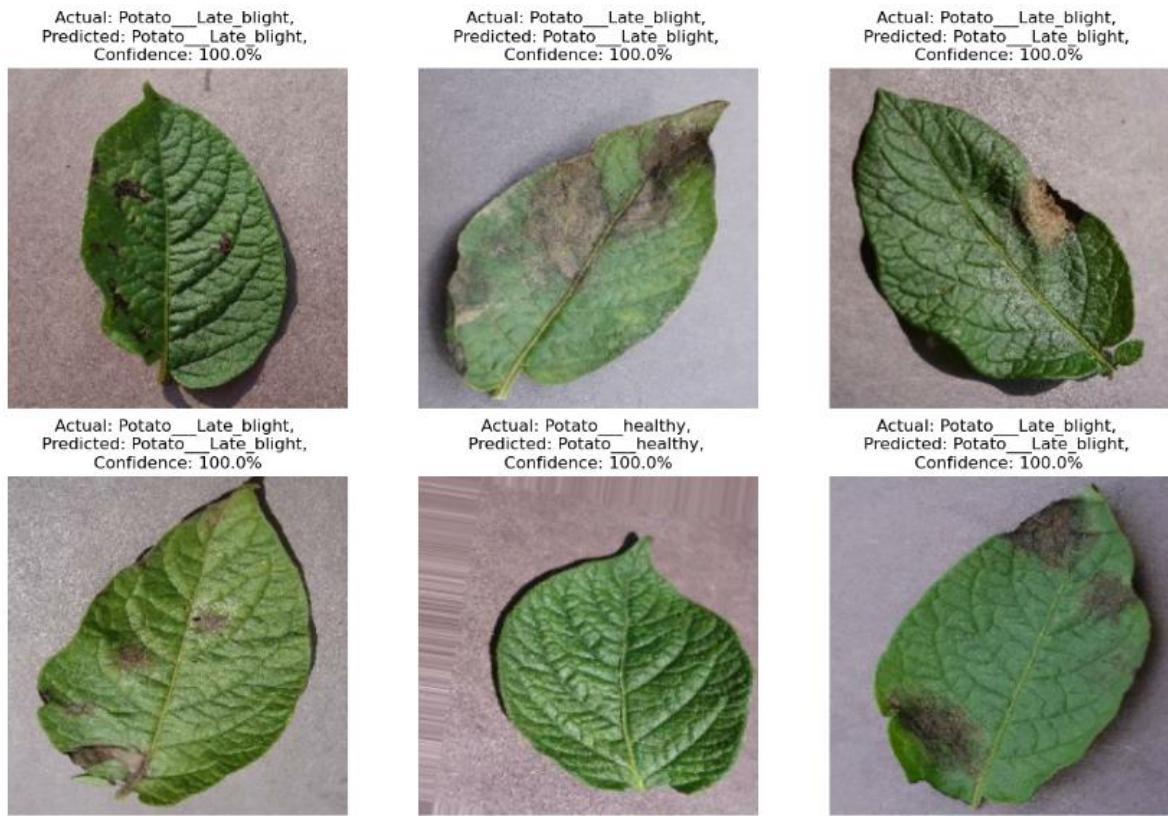
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=5
```

```
scores=model_from_vgg19.evaluate(test_ds)  
scores
```

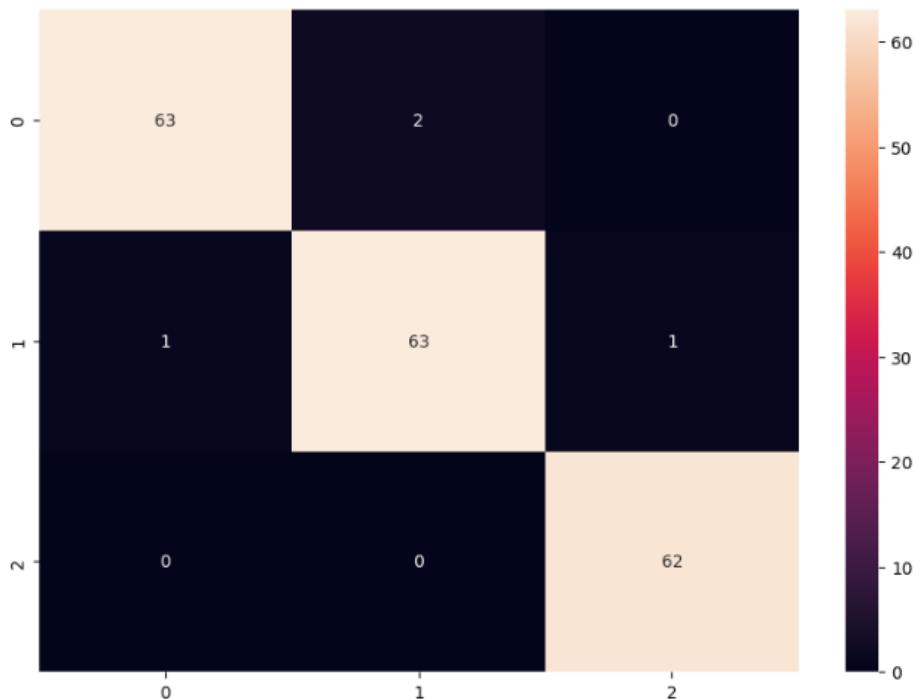
```
6/6 [=====] - 31s 5s/step - loss: 0.2437 - accuracy: 0.9792  
[0.24365198612213135, 0.9791666865348816]
```

Average Time per Epoch: 210.40 s





Classification Report:					
	precision	recall	f1-score	support	
0	0.98	0.97	0.98	65	
1	0.97	0.97	0.97	65	
2	0.98	1.00	0.99	62	
accuracy			0.98	192	
macro avg	0.98	0.98	0.98	192	
weighted avg	0.98	0.98	0.98	192	



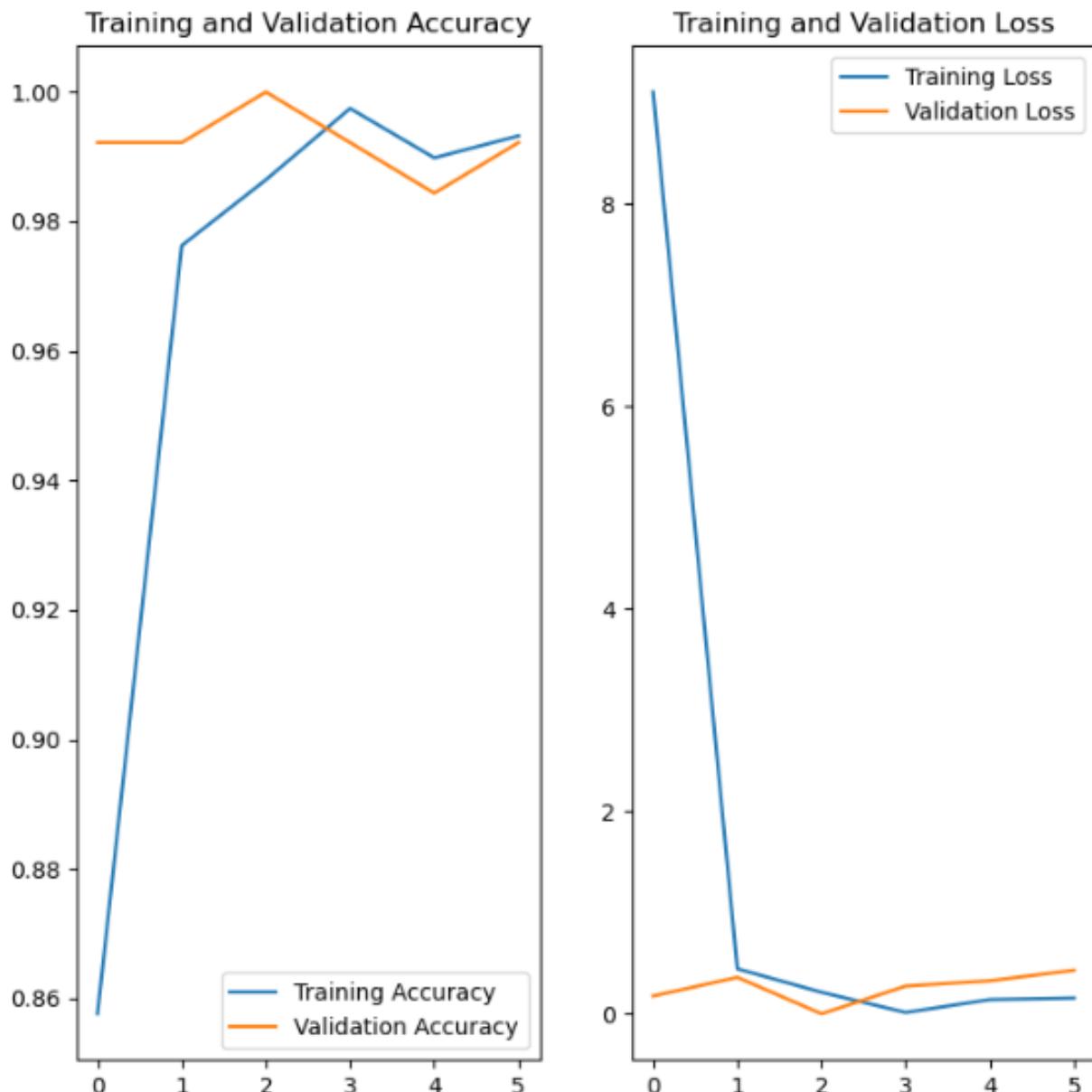
(e) 6

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=6
```

```
scores=model_from_vgg19.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 23s 4s/step - loss: 0.6647 - accuracy: 0.9792  
[0.6646503210067749, 0.9791666865348816]
```

Average Time per Epoch: 209.33 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%

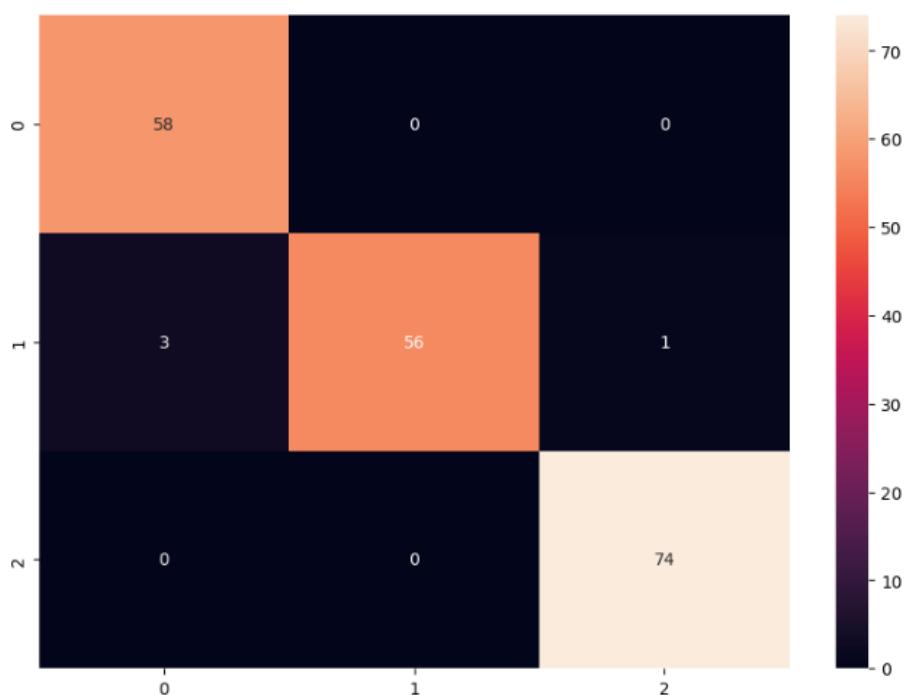


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	0.95	1.00	0.97	58
1	1.00	0.93	0.97	60
2	0.99	1.00	0.99	74
accuracy			0.98	192
macro avg	0.98	0.98	0.98	192
weighted avg	0.98	0.98	0.98	192



BATCH SIZE

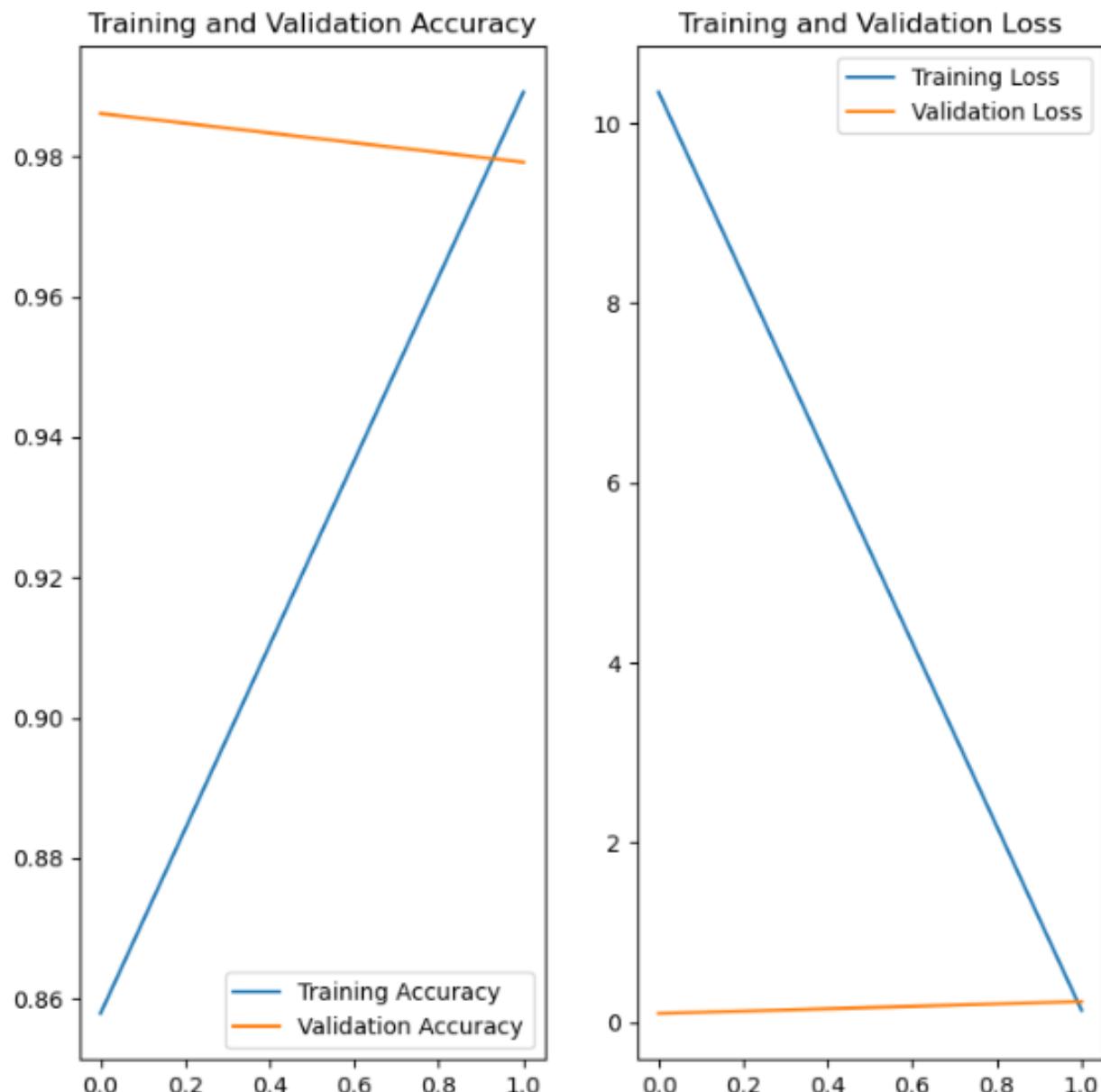
(a) 16

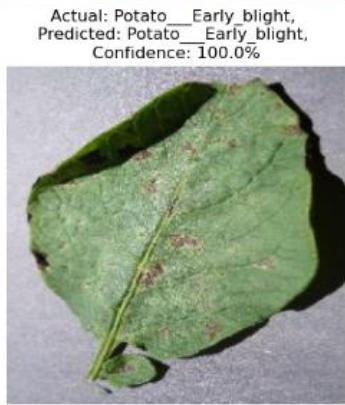
```
IMAGE_SIZE=224  
BATCH_SIZE=16  
CHANNELS=3  
EPOCHS=2
```

```
scores=model_from_vgg19.evaluate(test_ds)  
scores
```

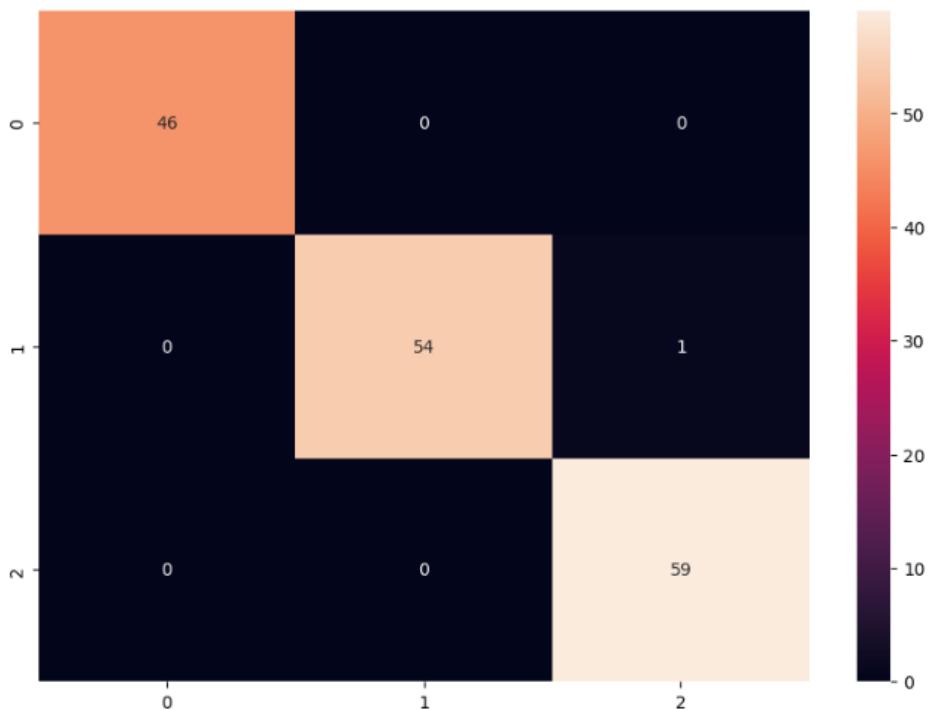
```
10/10 [=====] - 21s 2s/step - loss: 0.0409 - accuracy: 0.9937  
[0.040864571928977966, 0.9937499761581421]
```

Average Time per Epoch: 216.00 s





Classification Report:					
	precision	recall	f1-score	support	
0	1.00	1.00	1.00	46	
1	1.00	0.98	0.99	55	
2	0.98	1.00	0.99	59	
accuracy			0.99	160	
macro avg	0.99	0.99	0.99	160	
weighted avg	0.99	0.99	0.99	160	



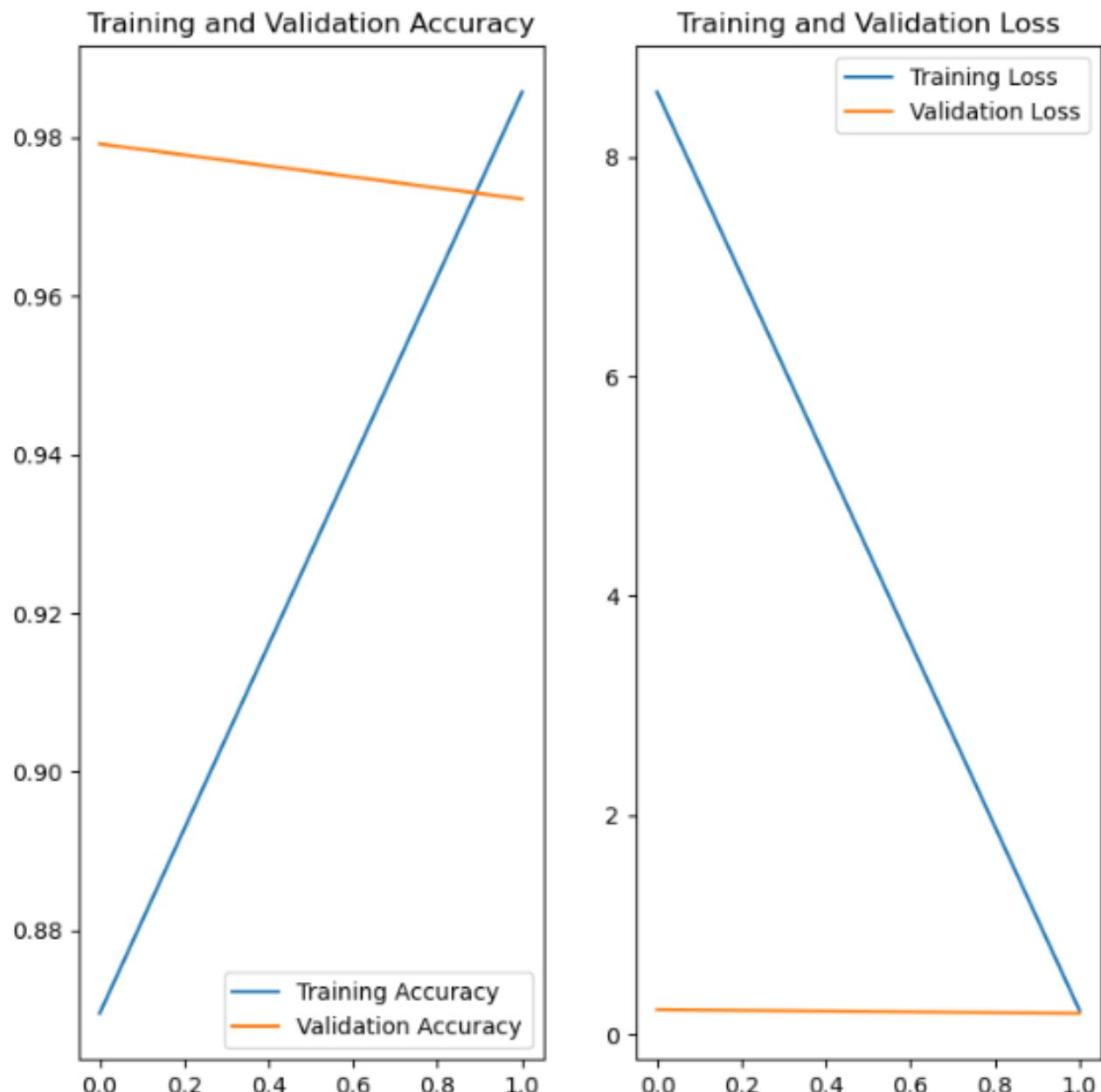
(b) 24

```
IMAGE_SIZE=224  
BATCH_SIZE=24  
CHANNELS=3  
EPOCHS=2
```

```
scores=model_from_vgg19.evaluate(test_ds)  
scores
```

```
7/7 [=====] - 23s 3s/step - loss: 0.0385 - accuracy: 0.9940  
[0.03845612332224846, 0.9940476417541504]
```

Average Time per Epoch: 216.00 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



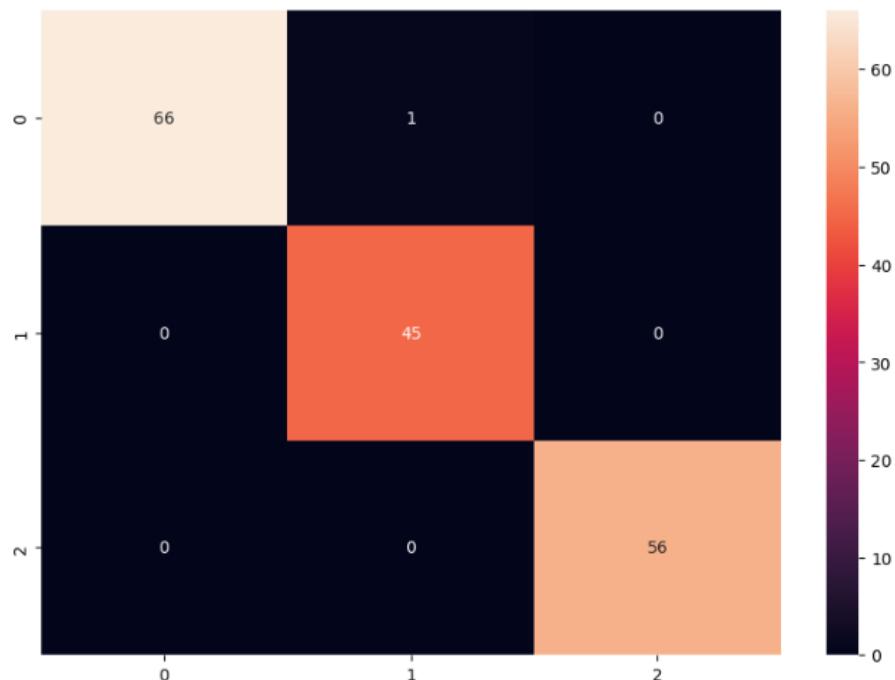
Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Classification Report:					
	precision	recall	f1-score	support	
0	1.00	0.99	0.99	67	
1	0.98	1.00	0.99	45	
2	1.00	1.00	1.00	56	
accuracy			0.99	168	
macro avg	0.99	1.00	0.99	168	
weighted avg	0.99	0.99	0.99	168	



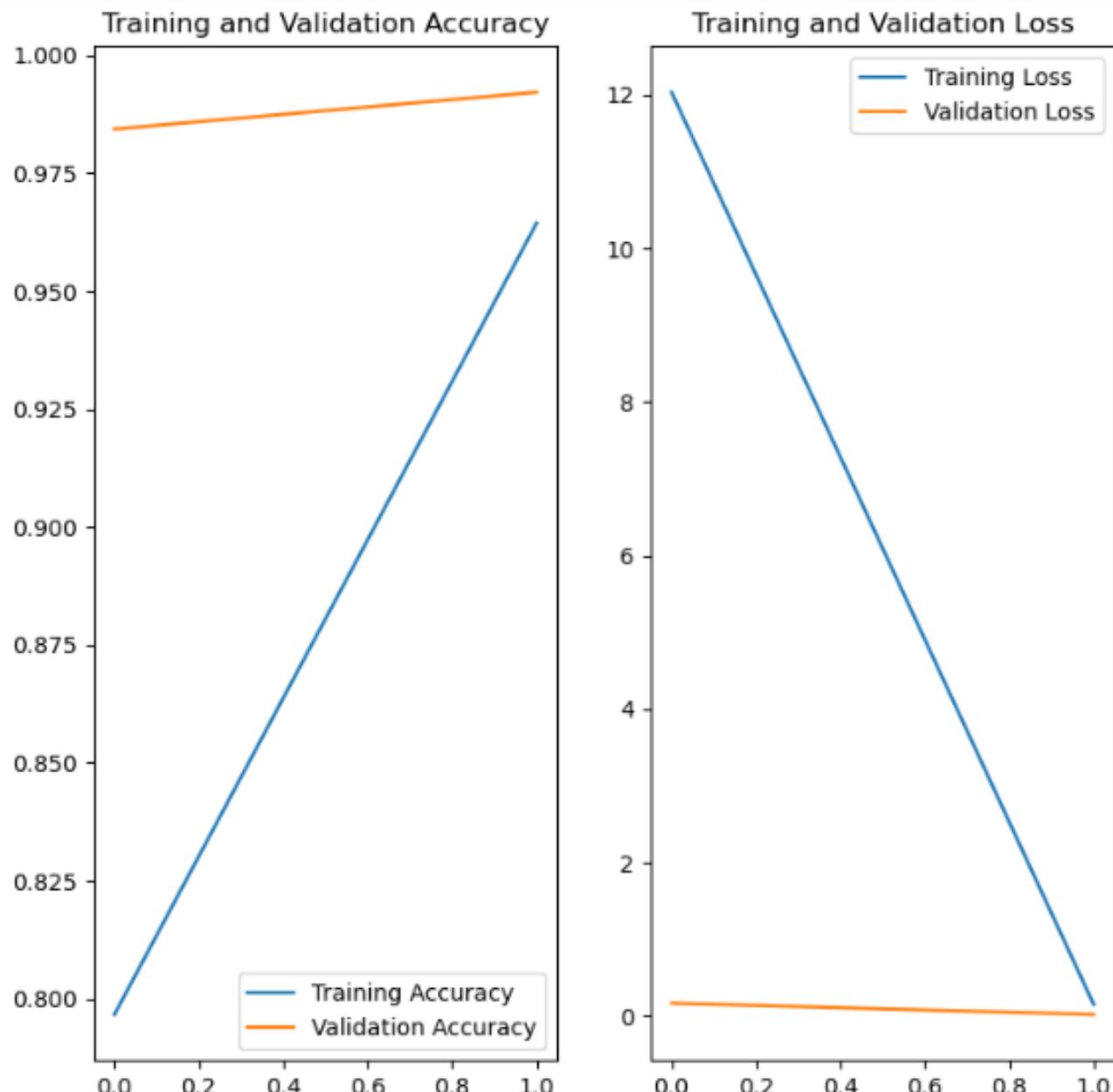
(c) 32

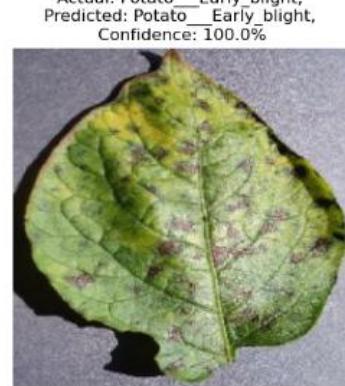
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=2
```

```
scores=model_from_vgg19.evaluate(test_ds)  
scores
```

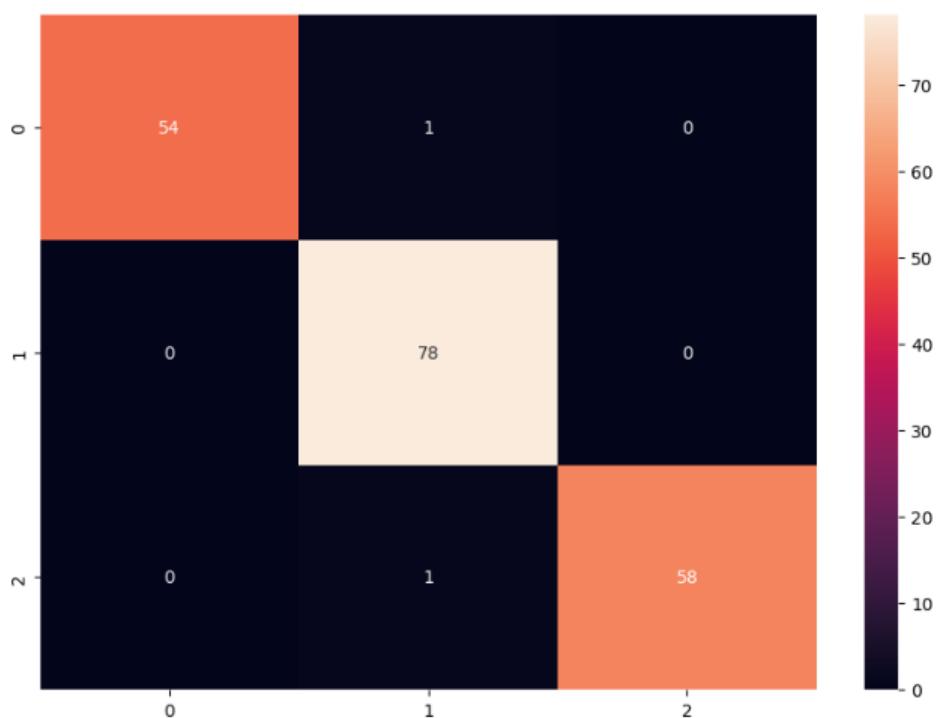
```
6/6 [=====] - 31s 5s/step - loss: 0.0248 - accuracy: 0.9896  
[0.024799933657050133, 0.9895833134651184]
```

Average Time per Epoch: 209.50 s





Classification Report:					
	precision	recall	f1-score	support	
0	1.00	0.98	0.99	55	
1	0.97	1.00	0.99	78	
2	1.00	0.98	0.99	59	
accuracy			0.99	192	
macro avg	0.99	0.99	0.99	192	
weighted avg	0.99	0.99	0.99	192	



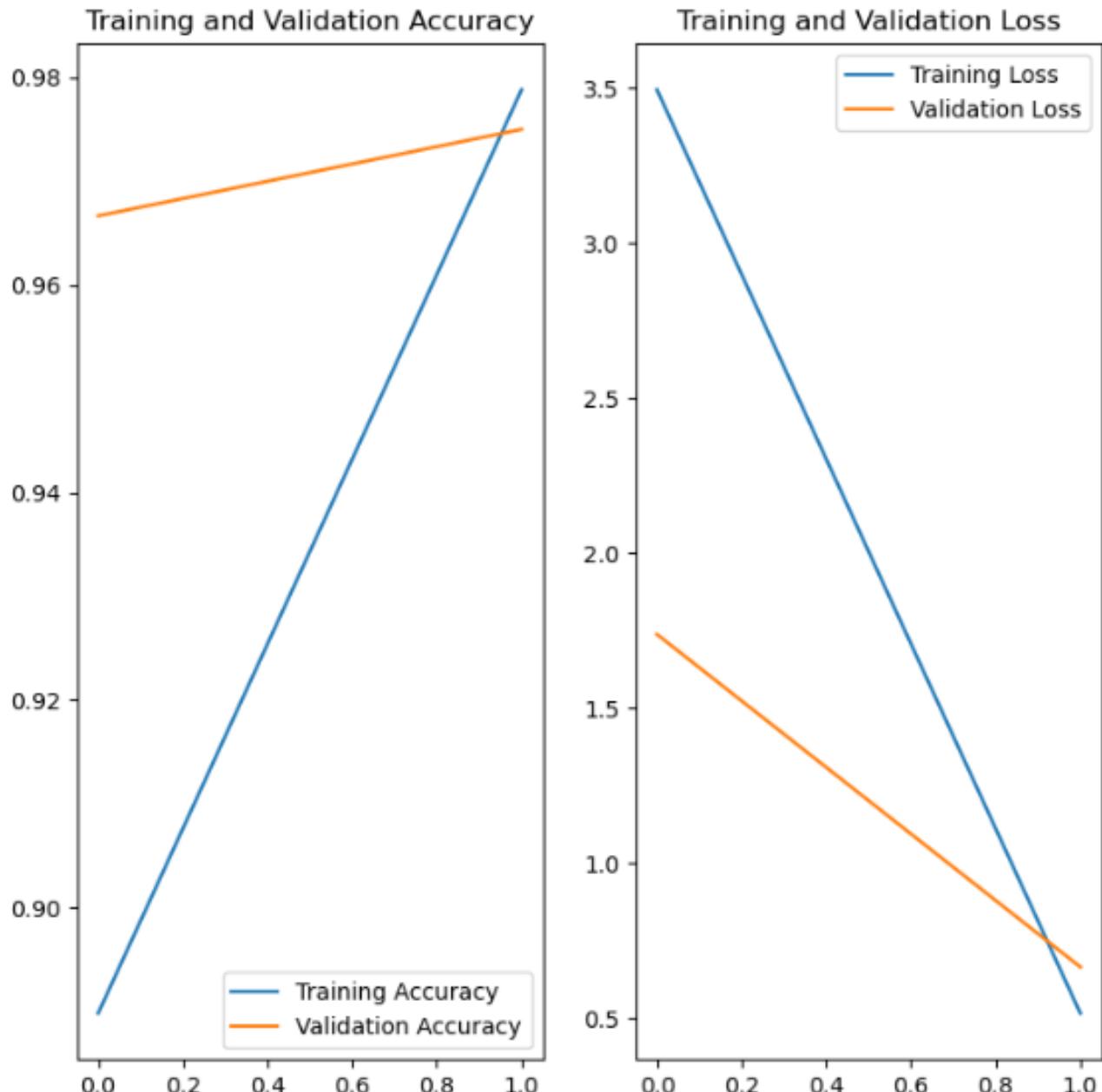
(d) 40

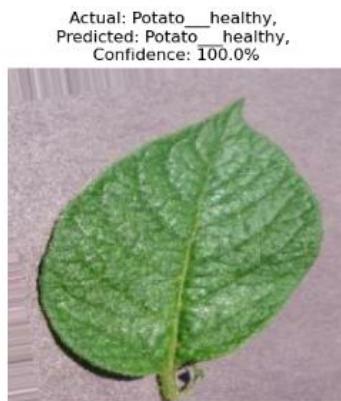
```
IMAGE_SIZE=224  
BATCH_SIZE=40  
CHANNELS=3  
EPOCHS=2
```

```
scores=model_from_vgg19.evaluate(test_ds)  
scores
```

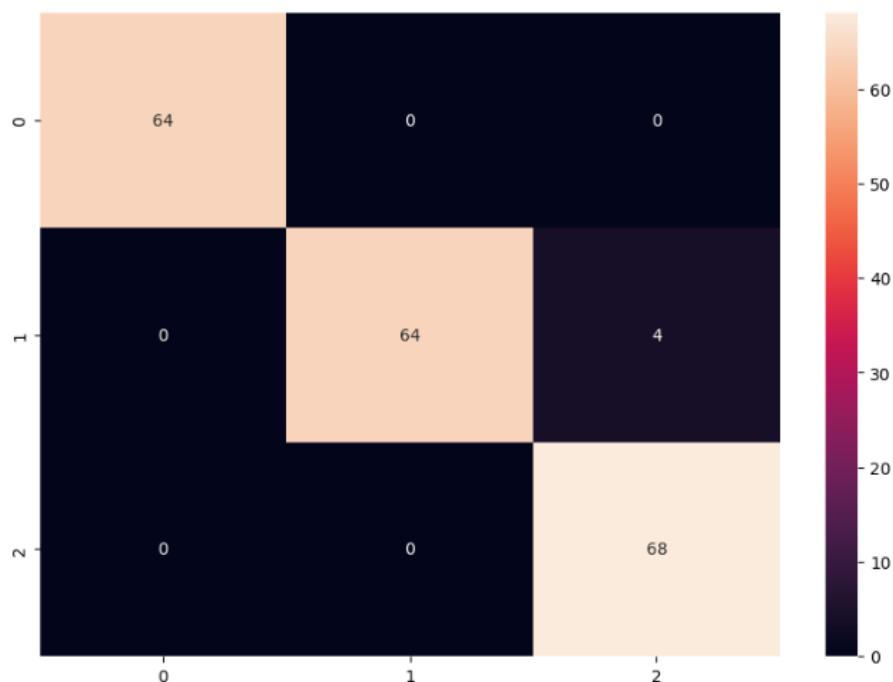
```
5/5 [=====] - 33s 6s/step - loss: 0.5060 - accuracy: 0.9800  
[0.5059549808502197, 0.9800000190734863]
```

Average Time per Epoch: 207.50 s





Classification Report:					
	precision	recall	f1-score	support	
0	1.00	1.00	1.00	64	
1	1.00	0.94	0.97	68	
2	0.94	1.00	0.97	68	
accuracy			0.98	200	
macro avg	0.98	0.98	0.98	200	
weighted avg	0.98	0.98	0.98	200	



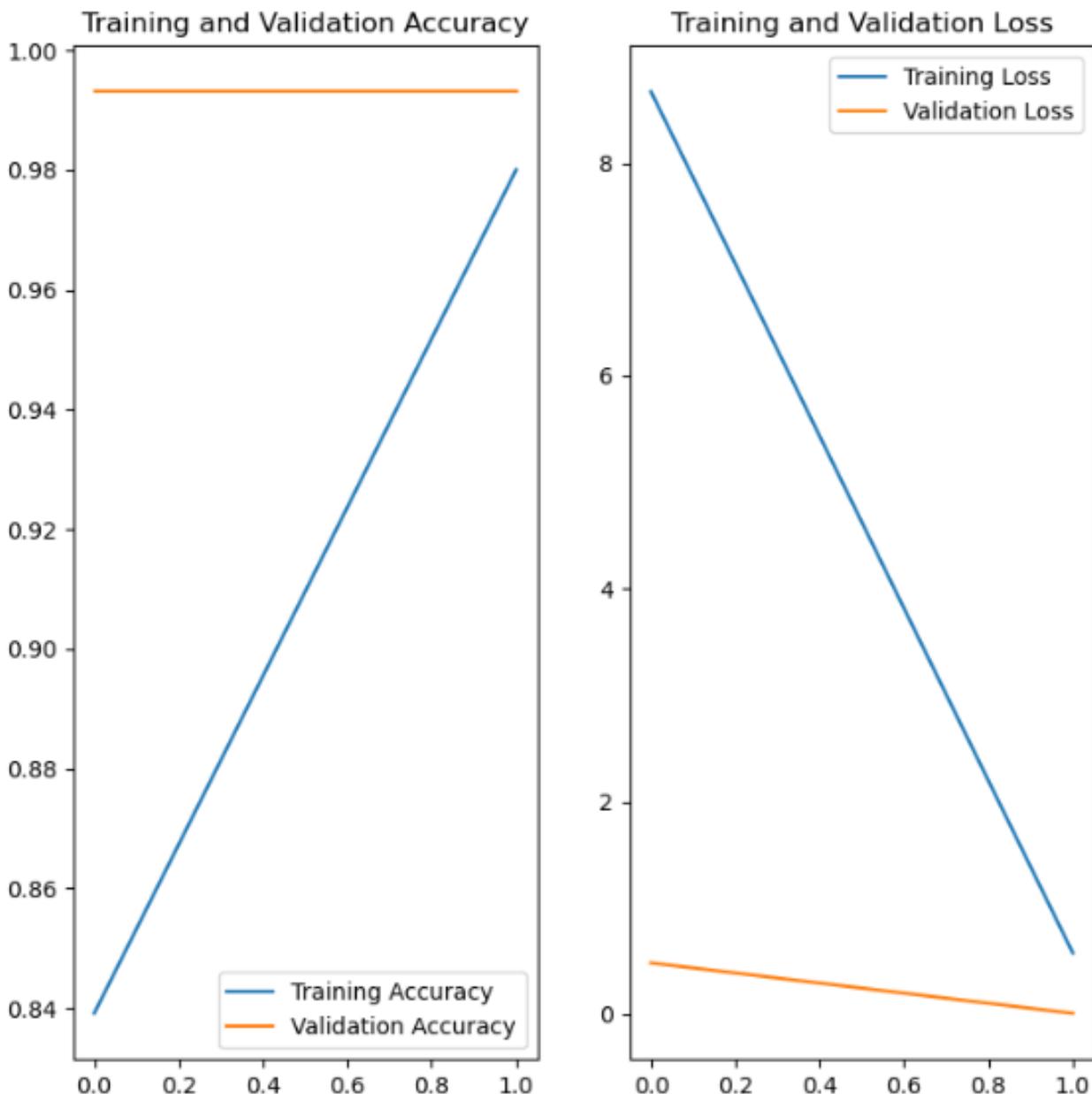
(e) 48

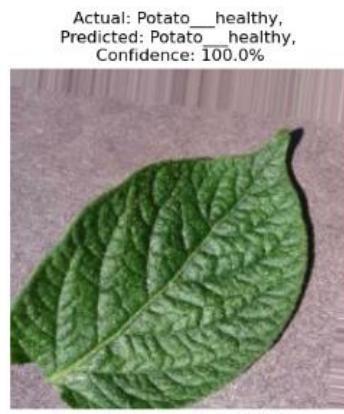
```
IMAGE_SIZE=224  
BATCH_SIZE=48  
CHANNELS=3  
EPOCHS=2
```

```
scores=model_from_vgg19.evaluate(test_ds)  
scores
```

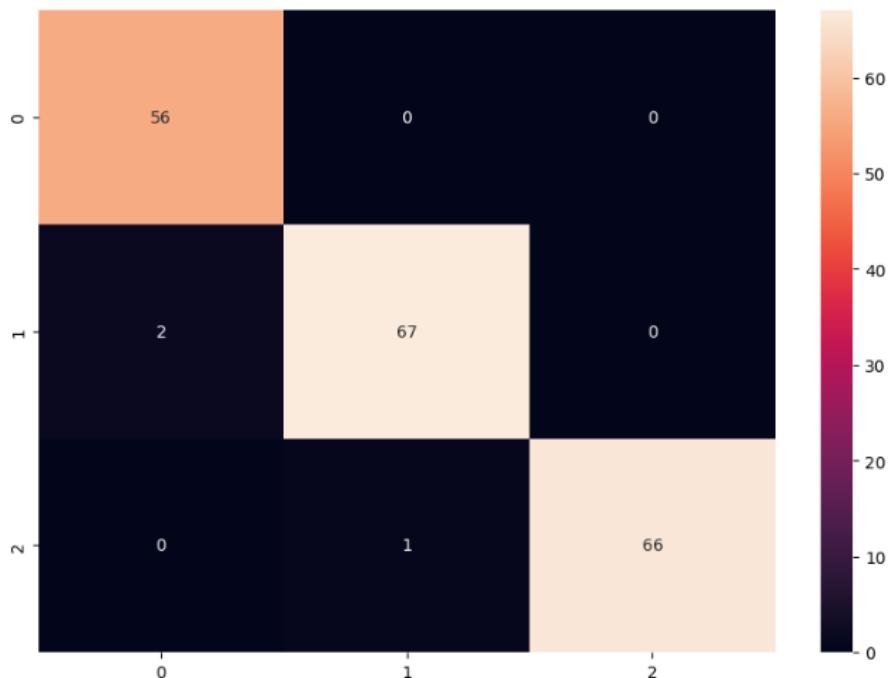
```
4/4 [=====] - 23s 6s/step - loss: 0.6685 - accuracy: 0.9844  
[0.6685178875923157, 0.984375]
```

Average Time per Epoch: 215.00 s





Classification Report:					
	precision	recall	f1-score	support	
0	0.97	1.00	0.98	56	
1	0.99	0.97	0.98	69	
2	1.00	0.99	0.99	67	
accuracy			0.98	192	
macro avg	0.98	0.99	0.98	192	
weighted avg	0.98	0.98	0.98	192	



DATASET SPLIT RATIO

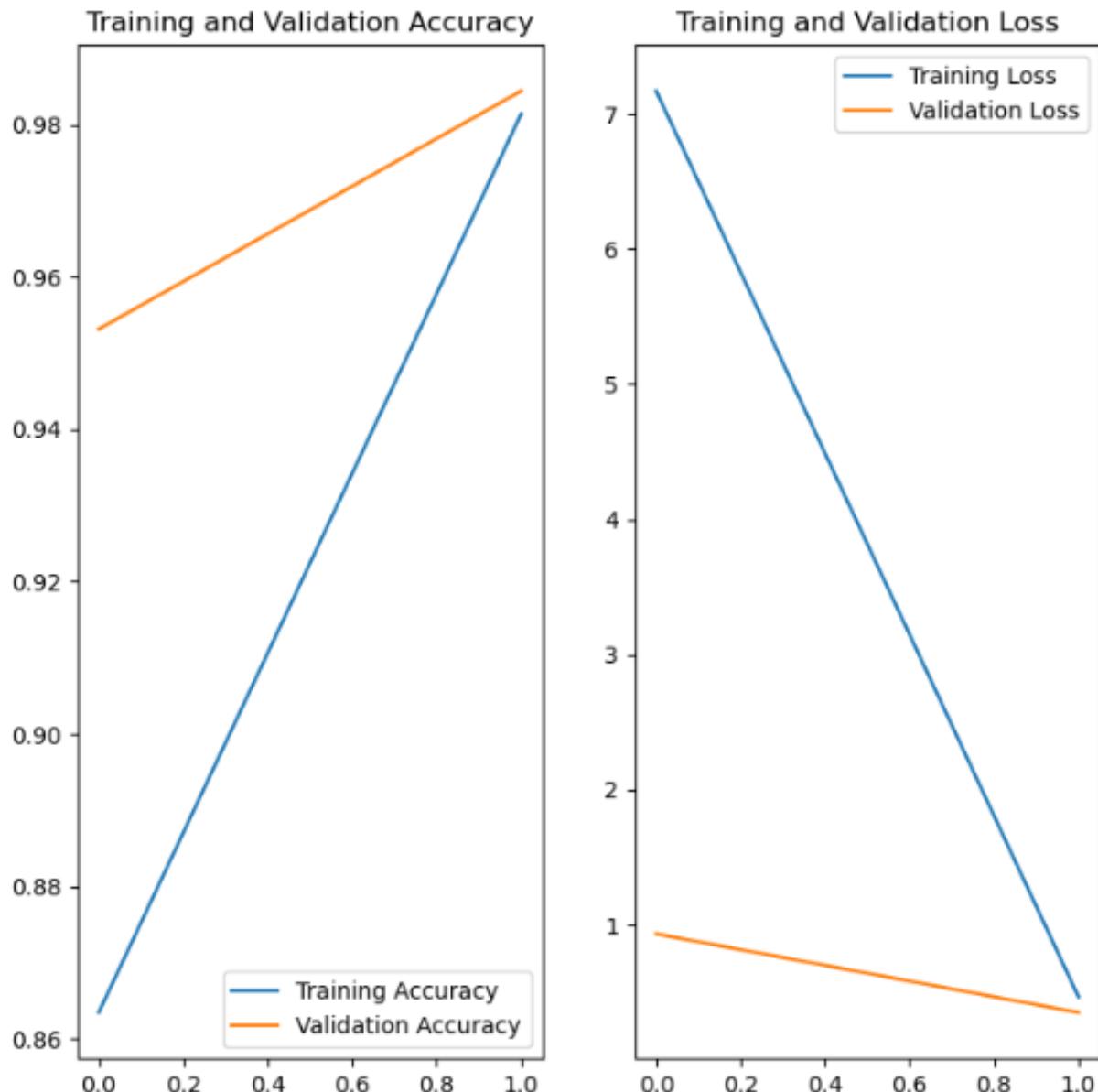
(a) 90:5:5

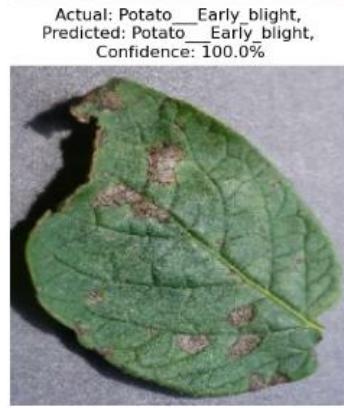
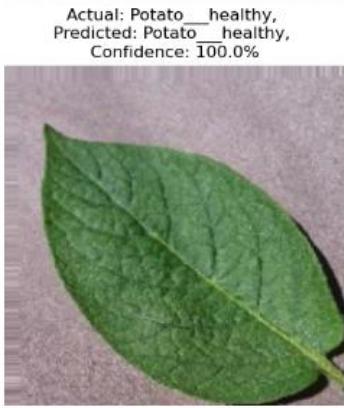
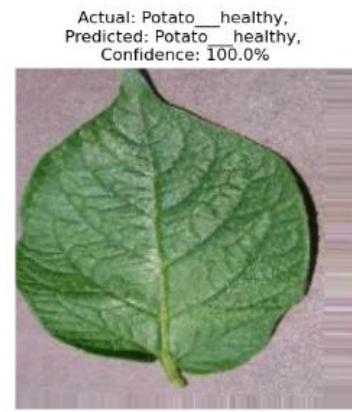
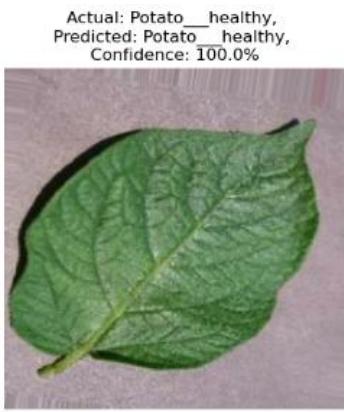
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=2
```

```
scores=model_from_vgg19.evaluate(test_ds)  
scores
```

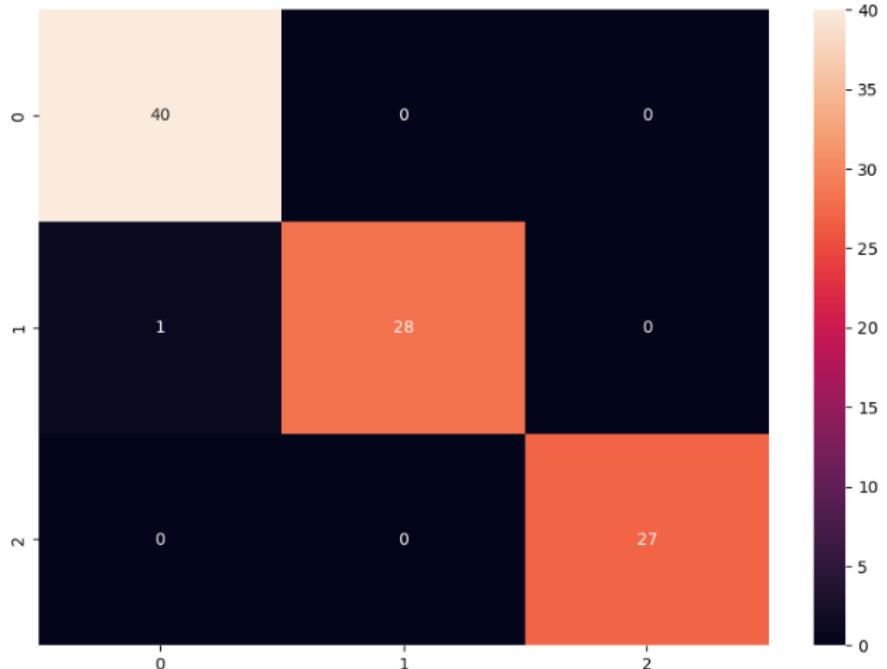
```
3/3 [=====] - 13s 4s/step - loss: 0.0337 - accuracy: 0.9896  
[0.03372085094451904, 0.9895833134651184]
```

Average Time per Epoch: 226.50 s





Classification Report:					
	precision	recall	f1-score	support	
0	0.98	1.00	0.99	40	
1	1.00	0.97	0.98	29	
2	1.00	1.00	1.00	27	
accuracy			0.99	96	
macro avg	0.99	0.99	0.99	96	
weighted avg	0.99	0.99	0.99	96	



(b) 80:10:10

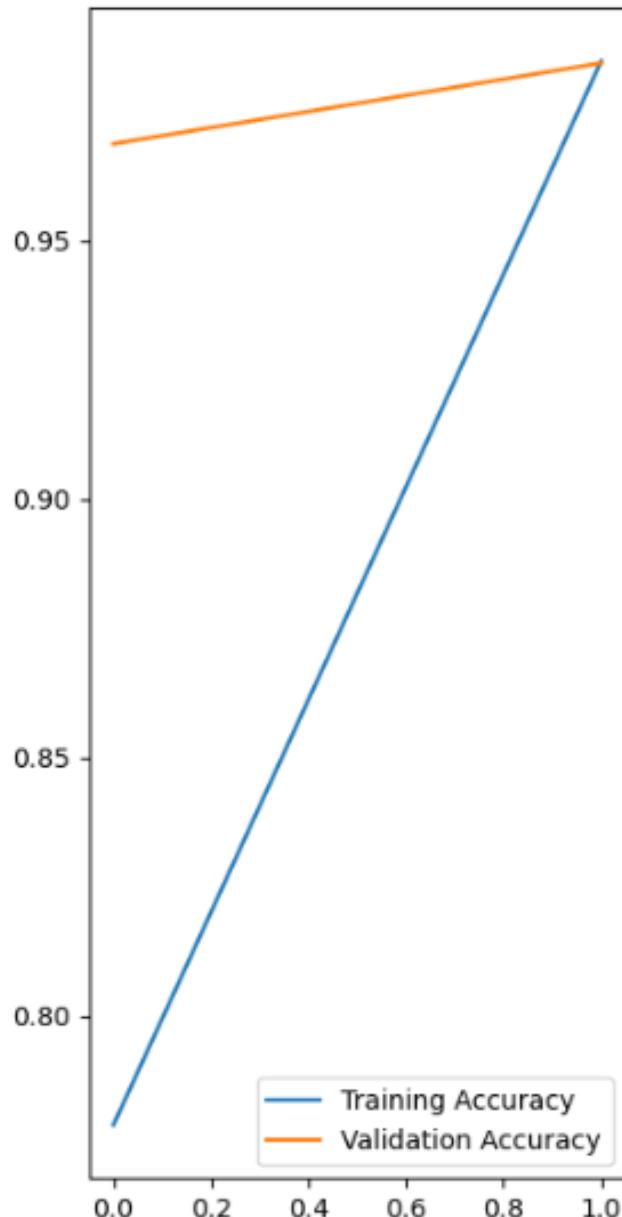
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=2
```

```
scores=model_from_vgg19.evaluate(test_ds)  
scores
```

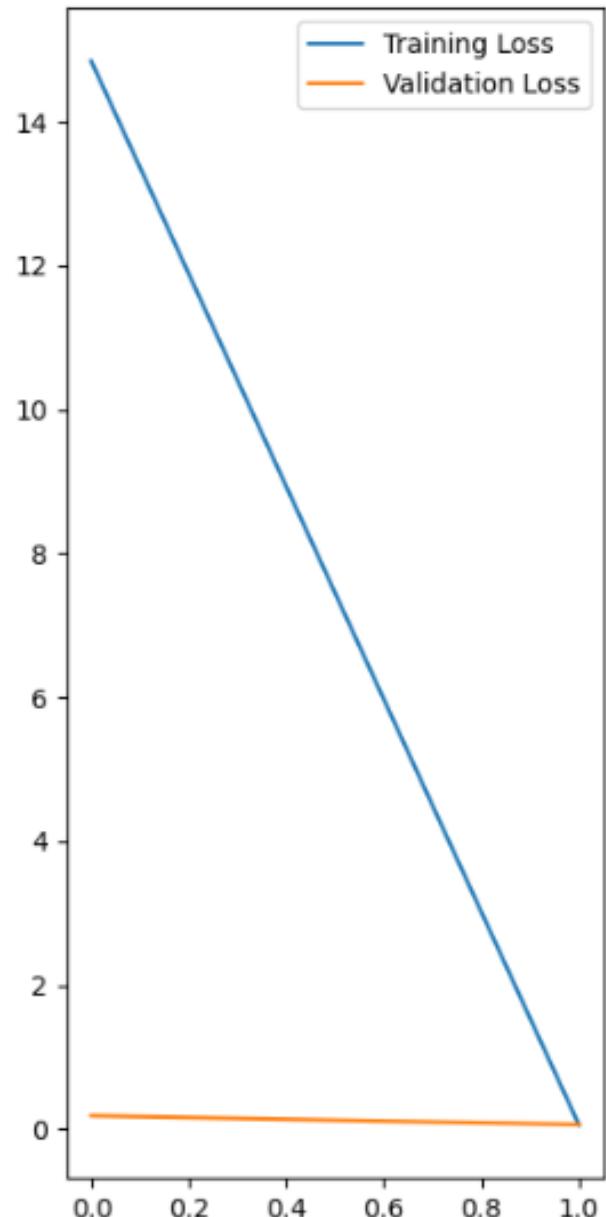
```
6/6 [=====] - 31s 5s/step - loss: 0.0502 - accuracy: 0.9792  
[0.050236087292432785, 0.9791666865348816]
```

Average Time per Epoch: 210.50 s

Training and Validation Accuracy



Training and Validation Loss



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 96.53%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.99%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.99%

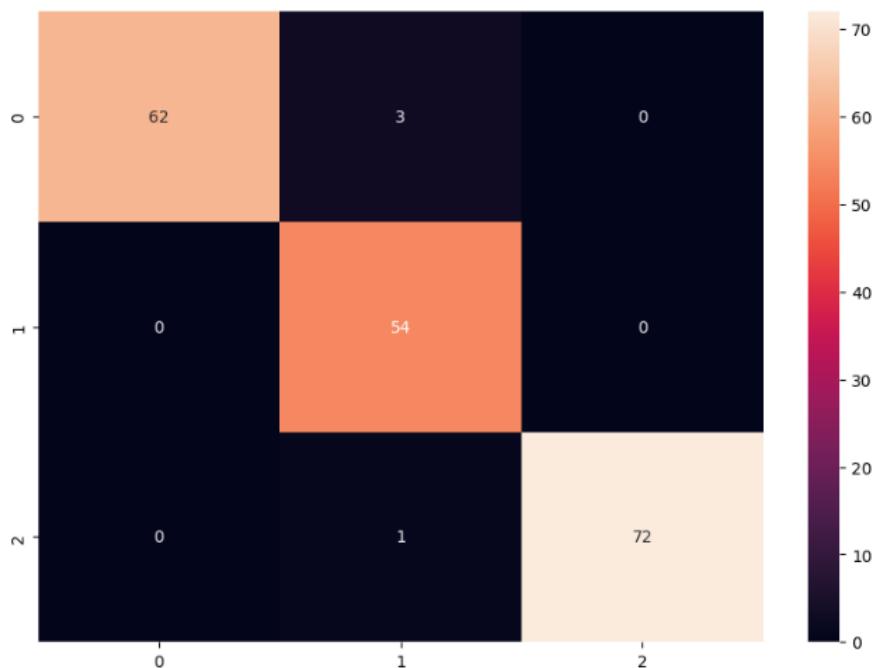


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	1.00	0.95	0.98	65
1	0.93	1.00	0.96	54
2	1.00	0.99	0.99	73
accuracy			0.98	192
macro avg	0.98	0.98	0.98	192
weighted avg	0.98	0.98	0.98	192



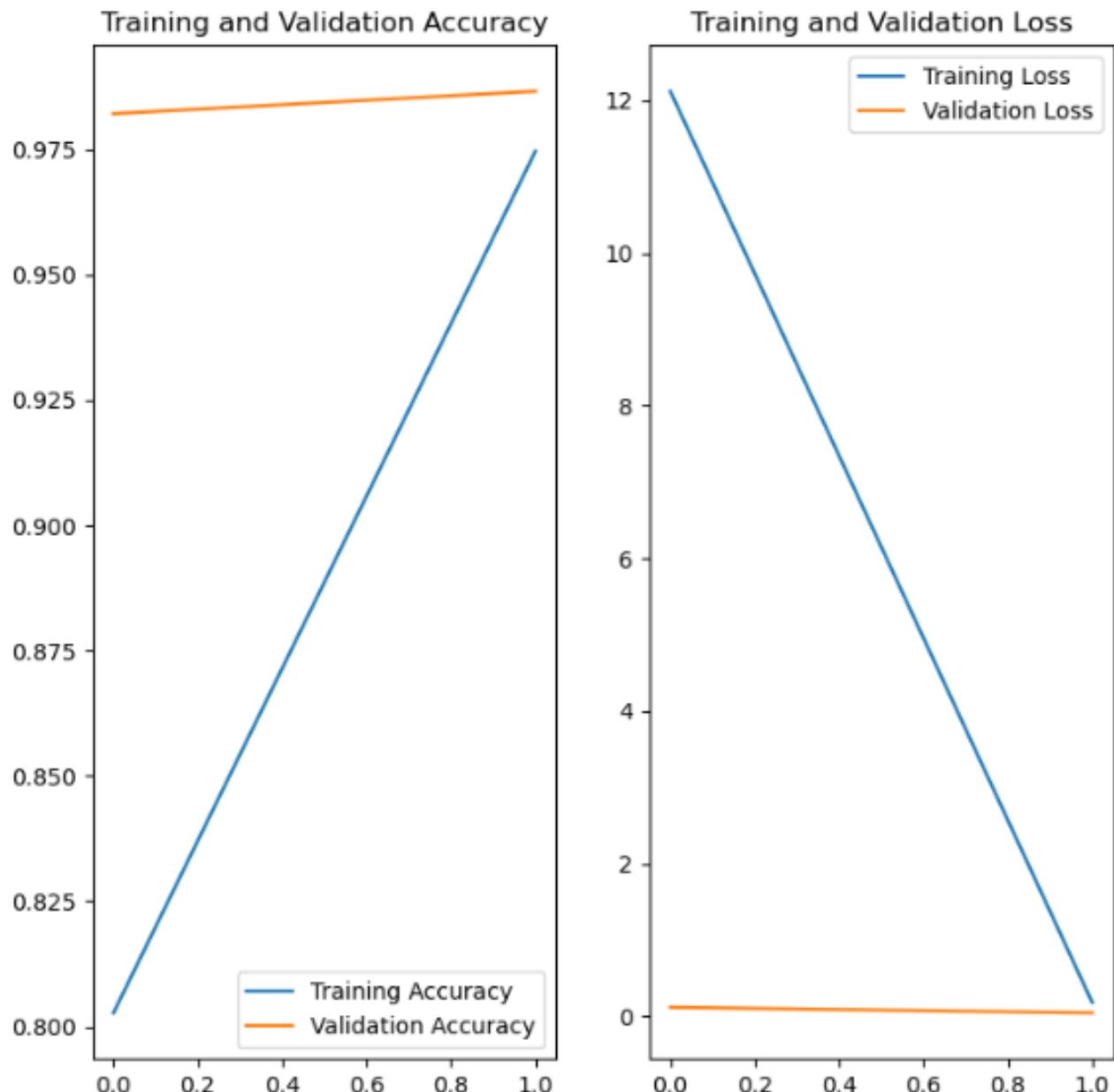
(c) 70:15:15

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=2
```

```
scores=model_from_vgg19.evaluate(test_ds)  
scores
```

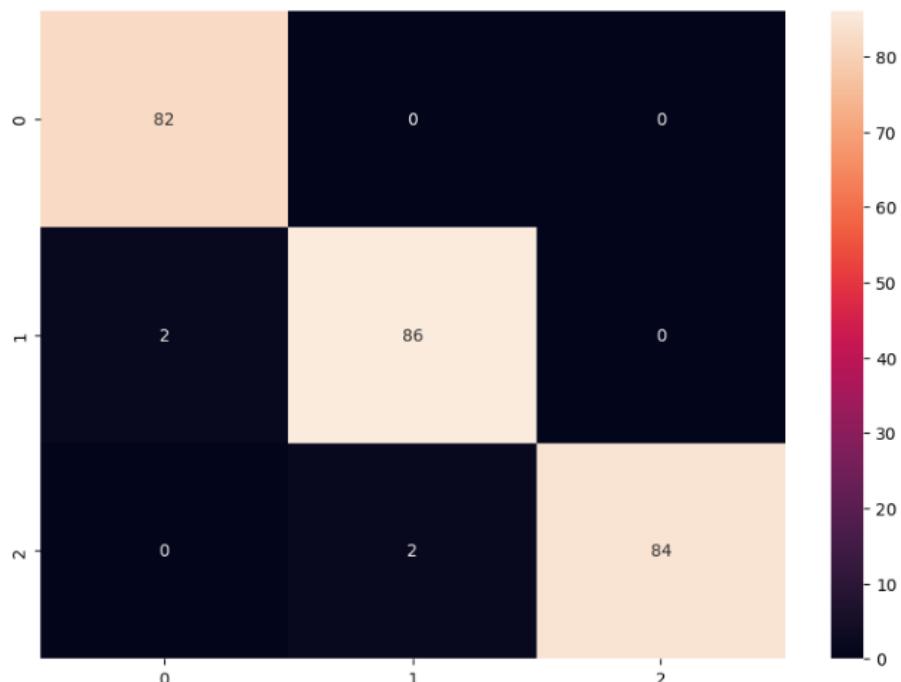
```
8/8 [=====] - 42s 5s/step - loss: 0.0900 - accuracy: 0.9844  
[0.09002374857664108, 0.984375]
```

Average Time per Epoch: 202.50 s





Classification Report:					
	precision	recall	f1-score	support	
0	0.98	1.00	0.99	82	
1	0.98	0.98	0.98	88	
2	1.00	0.98	0.99	86	
accuracy			0.98	256	
macro avg	0.98	0.98	0.98	256	
weighted avg	0.98	0.98	0.98	256	



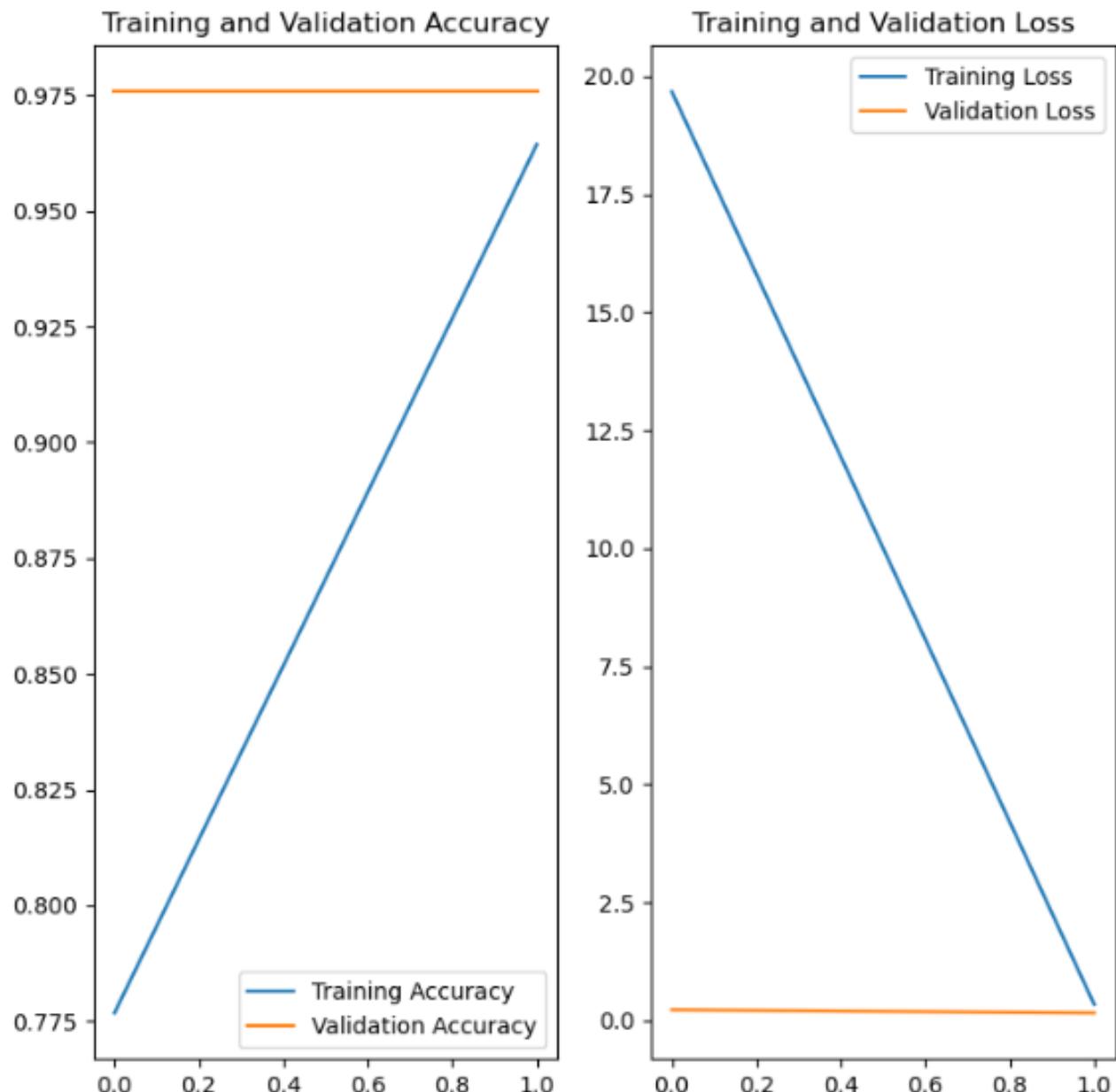
(d) 60:20:20

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=2
```

```
scores=model_from_vgg19.evaluate(test_ds)  
scores
```

```
10/10 [=====] - 52s 5s/step - loss: 0.1319 - accuracy: 0.9844  
[0.13191553950309753, 0.984375]
```

Average Time per Epoch: 190.50 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%

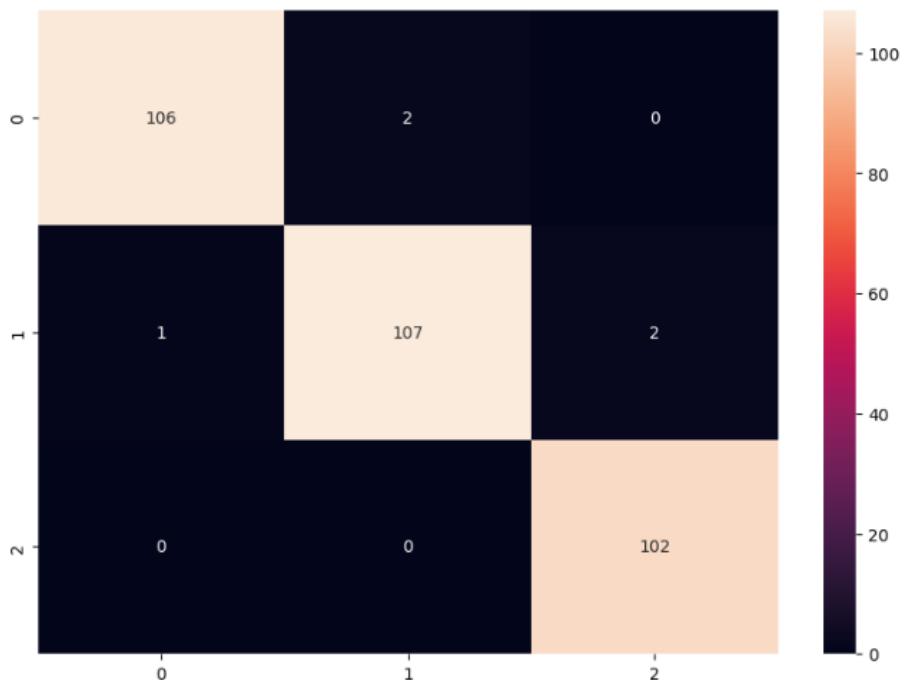


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	0.99	0.98	0.99	108
1	0.98	0.97	0.98	110
2	0.98	1.00	0.99	102
accuracy			0.98	320
macro avg	0.98	0.98	0.98	320
weighted avg	0.98	0.98	0.98	320



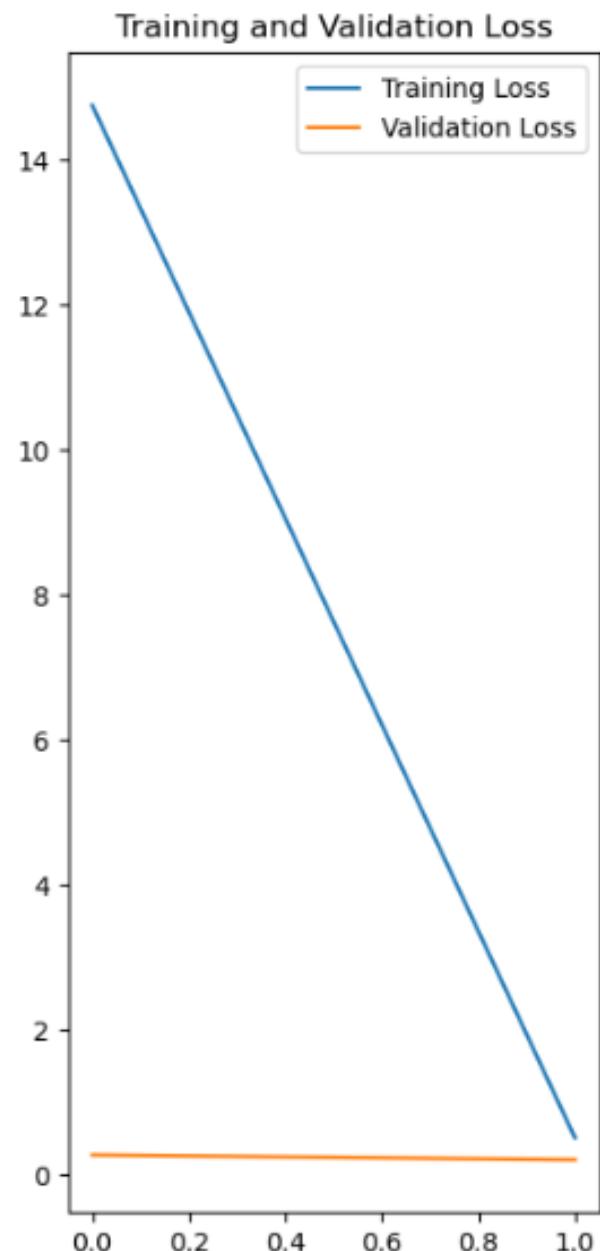
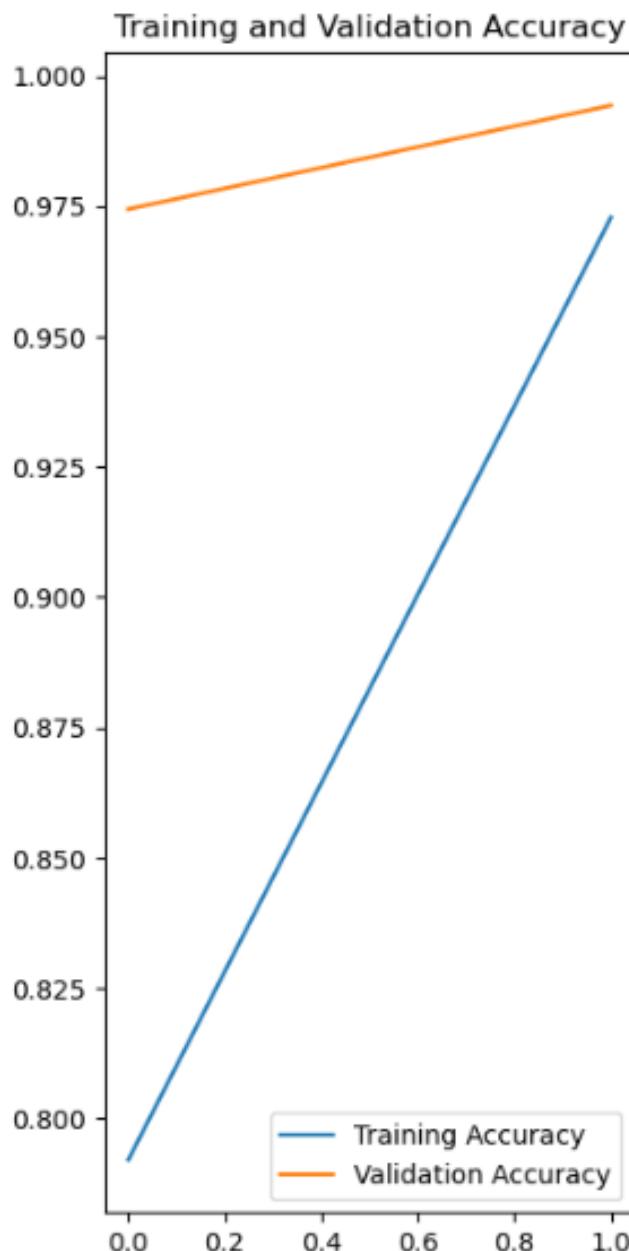
(e) 50:25:25

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=2
```

```
scores=model_from_vgg19.evaluate(test_ds)  
scores
```

```
13/13 [=====] - 63s 5s/step - loss: 0.4449 - accuracy: 0.9903  
[0.4449240565299988, 0.9902912378311157]
```

Average Time per Epoch: 174.50 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



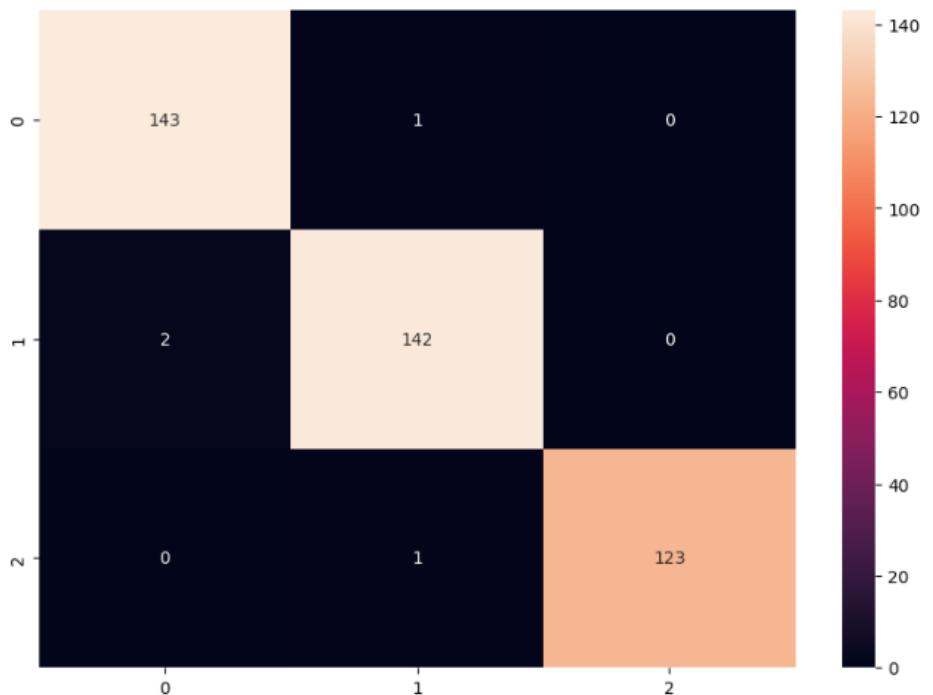
Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Classification Report:					
	precision	recall	f1-score	support	
0	0.99	0.99	0.99	144	
1	0.99	0.99	0.99	144	
2	1.00	0.99	1.00	124	
accuracy			0.99	412	
macro avg	0.99	0.99	0.99	412	
weighted avg	0.99	0.99	0.99	412	



Model 5: InceptionV3

BASE MODEL

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=15
```

```
scores=model.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 5s 722ms/step - loss: 1.8479 - accuracy: 0.9635  
[1.8479481935501099, 0.9635416865348816]
```

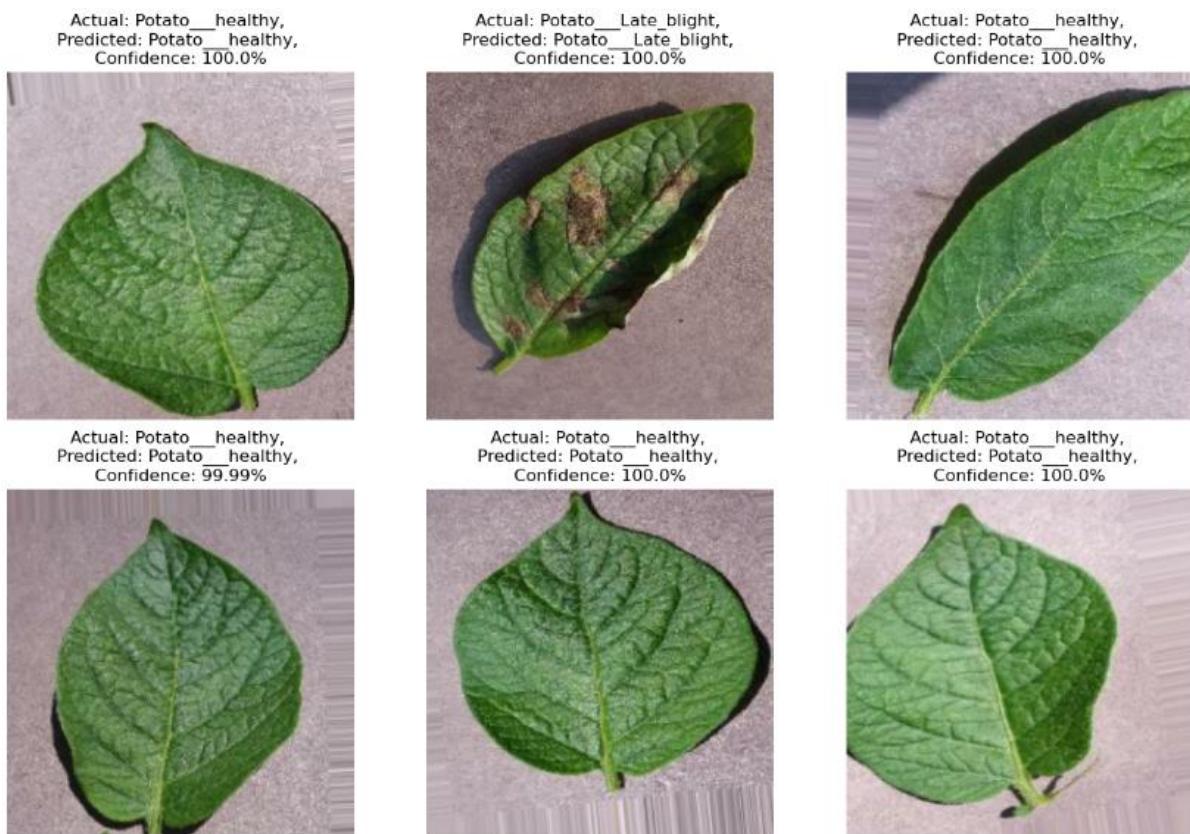
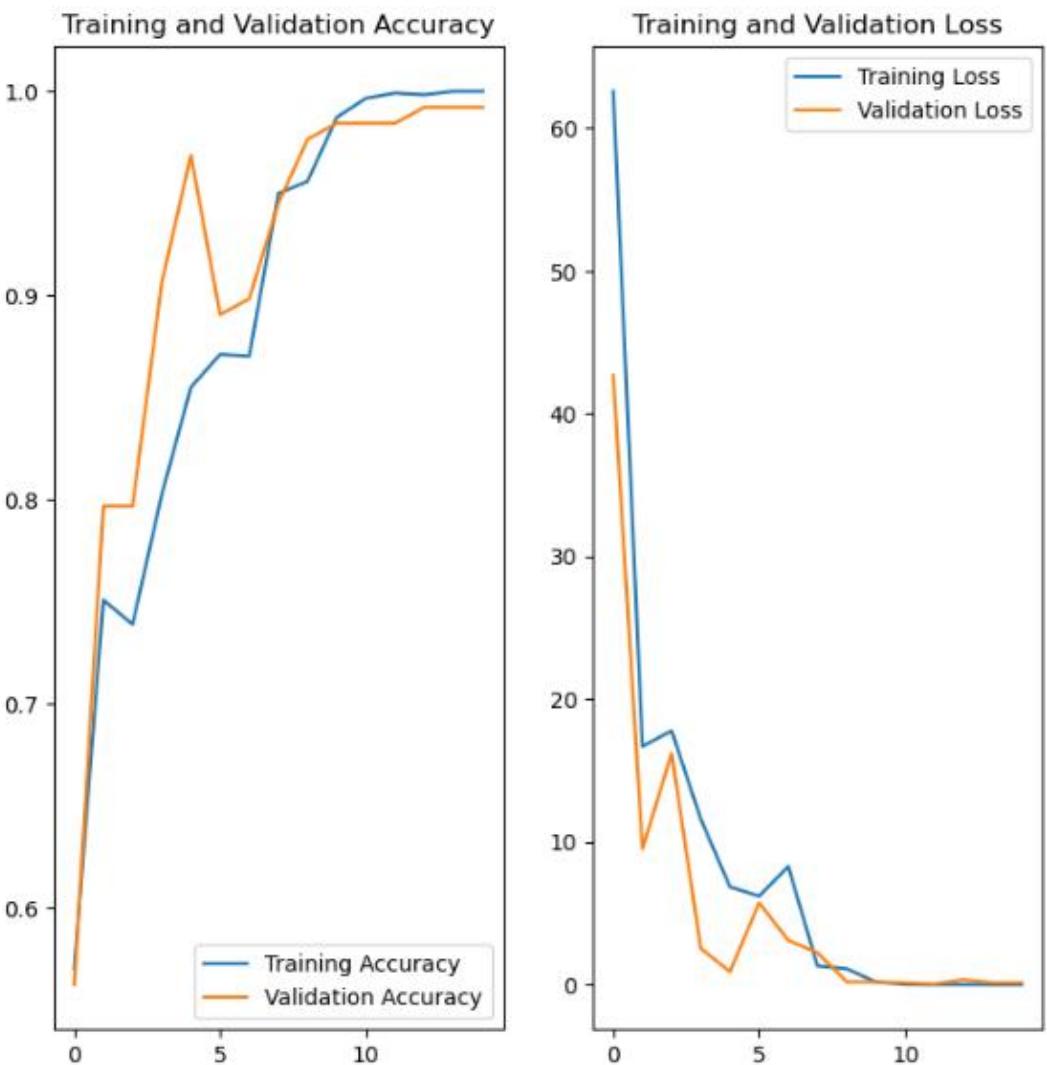
Average Time per Epoch: 39.73 s

```
history4.history['loss']  
  
[62.594444274902344,  
 16.69968032836914,  
 17.795780181884766,  
 11.607573509216309,  
 6.856191158294678,  
 6.20815896987915,  
 8.285165786743164,  
 1.3150519132614136,  
 1.1206449270248413,  
 0.1945856362581253,  
 0.020683303475379944,  
 0.004871027544140816,  
 0.007829027250409126,  
 7.025319632703031e-07,  
 4.790342245541979e-06]
```

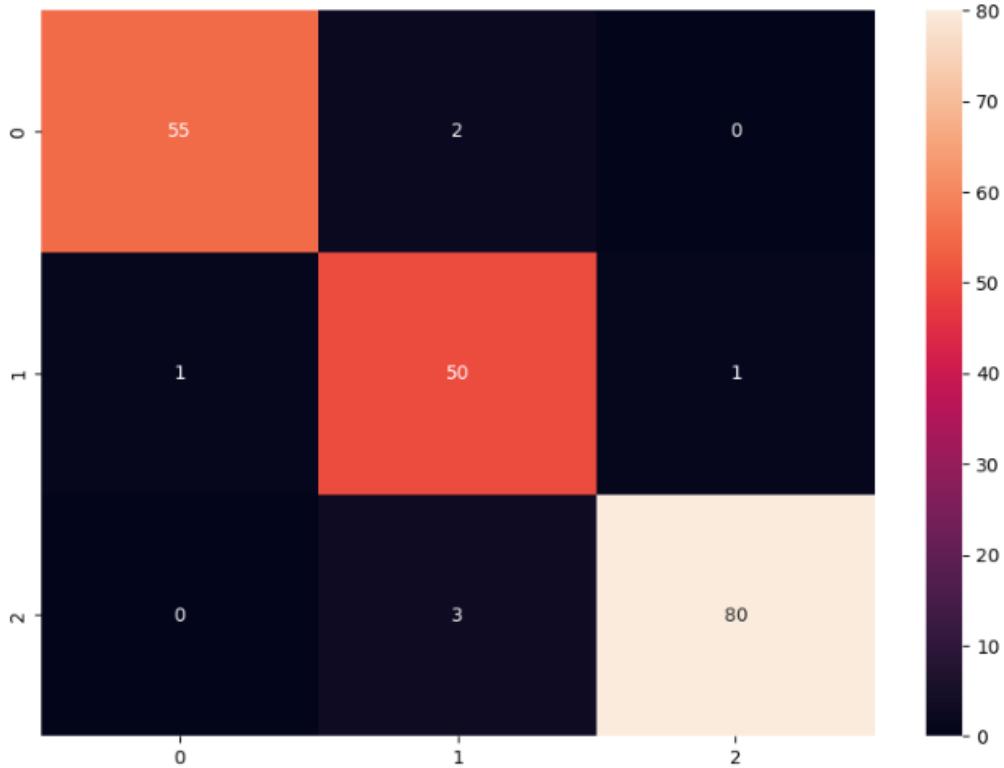
```
history4.history['accuracy']  
  
[0.5703389644622803,  
 0.7508474588394165,  
 0.7389830350875854,  
 0.8025423884391785,  
 0.8550847172737122,  
 0.8711864352226257,  
 0.8703389763832092,  
 0.949999988079071,  
 0.9559321999549866,  
 0.9872881174087524,  
 0.996610164642334,  
 0.9991525411605835,  
 0.998305082321167,  
 1.0,  
 1.0]
```

```
history4.history['val_loss']  
  
[42.70122146606445,  
 9.524447441101074,  
 16.21157455444336,  
 2.556218147277832,  
 0.9074869155883789,  
 5.73671817779541,  
 3.1088521480560303,  
 2.247347593307495,  
 0.20979616045951843,  
 0.19029897451400757,  
 0.1439865678548813,  
 0.04703088849782944,  
 0.3575426936149597,  
 0.14456777274608612,  
 0.14031752943992615]
```

```
history4.history['val_accuracy']  
  
[0.5625,  
 0.796875,  
 0.796875,  
 0.90625,  
 0.96875,  
 0.890625,  
 0.8984375,  
 0.9453125,  
 0.9765625,  
 0.984375,  
 0.984375,  
 0.984375,  
 0.9921875,  
 0.9921875,  
 0.9921875]
```



Classification Report:				
	precision	recall	f1-score	support
0	0.98	0.96	0.97	57
1	0.91	0.96	0.93	52
2	0.99	0.96	0.98	83
accuracy			0.96	192
macro avg	0.96	0.96	0.96	192
weighted avg	0.96	0.96	0.96	192



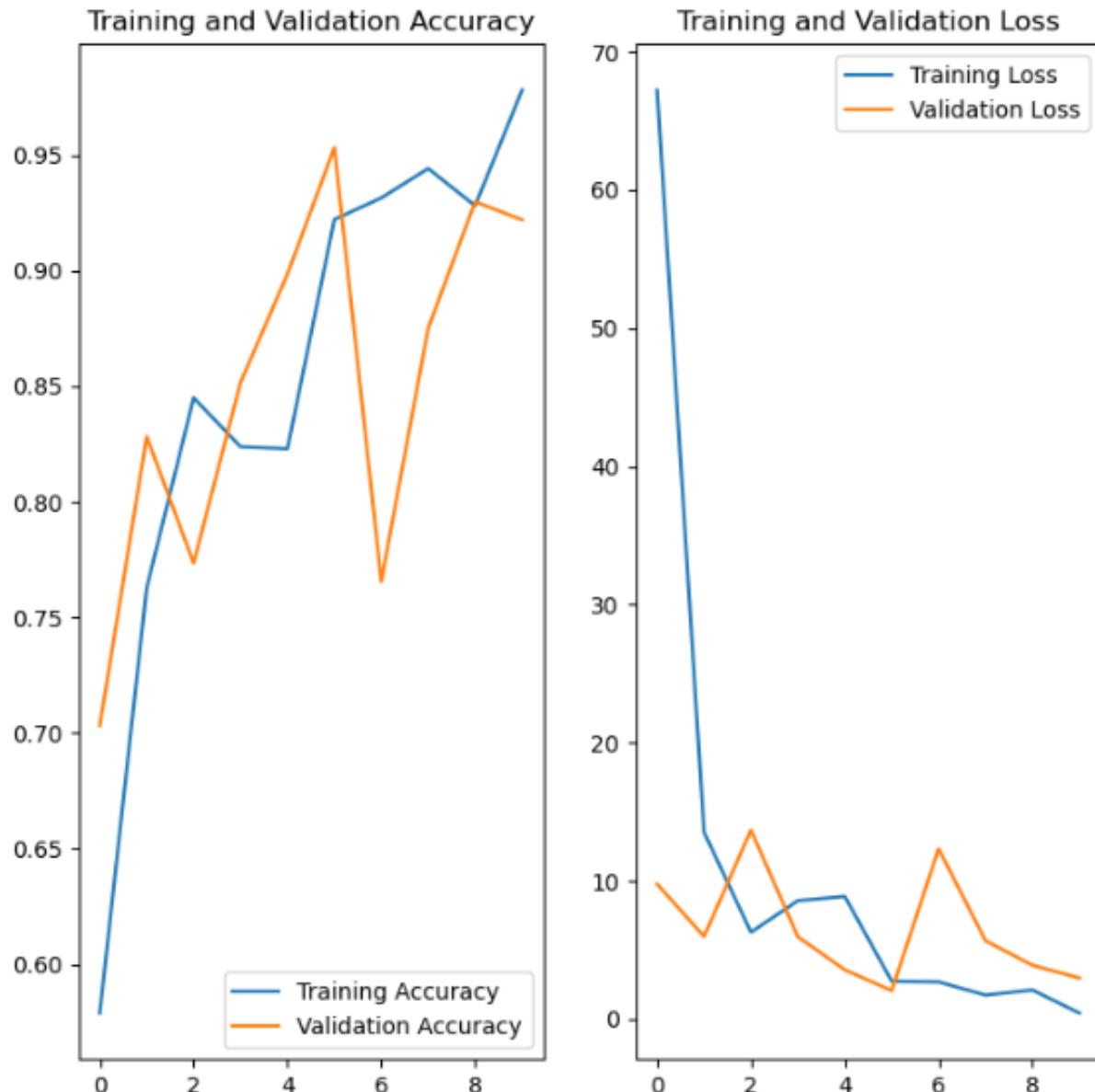
NO. OF EPOCHS

(a) 10

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=10
```

```
scores=model.evaluate(test_ds)  
scores  
  
6/6 [=====] - 6s 1s/step - loss: 2.5883 - accuracy: 0.9323  
[2.588329553604126, 0.9322916865348816]
```

Average Time per Epoch: 40.80 s



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%

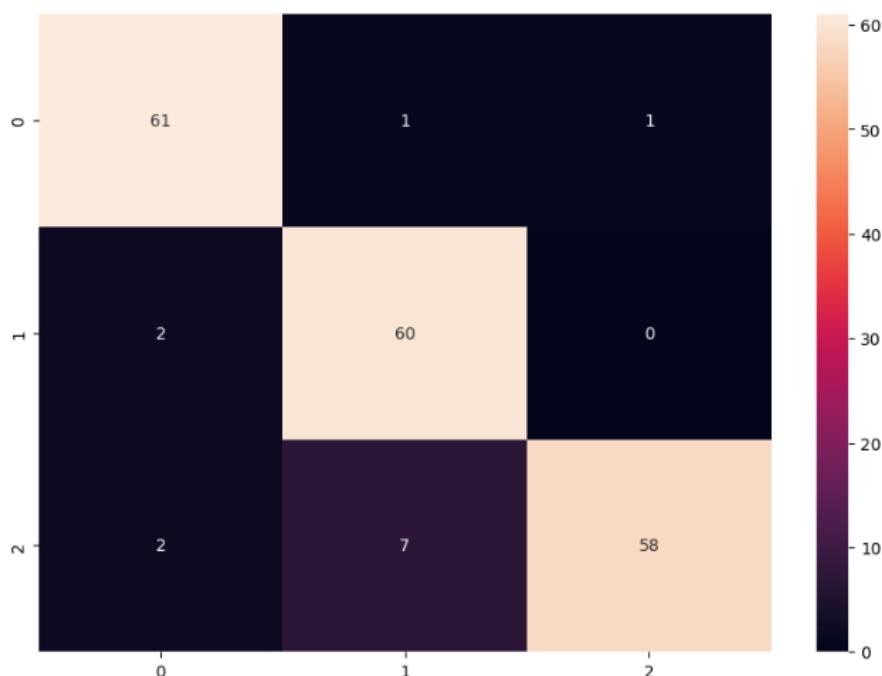


Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	0.94	0.97	0.95	63
1	0.88	0.97	0.92	62
2	0.98	0.87	0.92	67
accuracy			0.93	192
macro avg	0.93	0.93	0.93	192
weighted avg	0.94	0.93	0.93	192

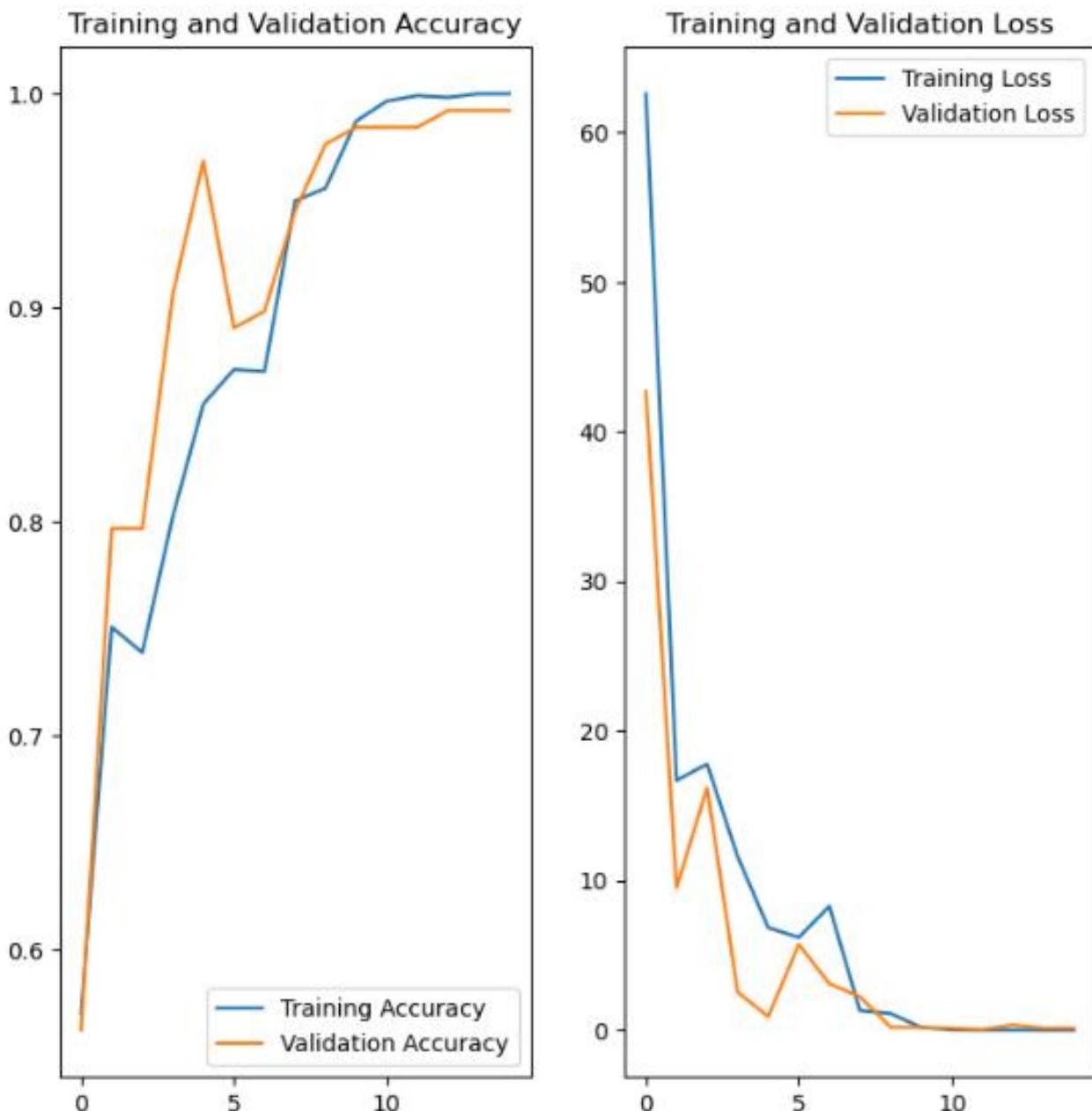


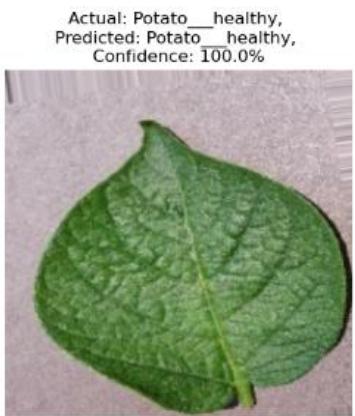
(b) 15

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=15
```

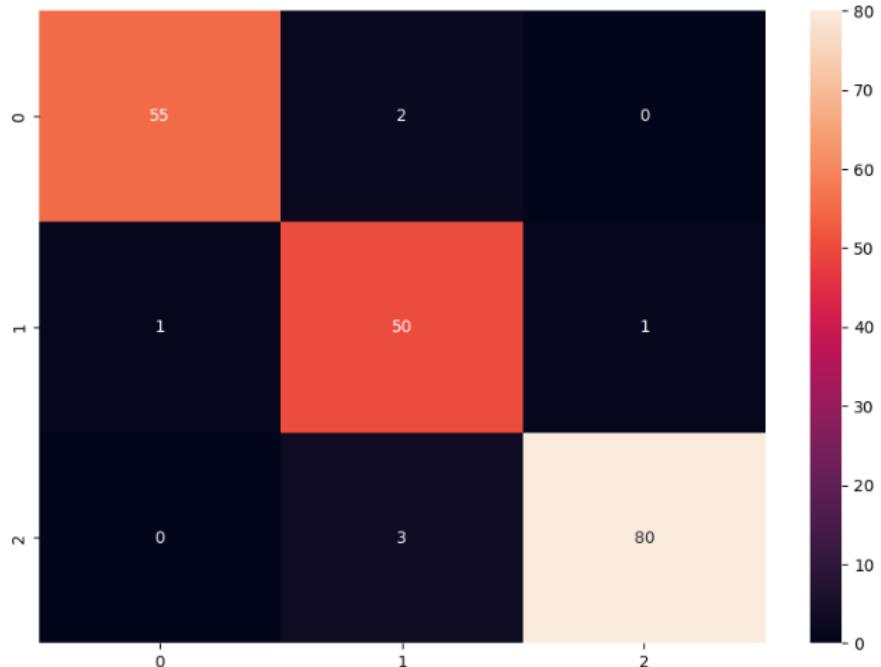
```
scores=model.evaluate(test_ds)  
scores  
  
6/6 [=====] - 5s 722ms/step - loss: 1.8479 - accuracy: 0.9635  
[1.8479481935501099, 0.9635416865348816]
```

Average Time per Epoch: 39.73 s





Classification Report:					
	precision	recall	f1-score	support	
0	0.98	0.96	0.97	57	
1	0.91	0.96	0.93	52	
2	0.99	0.96	0.98	83	
accuracy			0.96	192	
macro avg	0.96	0.96	0.96	192	
weighted avg	0.96	0.96	0.96	192	



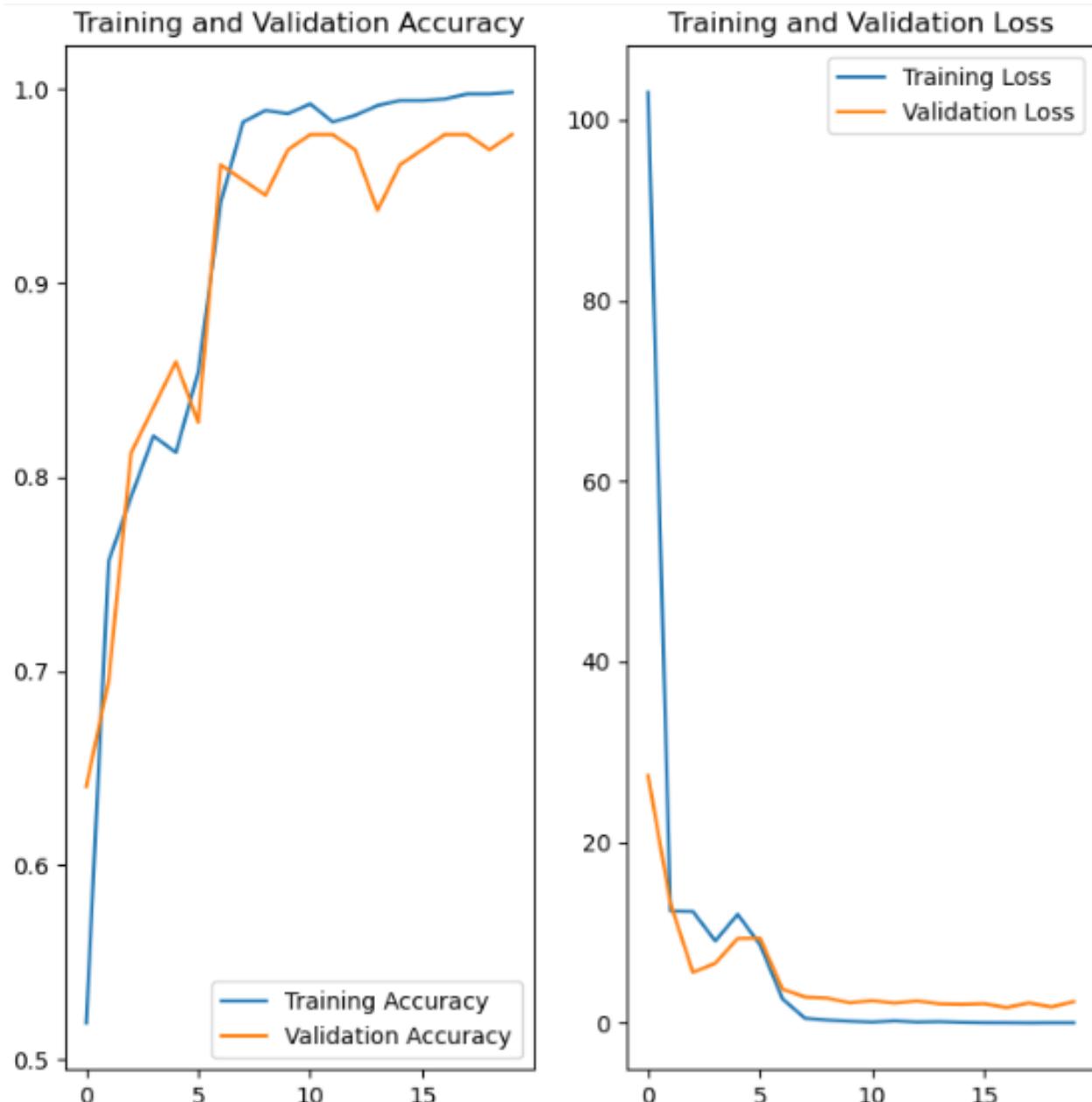
(c) 20

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 5s 804ms/step - loss: 1.1423 - accuracy: 0.9688  
[1.1423243284225464, 0.96875]
```

Average Time per Epoch: 40.35 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%

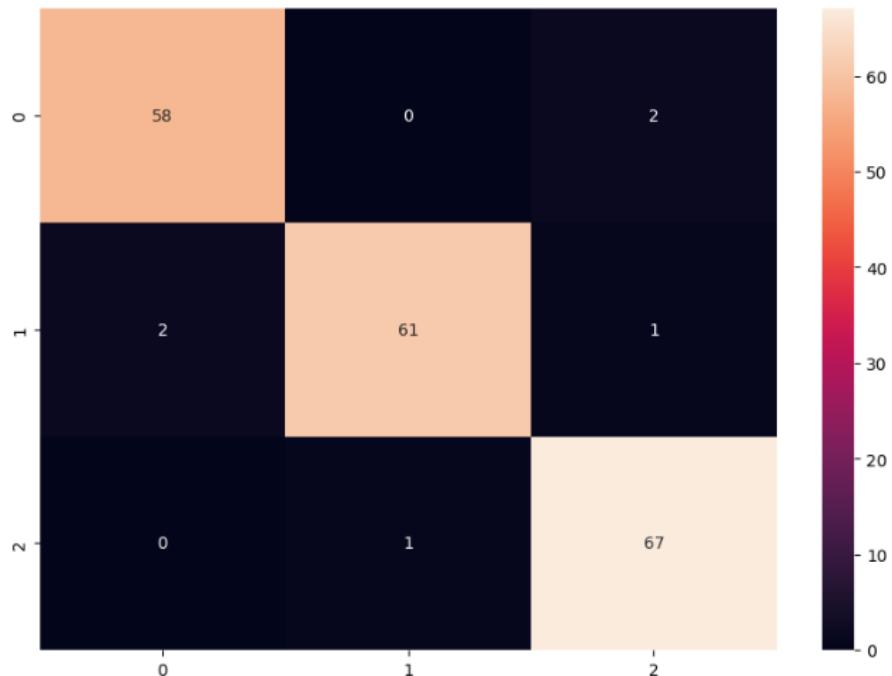


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	0.97	0.97	0.97	60
1	0.98	0.95	0.97	64
2	0.96	0.99	0.97	68
accuracy			0.97	192
macro avg	0.97	0.97	0.97	192
weighted avg	0.97	0.97	0.97	192



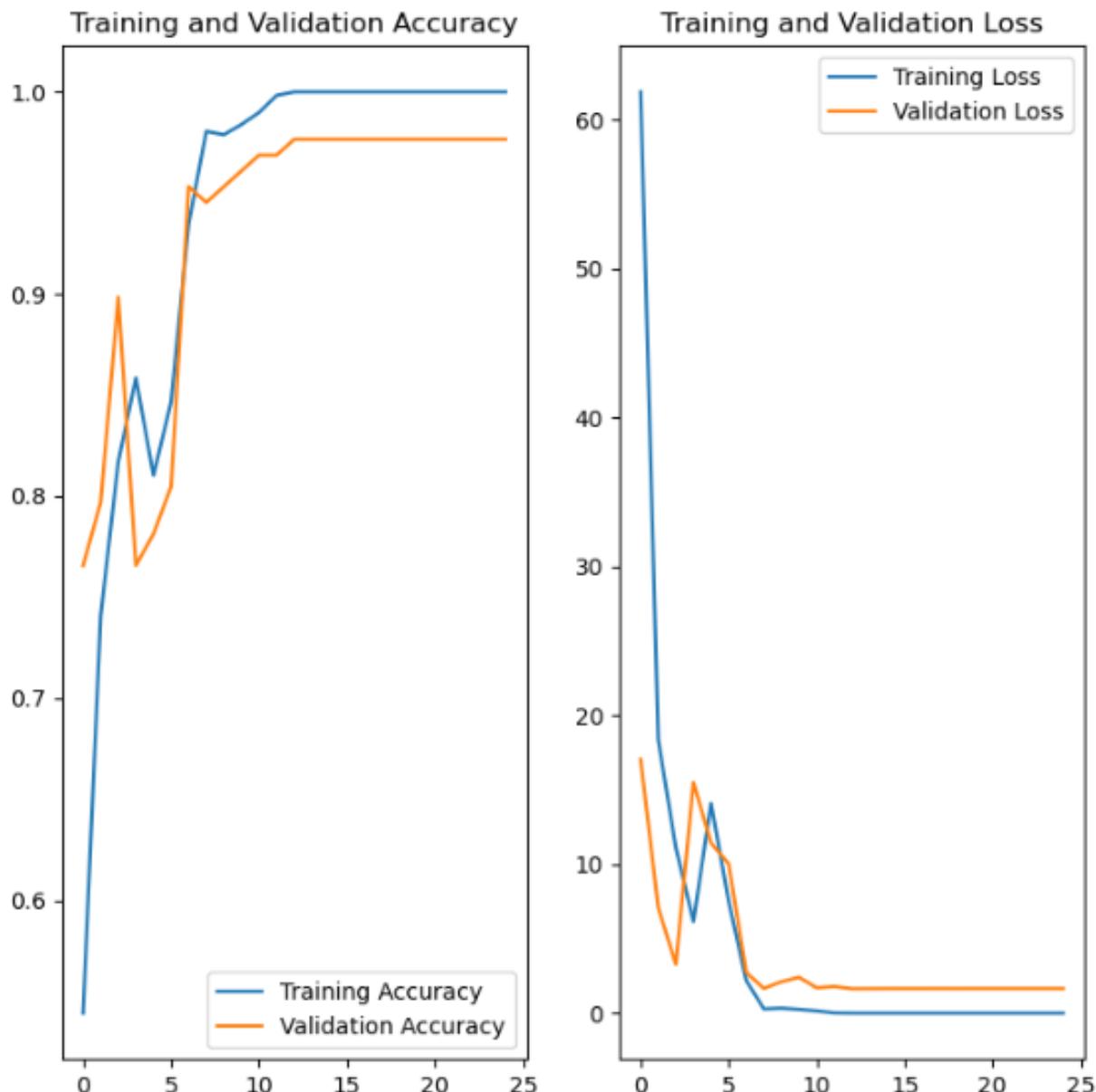
(d) 25

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=25
```

```
scores=model.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 5s 711ms/step - loss: 1.2008 - accuracy: 0.9688  
[1.2008116245269775, 0.96875]
```

Average Time per Epoch: 41.04 s



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%

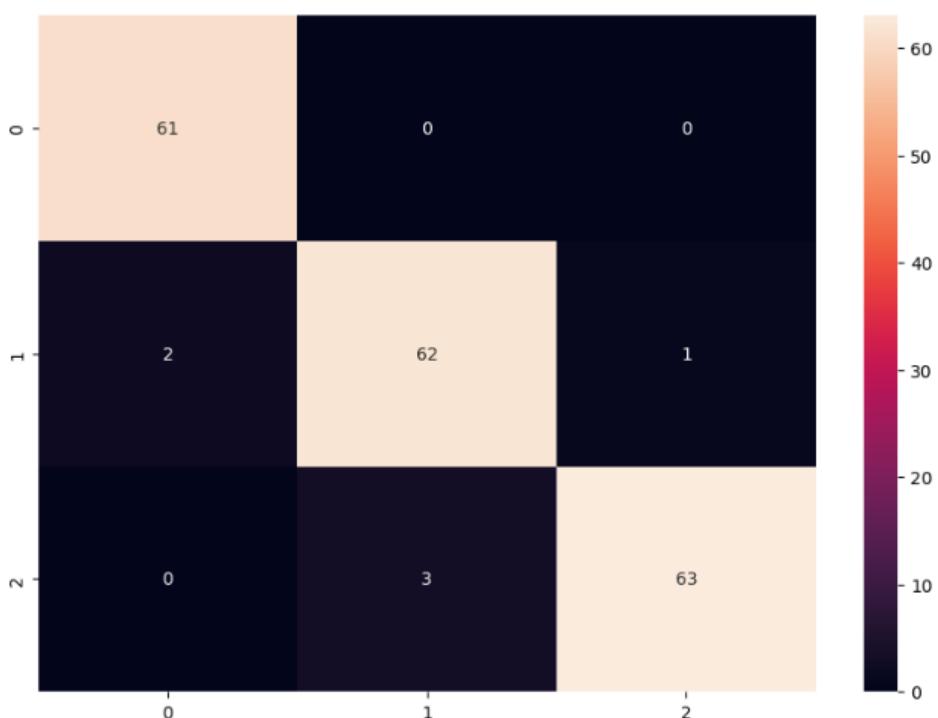


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	0.97	1.00	0.98	61
1	0.95	0.95	0.95	65
2	0.98	0.95	0.97	66
accuracy			0.97	192
macro avg	0.97	0.97	0.97	192
weighted avg	0.97	0.97	0.97	192



(e) 30

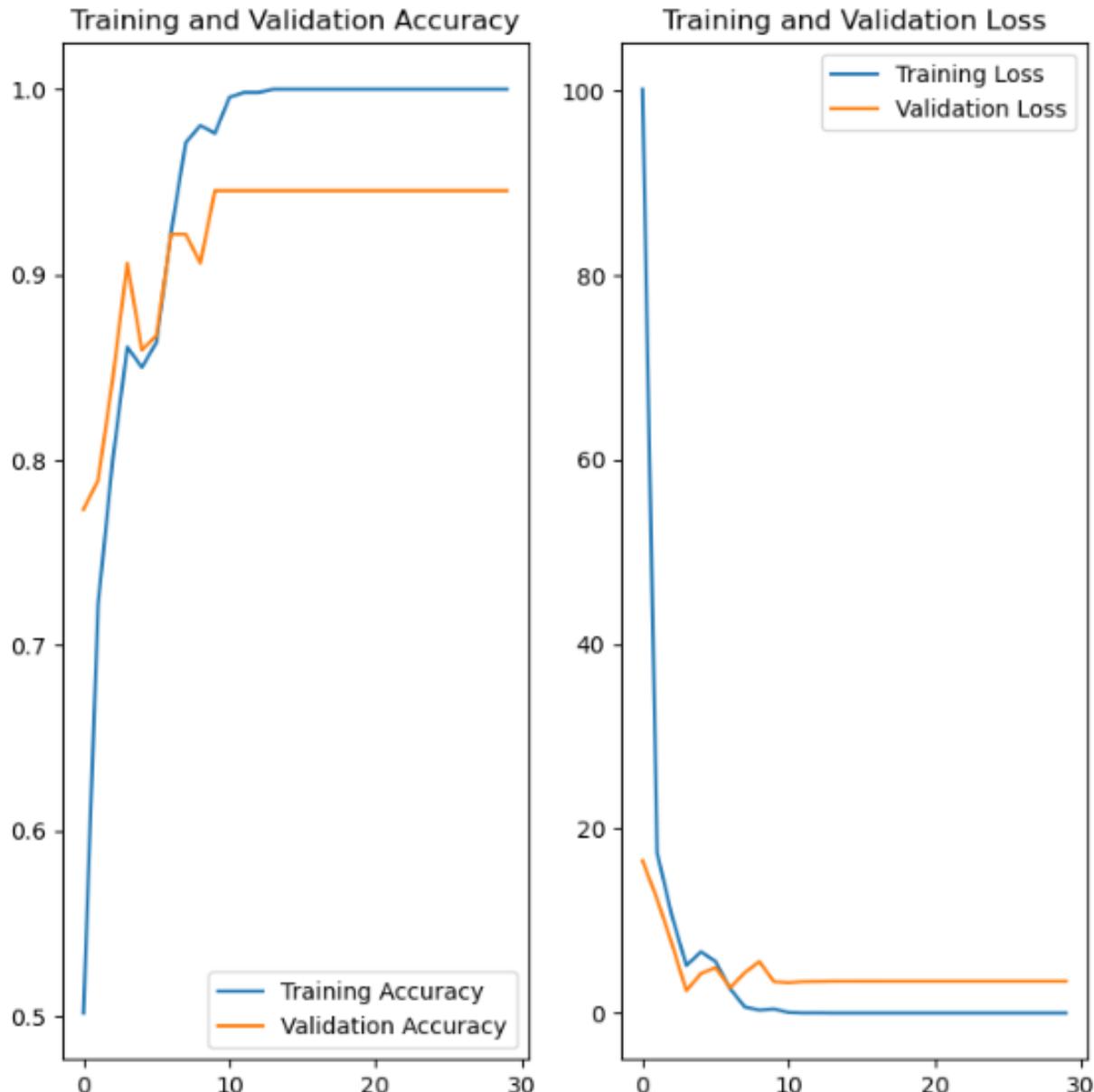
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=30
```

```
scores=model.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 7s 1000ms/step - loss: 1.7890 - accuracy: 0.9427
```

```
[1.7890082597732544, 0.9427083134651184]
```

Average Time per Epoch: 41.13 s



Actual: Potato_Early_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%

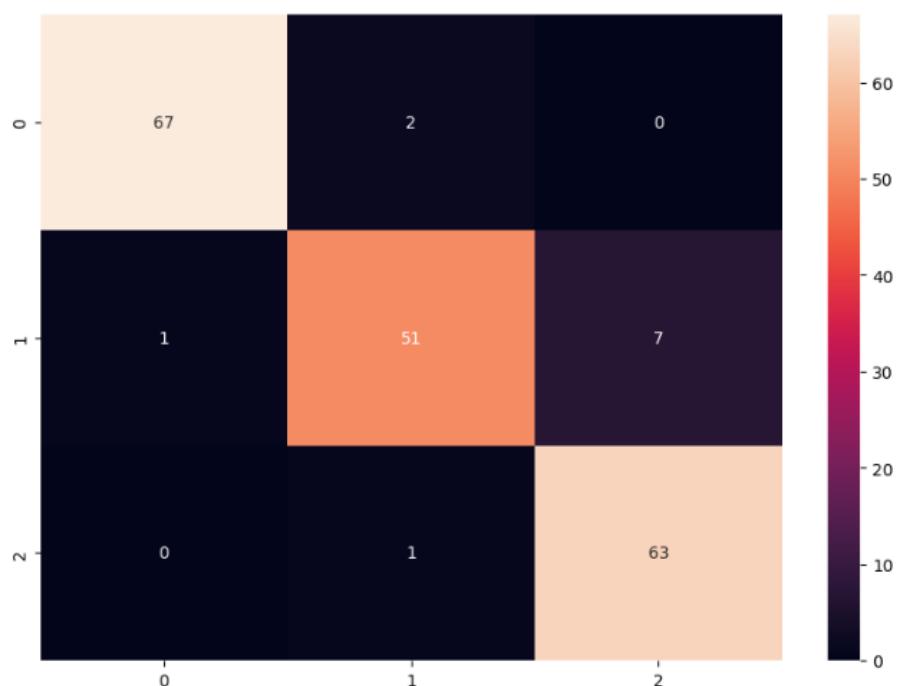


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	0.99	0.97	0.98	69
1	0.94	0.86	0.90	59
2	0.90	0.98	0.94	64
accuracy			0.94	192
macro avg	0.94	0.94	0.94	192
weighted avg	0.94	0.94	0.94	192



BATCH SIZE

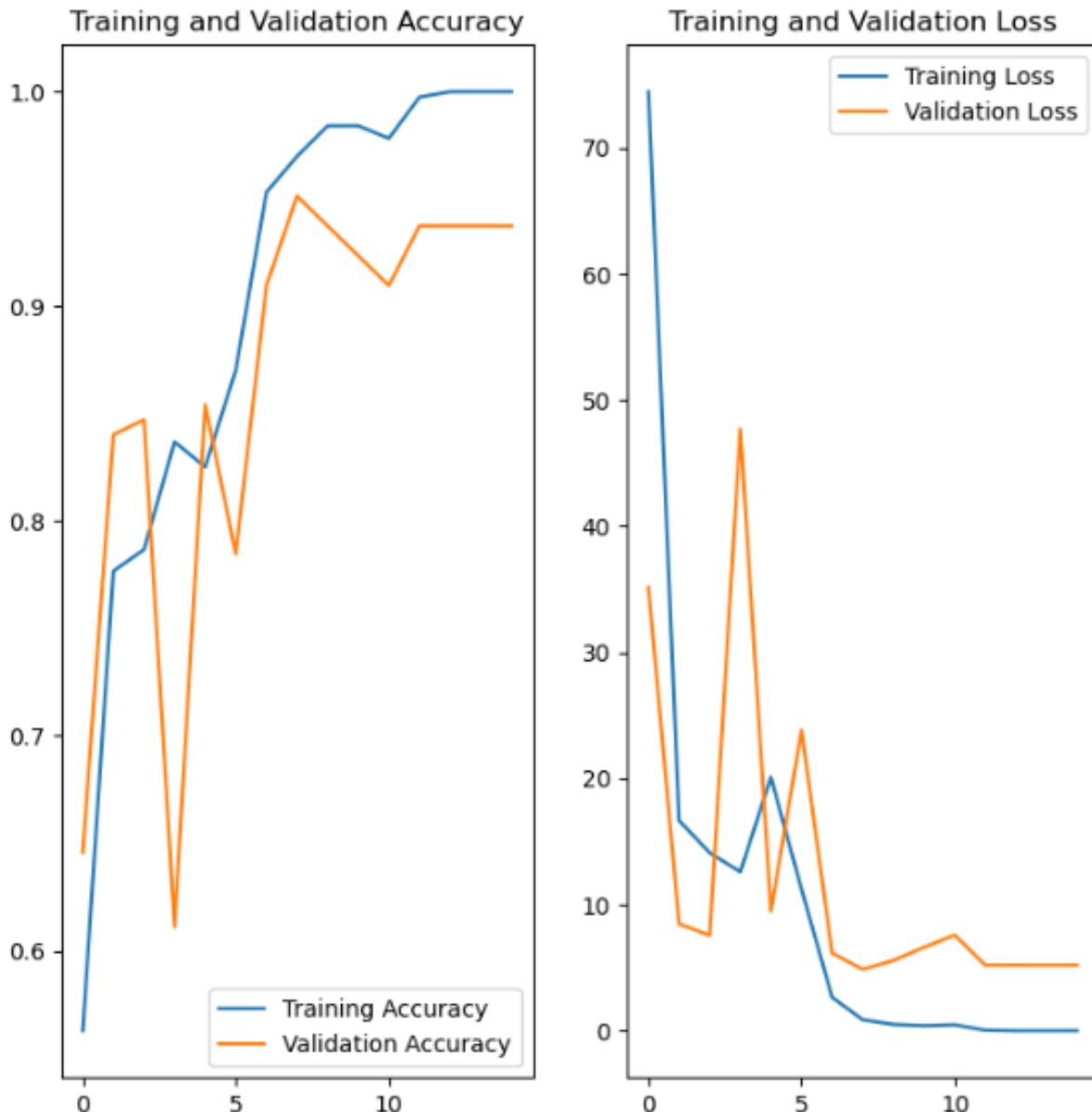
(a) 16

```
IMAGE_SIZE=224  
BATCH_SIZE=16  
CHANNELS=3  
EPOCHS=15
```

```
scores=model.evaluate(test_ds)  
scores
```

```
10/10 [=====] - 4s 377ms/step - loss: 2.9272 - accuracy: 0.9563  
[2.9272477626800537, 0.956250011920929]
```

Average Time per Epoch: 46.33 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%

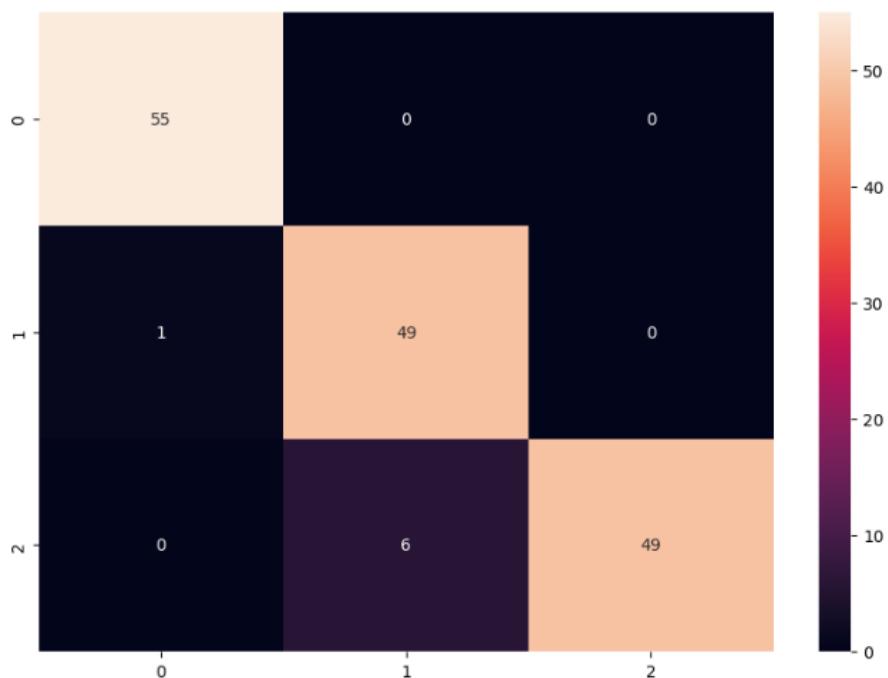


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 98.86%



Classification Report:

	precision	recall	f1-score	support
0	0.98	1.00	0.99	55
1	0.89	0.98	0.93	50
2	1.00	0.89	0.94	55
accuracy			0.96	160
macro avg	0.96	0.96	0.96	160
weighted avg	0.96	0.96	0.96	160



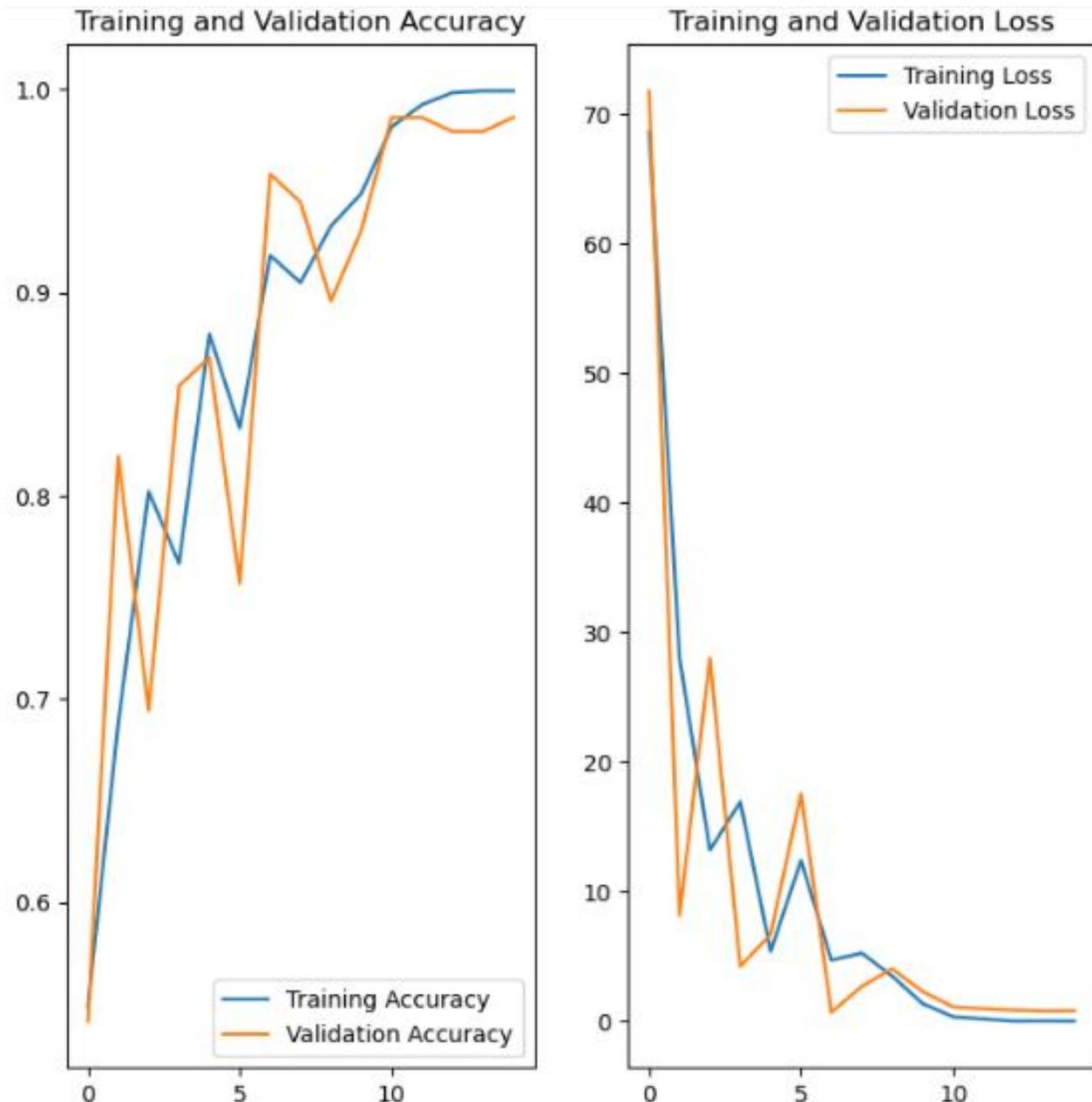
(b) 24

```
IMAGE_SIZE=224  
BATCH_SIZE=24  
CHANNELS=3  
EPOCHS=15
```

```
scores=model.evaluate(test_ds)  
scores
```

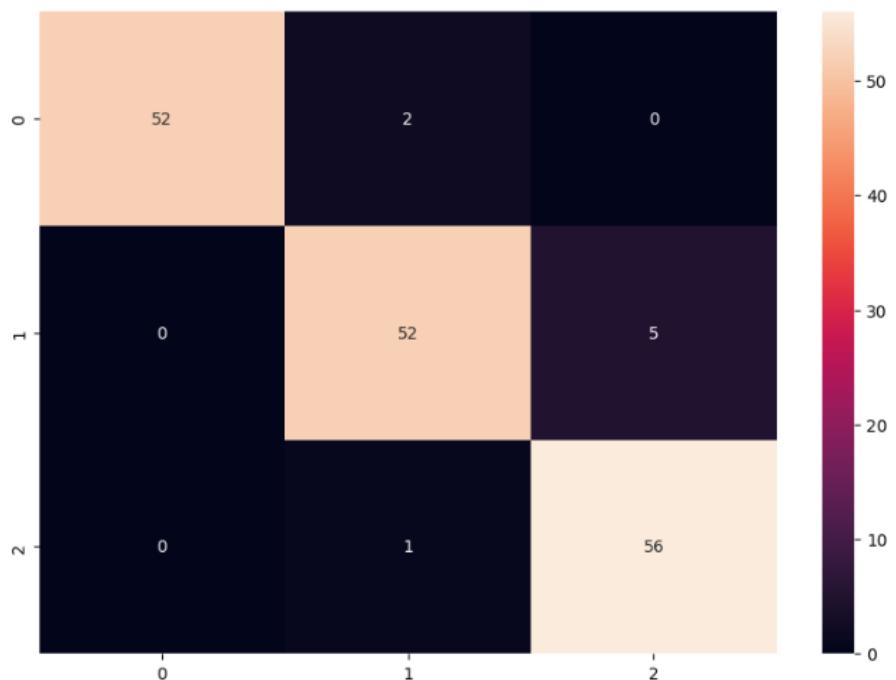
```
7/7 [=====] - 5s 635ms/step - loss: 2.4602 - accuracy: 0.9524  
[2.4602062702178955, 0.9523809552192688]
```

Average Time per Epoch: 43.40 s





Classification Report:					
	precision	recall	f1-score	support	
0	1.00	0.96	0.98	54	
1	0.95	0.91	0.93	57	
2	0.92	0.98	0.95	57	
accuracy			0.95	168	
macro avg	0.95	0.95	0.95	168	
weighted avg	0.95	0.95	0.95	168	



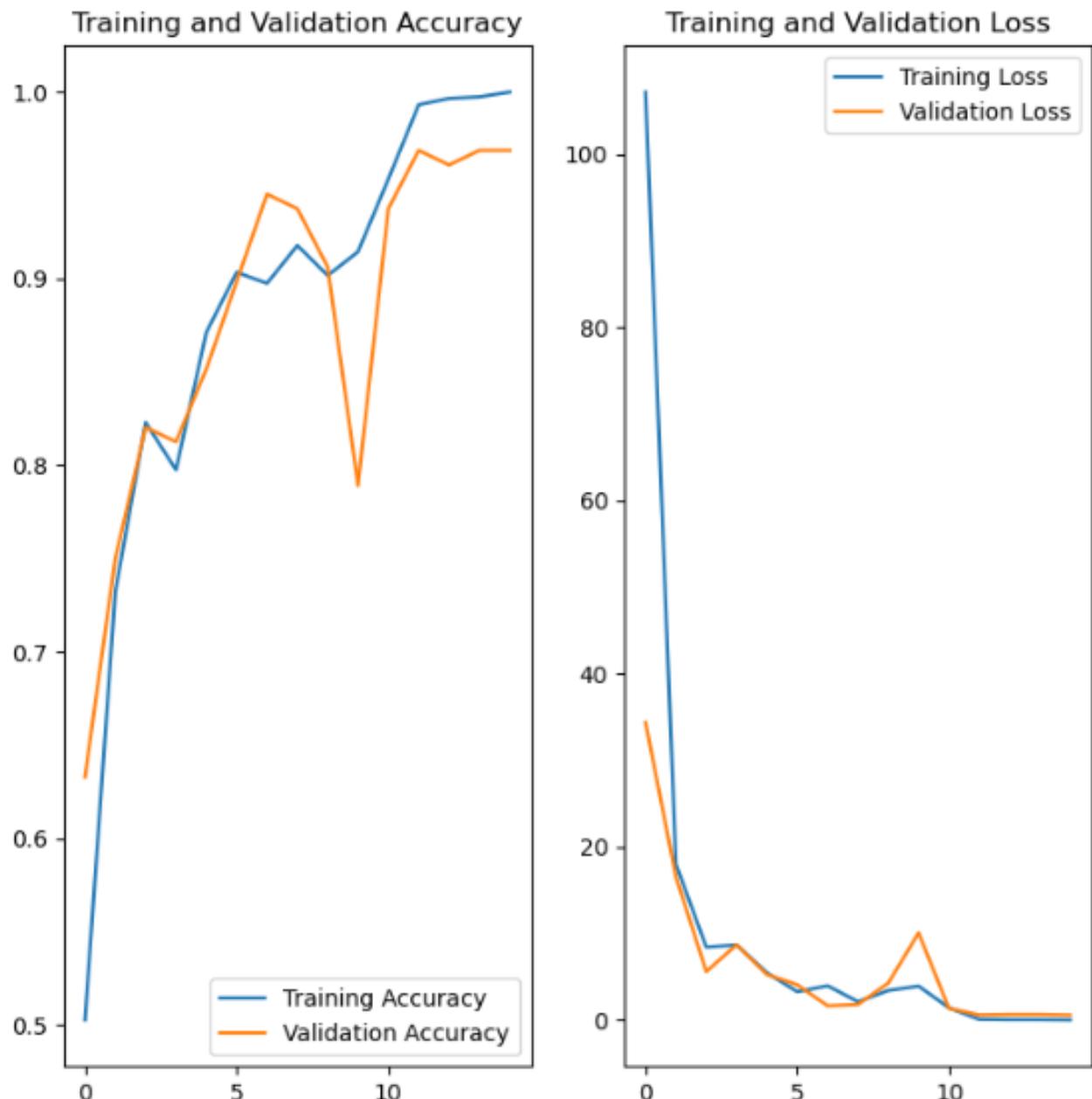
(c) 32

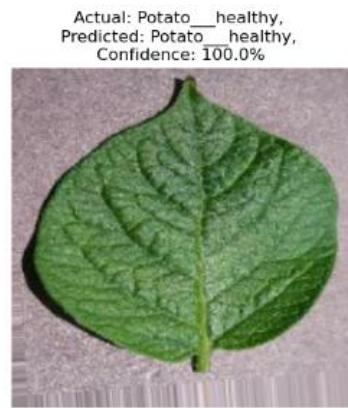
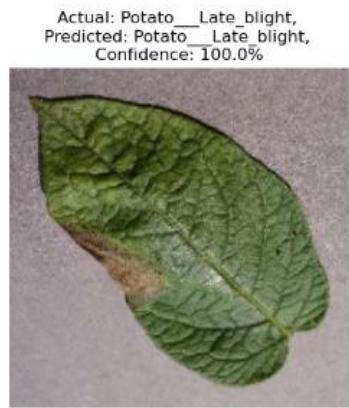
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=15
```

```
scores=model.evaluate(test_ds)  
scores
```

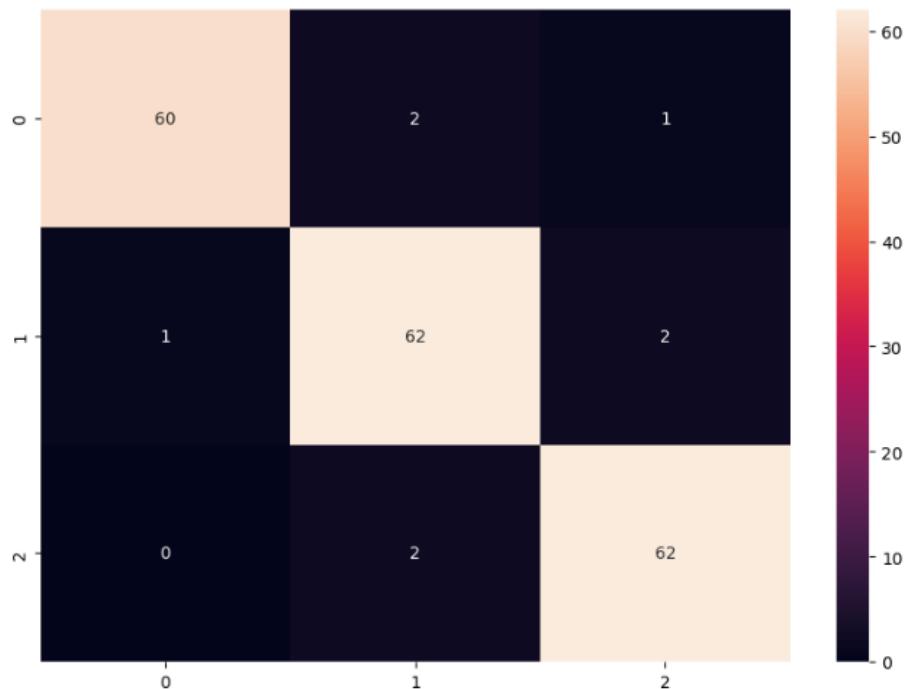
```
6/6 [=====] - 9s 1s/step - loss: 3.2515 - accuracy: 0.9583  
[3.251488447189331, 0.9583333134651184]
```

Average Time per Epoch: 43.60 s





Classification Report:					
	precision	recall	f1-score	support	
0	0.98	0.95	0.97	63	
1	0.94	0.95	0.95	65	
2	0.95	0.97	0.96	64	
accuracy			0.96	192	
macro avg	0.96	0.96	0.96	192	
weighted avg	0.96	0.96	0.96	192	

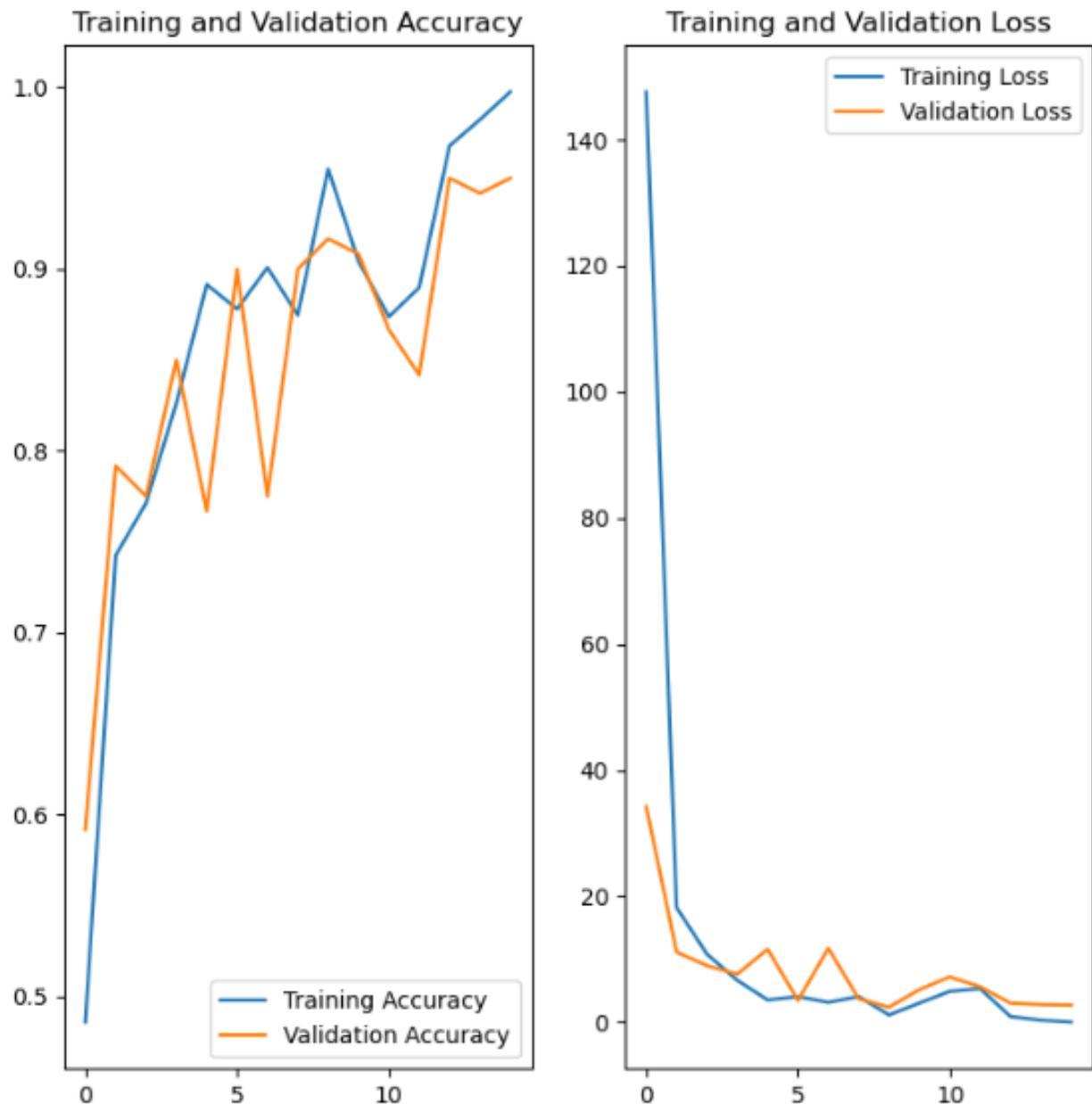


(d) 40

```
IMAGE_SIZE=224  
BATCH_SIZE=40  
CHANNELS=3  
EPOCHS=15
```

```
scores=model.evaluate(test_ds)  
scores  
  
5/5 [=====] - 6s 1s/step - loss: 3.2511 - accuracy: 0.9400  
[3.2511157989501953, 0.9399999976158142]
```

Average Time per Epoch: 46.67 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%

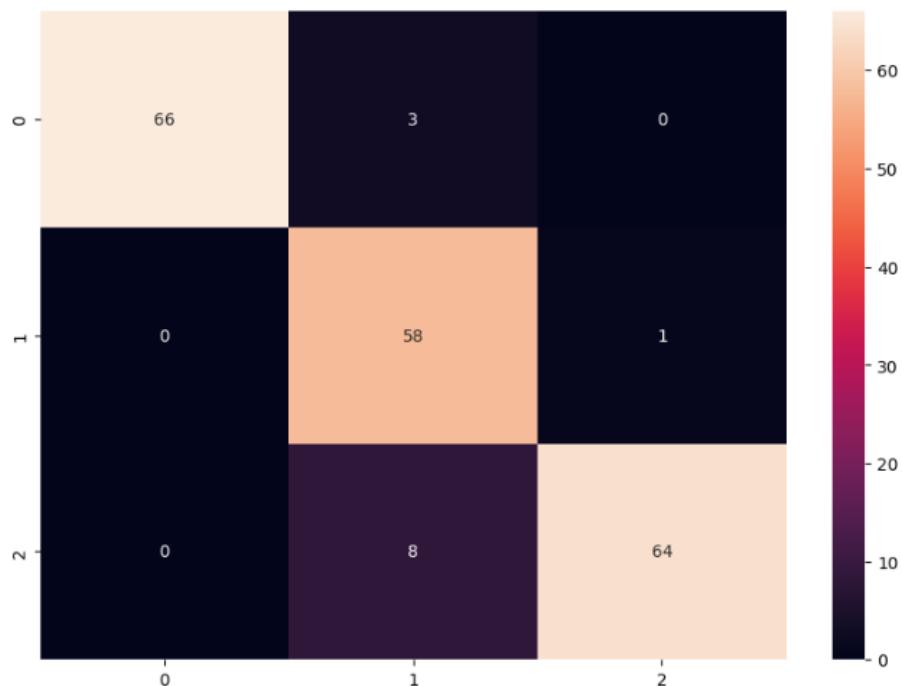


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	1.00	0.96	0.98	69
1	0.84	0.98	0.91	59
2	0.98	0.89	0.93	72
accuracy			0.94	200
macro avg	0.94	0.94	0.94	200
weighted avg	0.95	0.94	0.94	200



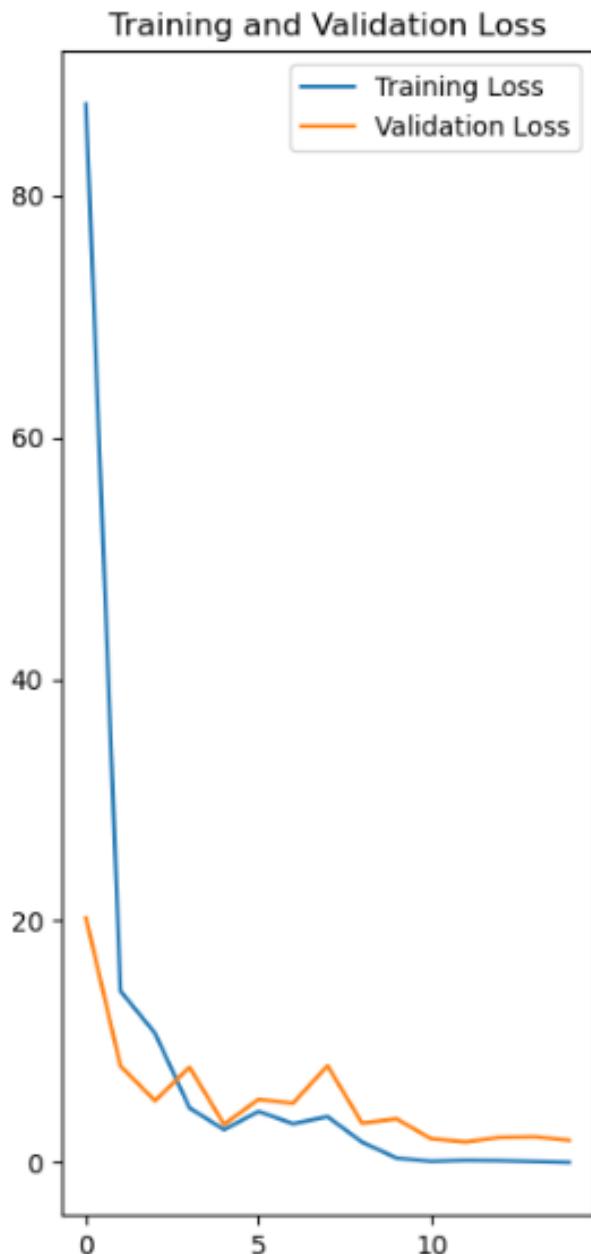
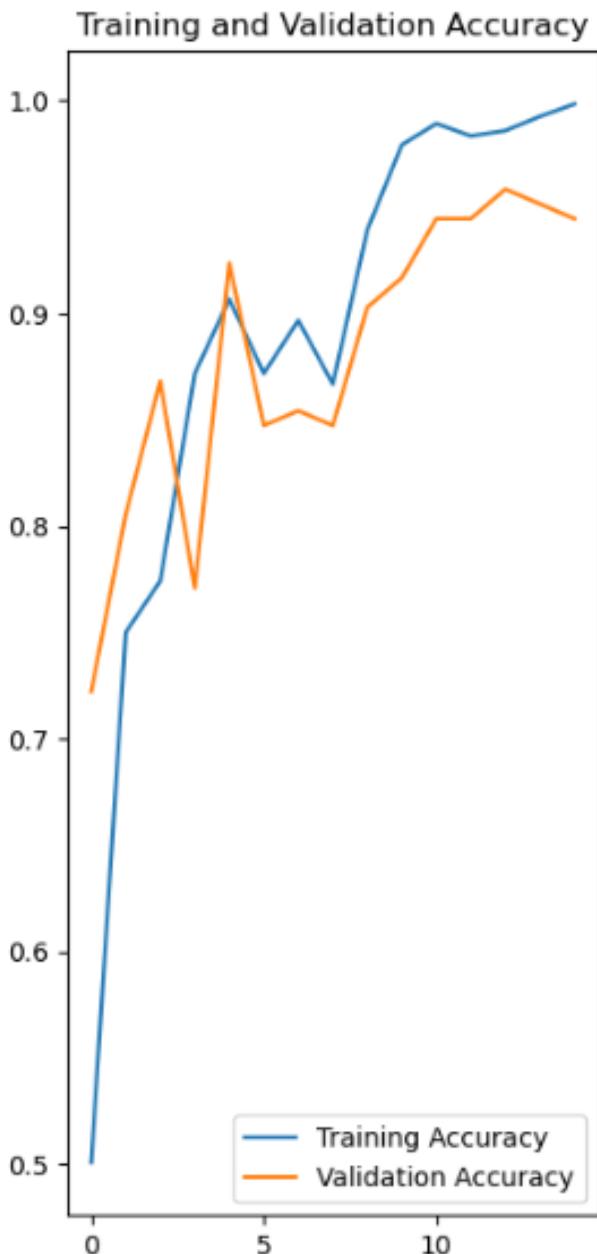
(e) 48

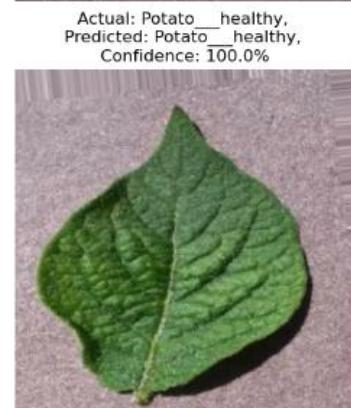
```
IMAGE_SIZE=224  
BATCH_SIZE=48  
CHANNELS=3  
EPOCHS=15
```

```
scores=model.evaluate(test_ds)  
scores
```

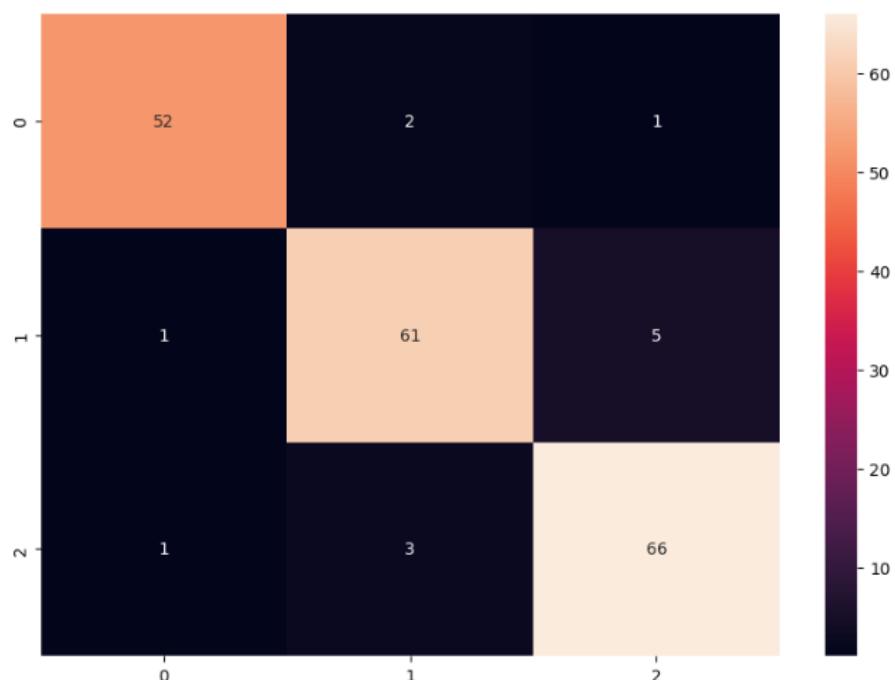
```
4/4 [=====] - 6s 1s/step - loss: 1.7262 - accuracy: 0.9323  
[1.7262252569198608, 0.9322916865348816]
```

Average Time per Epoch: 44.73 s





Classification Report:					
	precision	recall	f1-score	support	
0	0.96	0.95	0.95	55	
1	0.92	0.91	0.92	67	
2	0.92	0.94	0.93	70	
accuracy			0.93	192	
macro avg	0.93	0.93	0.93	192	
weighted avg	0.93	0.93	0.93	192	



DATASET SPLIT RATIO

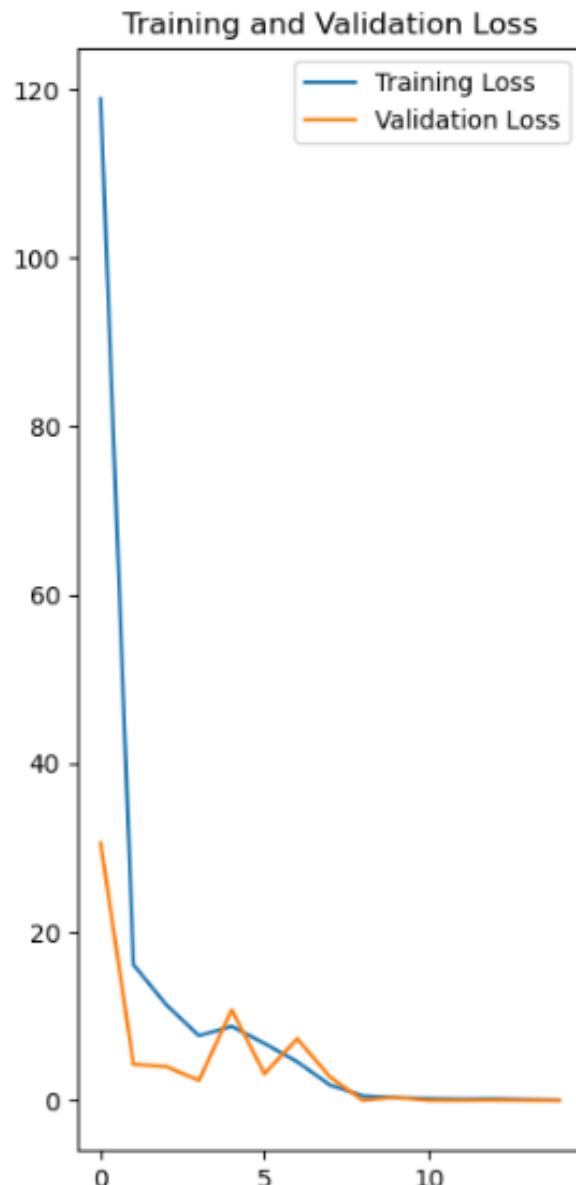
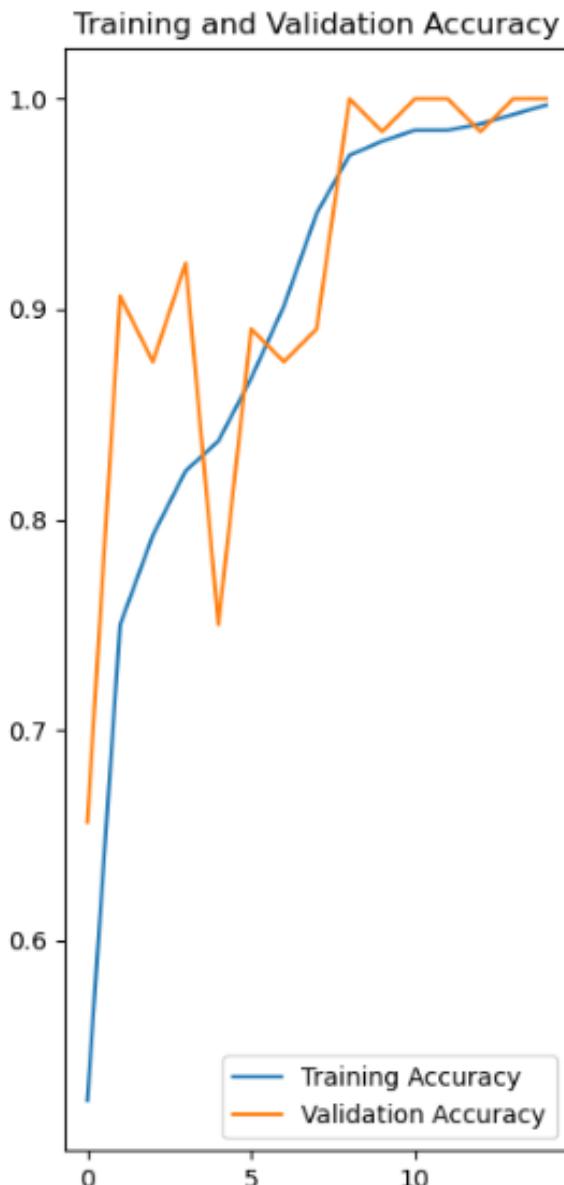
(a) 90:5:5

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=15
```

```
scores=model.evaluate(test_ds)  
scores
```

```
3/3 [=====] - 3s 731ms/step - loss: 0.5846 - accuracy: 0.9792  
[0.5845597982406616, 0.9791666865348816]
```

Average Time per Epoch: 44.80 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_ healthy,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%

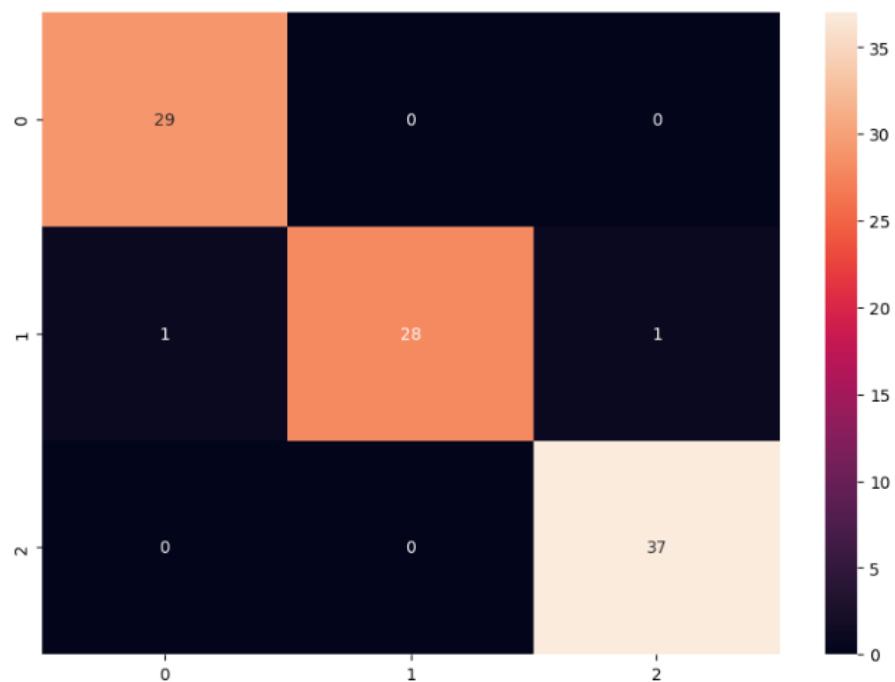


Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	0.97	1.00	0.98	29
1	1.00	0.93	0.97	30
2	0.97	1.00	0.99	37
accuracy			0.98	96
macro avg	0.98	0.98	0.98	96
weighted avg	0.98	0.98	0.98	96



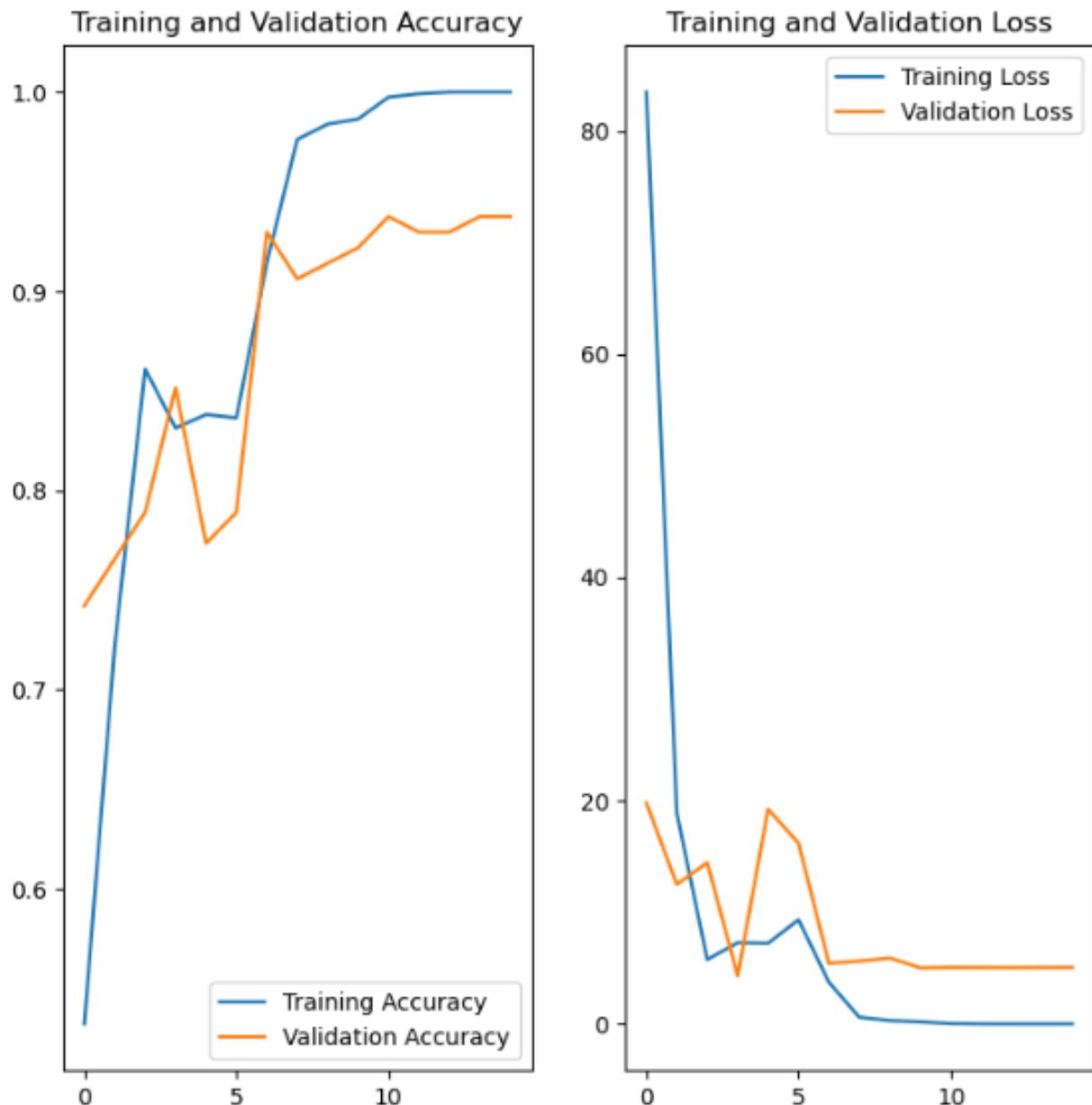
(b) 80:10:10

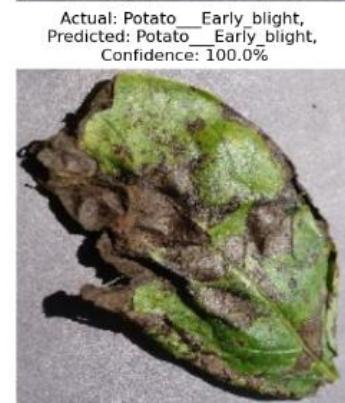
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=15
```

```
scores=model.evaluate(test_ds)  
scores
```

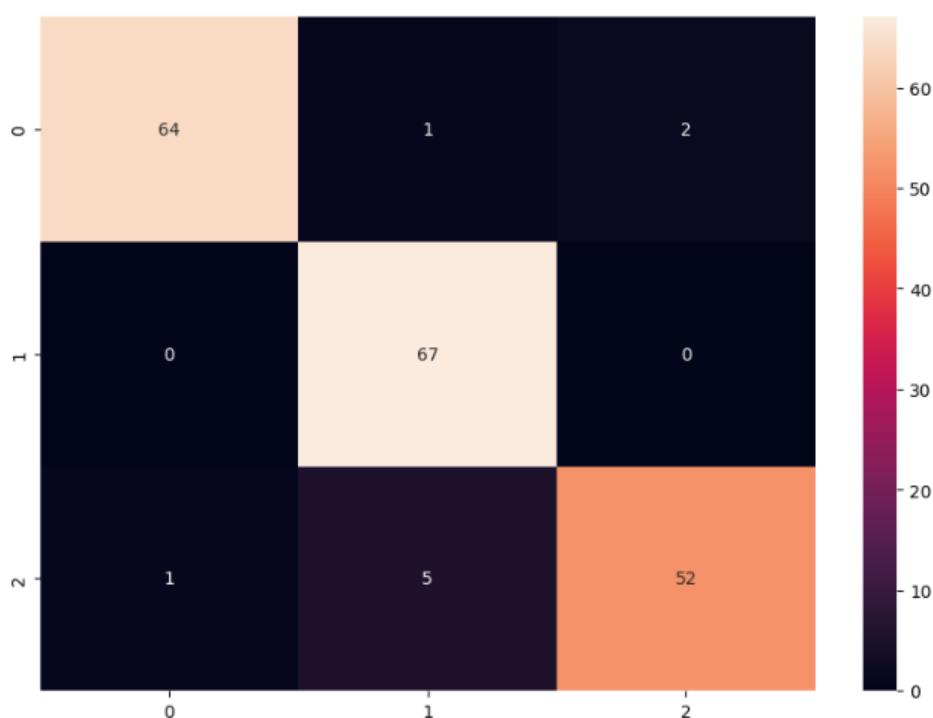
```
6/6 [=====] - 5s 705ms/step - loss: 2.3687 - accuracy: 0.9531  
[2.3687052726745605, 0.953125]
```

Average Time per Epoch: 41.20 s





Classification Report:					
	precision	recall	f1-score	support	
0	0.98	0.96	0.97	67	
1	0.92	1.00	0.96	67	
2	0.96	0.90	0.93	58	
accuracy			0.95	192	
macro avg	0.96	0.95	0.95	192	
weighted avg	0.95	0.95	0.95	192	y



(c) 70:15:15

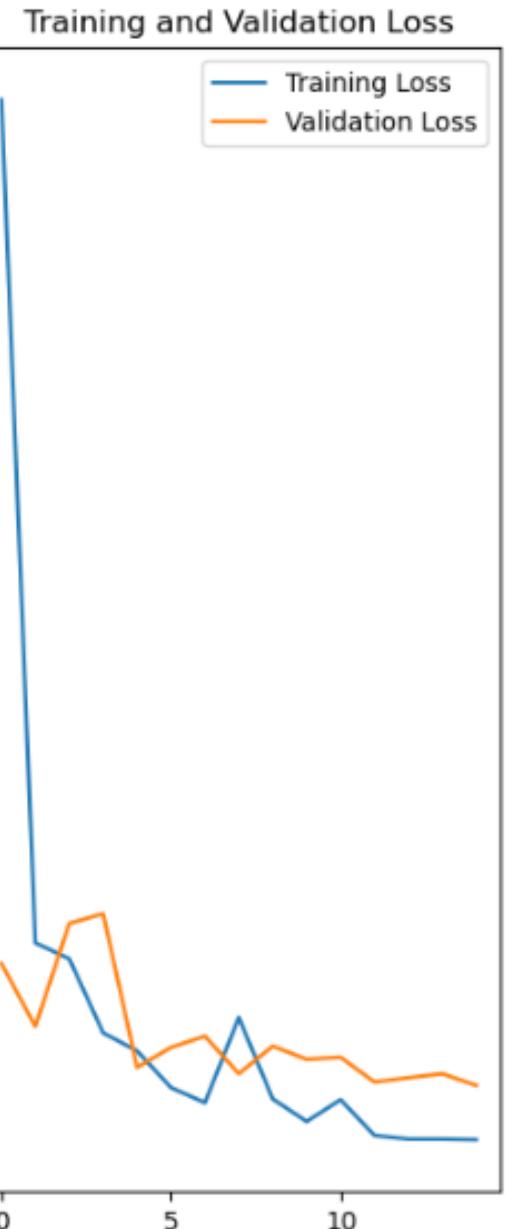
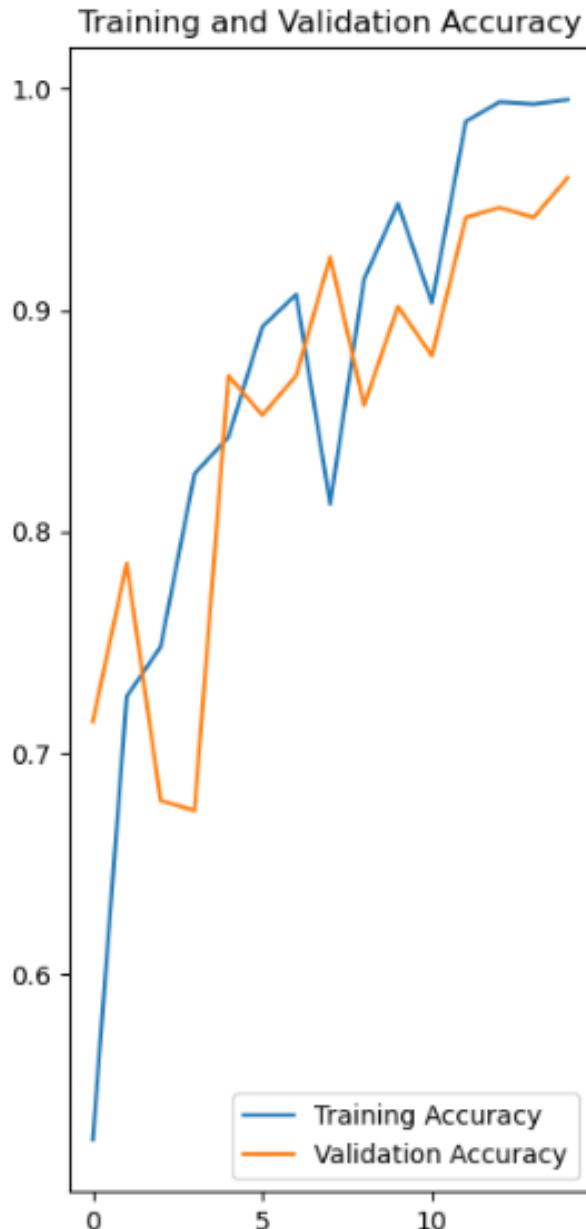
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=15
```

```
scores=model.evaluate(test_ds)
```

```
scores
```

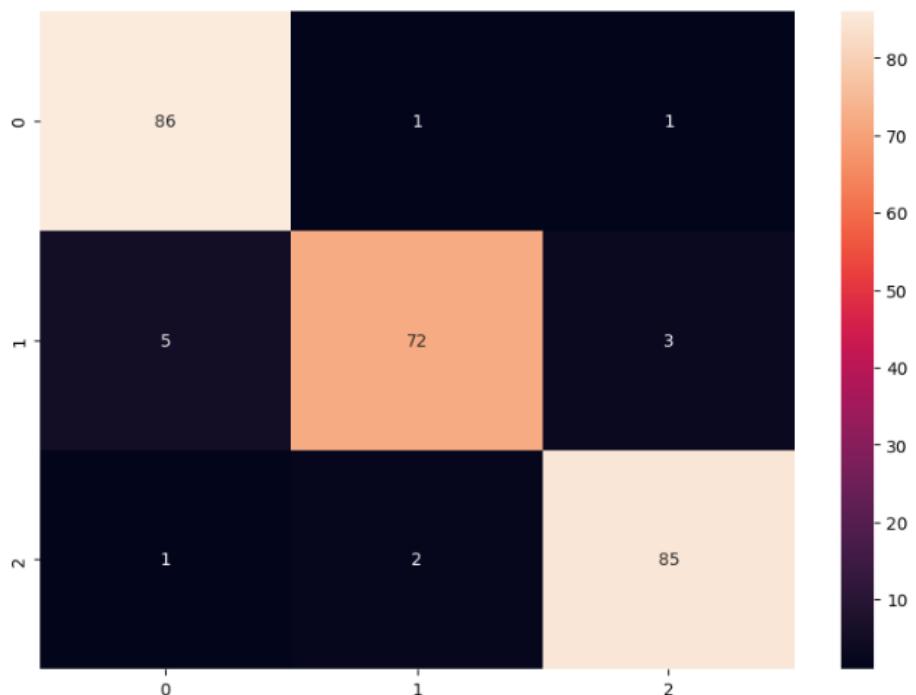
```
8/8 [=====] - 9s 996ms/step - loss: 3.2283 - accuracy: 0.9492  
[3.228309154510498, 0.94921875]
```

Average Time per Epoch: 39.67 s





Classification Report:					
	precision	recall	f1-score	support	
0	0.93	0.98	0.96	88	
1	0.96	0.90	0.93	80	
2	0.96	0.97	0.96	88	
accuracy			0.95	256	
macro avg	0.95	0.95	0.95	256	
weighted avg	0.95	0.95	0.95	256	



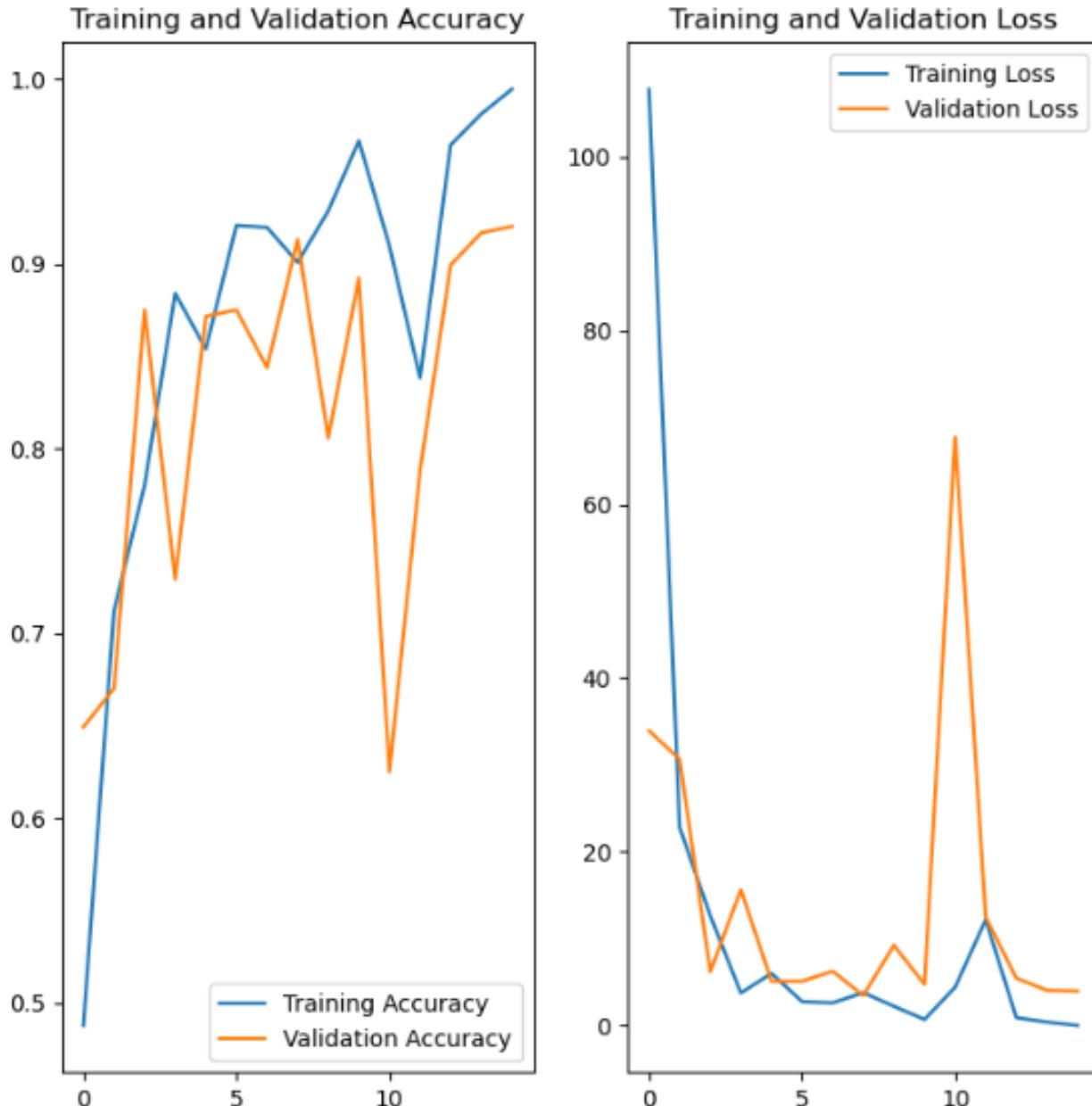
(d) 60:20:20

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=15
```

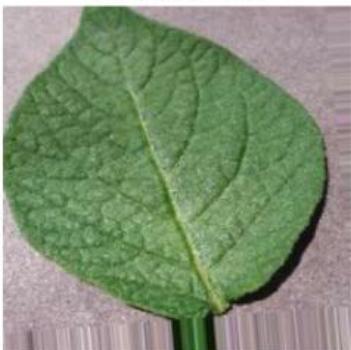
```
scores=model.evaluate(test_ds)  
scores
```

```
10/10 [=====] - 11s 1s/step - loss: 4.2928 - accuracy: 0.9000  
[4.292840003967285, 0.8999999761581421]
```

Average Time per Epoch: 37.80 s



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%

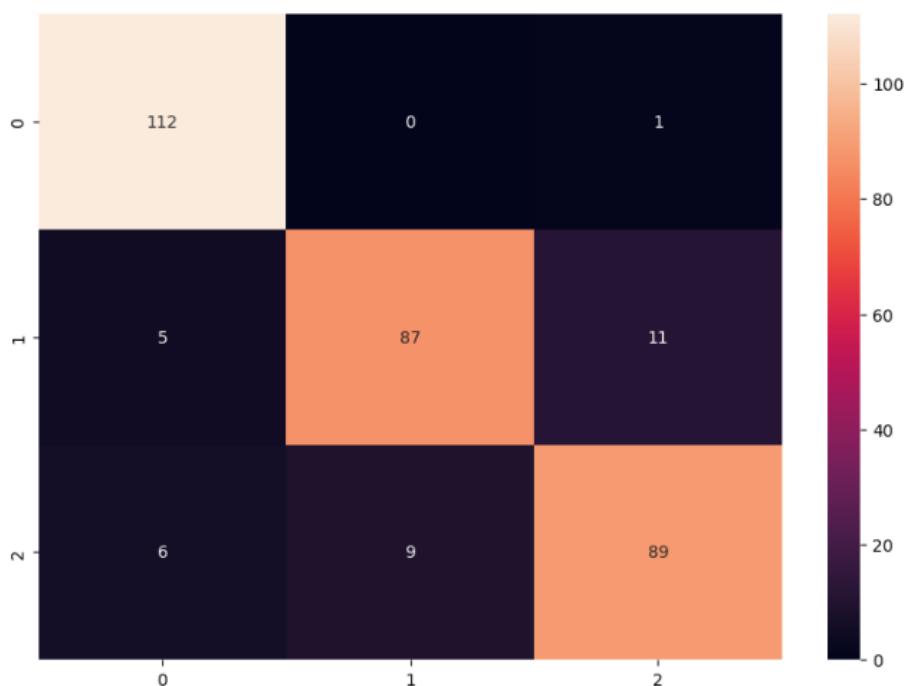


Actual: Potato_Late_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	0.91	0.99	0.95	113
1	0.91	0.84	0.87	103
2	0.88	0.86	0.87	104
accuracy			0.90	320
macro avg	0.90	0.90	0.90	320
weighted avg	0.90	0.90	0.90	320



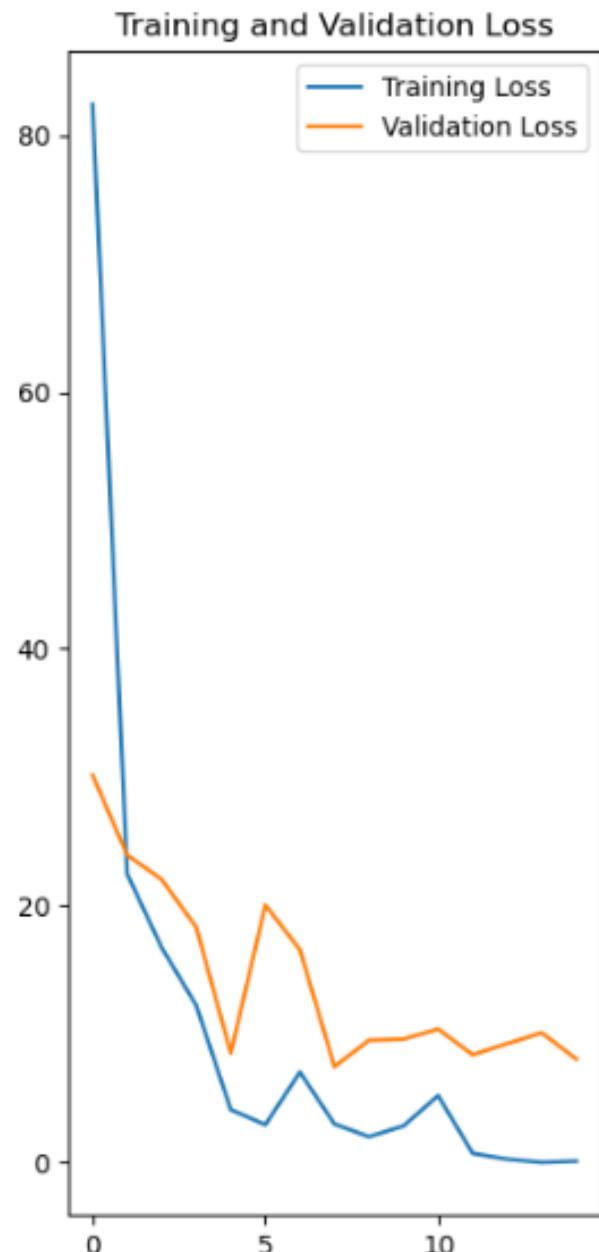
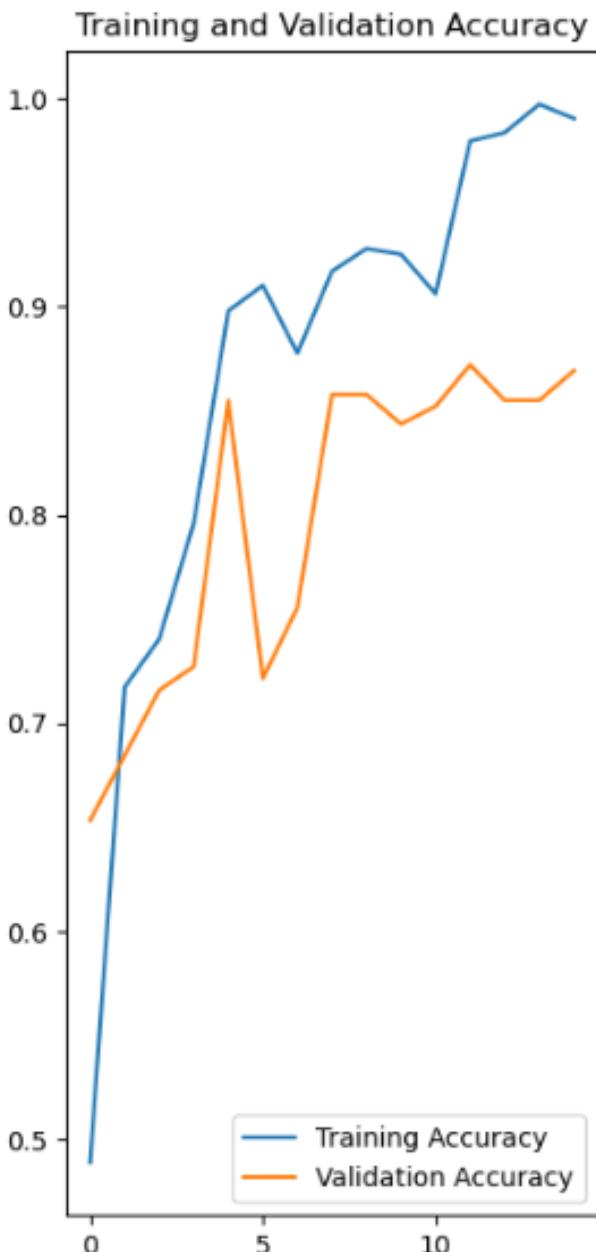
(e) 50:25:25

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=15
```

```
scores=model.evaluate(test_ds)  
scores
```

```
13/13 [=====] - 13s 994ms/step - loss: 4.8327 - accuracy: 0.9199  
[4.8327317237854, 0.9199029207229614]
```

Average Time per Epoch: 34.33 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%

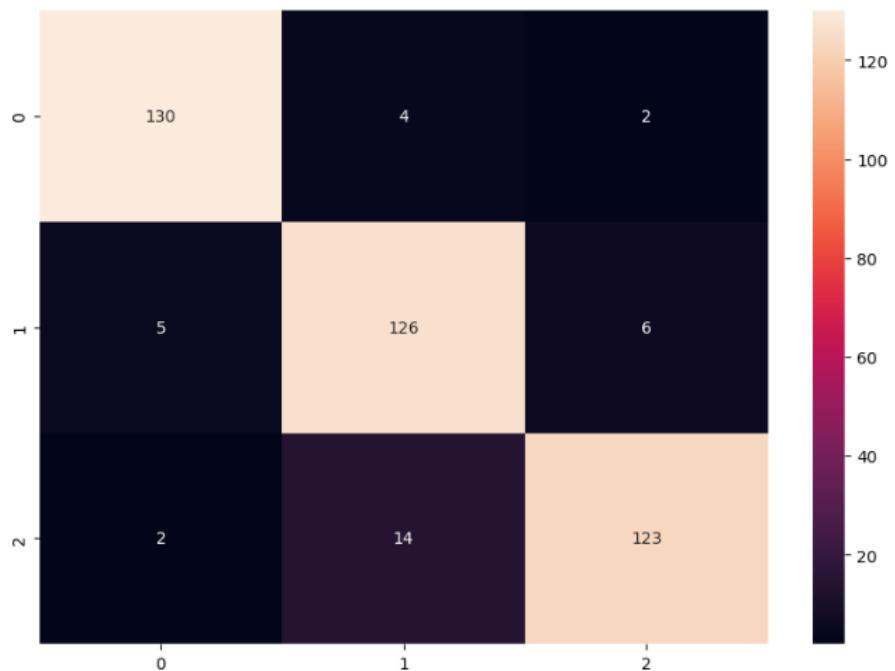


Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	0.95	0.96	0.95	136
1	0.88	0.92	0.90	137
2	0.94	0.88	0.91	139
accuracy			0.92	412
macro avg	0.92	0.92	0.92	412
weighted avg	0.92	0.92	0.92	412



Model 6: AlexNet

BASE MODEL

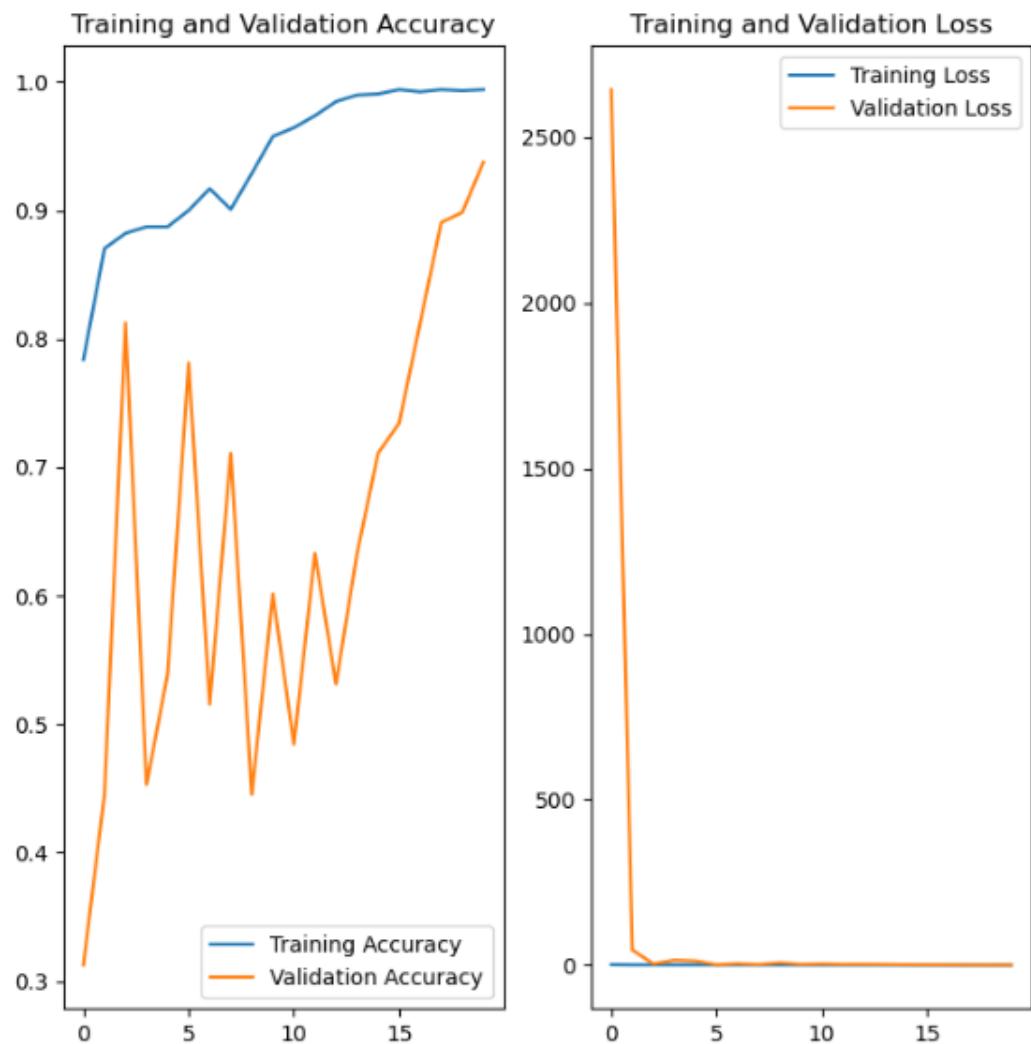
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 2s 197ms/step - loss: 0.3773 - accuracy: 0.8698  
[0.37729474902153015, 0.8697916865348816]
```

Average Time per Epoch: 50.30 s

history.history['loss']	history.history['accuracy']	history.history['val_loss']	history.history['val_accuracy']
[1.0363885164260864, 0.35841742157936096, 0.32910966873168945, 0.3196098804473877, 0.30750805139541626, 0.26871222257614136, 0.2175215184688568, 0.24979881942272186, 0.1825966089963913, 0.12338171154260635, 0.09984777122735977, 0.07828336209058762, 0.04998714476823807, 0.04156779497861862, 0.03838718309998512, 0.03127450868487358, 0.031551457941532135, 0.02991720288991928, 0.030878471210598946, 0.029012640938162804]	[0.7838982939720154, 0.8703389763832092, 0.8822034001350403, 0.8872881531715393, 0.8872881531715393, 0.8999999761581421, 0.9169491529464722, 0.9008474349975586, 0.9288135766983032, 0.9576271176338196, 0.9644067883491516, 0.9737288355827332, 0.9847457408905029, 0.989830493927002, 0.9906779527664185, 0.9940677881240845, 0.9923728704452515, 0.9940677881240845, 0.993220329284668, 0.9940677881240845]	[2644.36474609375, 45.44966884277344, 3.505288600921631, 14.91914176940918, 12.3828706741333, 0.7199034690856934, 3.853059768676758, 1.342477560043335, 6.737692832946777, 1.9182166891098022, 3.317150354385376, 1.9587233066558838, 2.1551766395568848, 1.681505799293518, 1.0468779802322388, 0.8132187128067017, 0.5831016302108765, 0.3445747494697571, 0.2804313898086548, 0.18049420416355133]	[0.3125, 0.4453125, 0.8125, 0.453125, 0.5390625, 0.78125, 0.515625, 0.7109375, 0.4453125, 0.6015625, 0.484375, 0.6328125, 0.53125, 0.6328125, 0.7109375, 0.734375, 0.8125, 0.890625, 0.8984375, 0.9375]



Actual: Potato__healthy,
Predicted: Potato__healthy,
Confidence: 91.09%



Actual: Potato__Early_blight,
Predicted: Potato__Late_blight,
Confidence: 99.19%



Actual: Potato__Early_blight,
Predicted: Potato__Early_blight,
Confidence: 82.29%



Actual: Potato__Early_blight,
Predicted: Potato__Early_blight,
Confidence: 95.26%



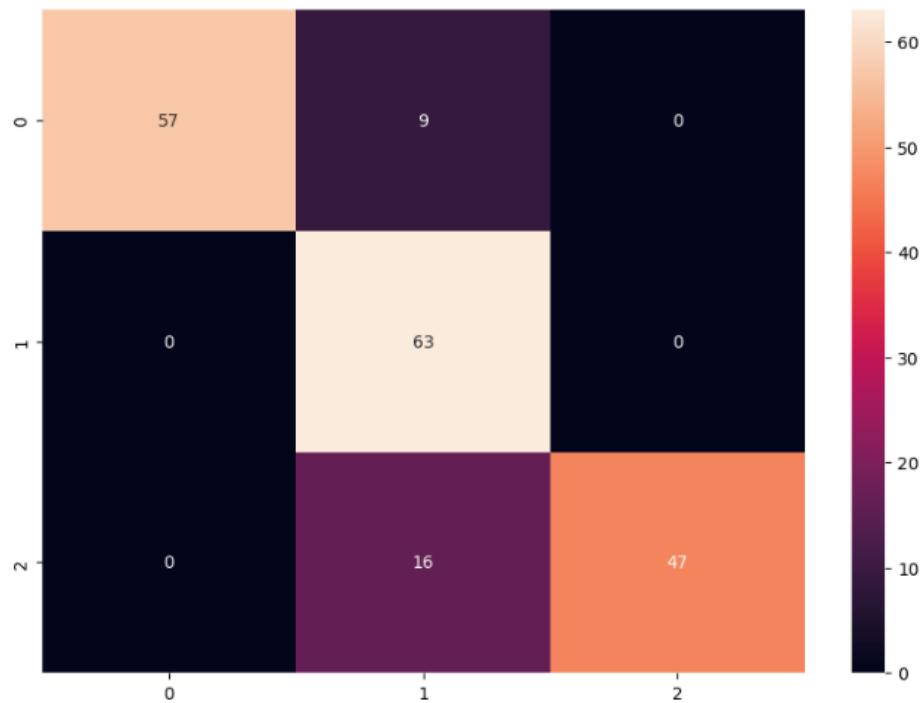
Actual: Potato__healthy,
Predicted: Potato__healthy,
Confidence: 100.0%



Actual: Potato__Late_blight,
Predicted: Potato__Late_blight,
Confidence: 99.61%



Classification Report:				
	precision	recall	f1-score	support
0	1.00	0.86	0.93	66
1	0.72	1.00	0.83	63
2	1.00	0.75	0.85	63
accuracy			0.87	192
macro avg	0.91	0.87	0.87	192
weighted avg	0.91	0.87	0.87	192



NO. OF EPOCHS

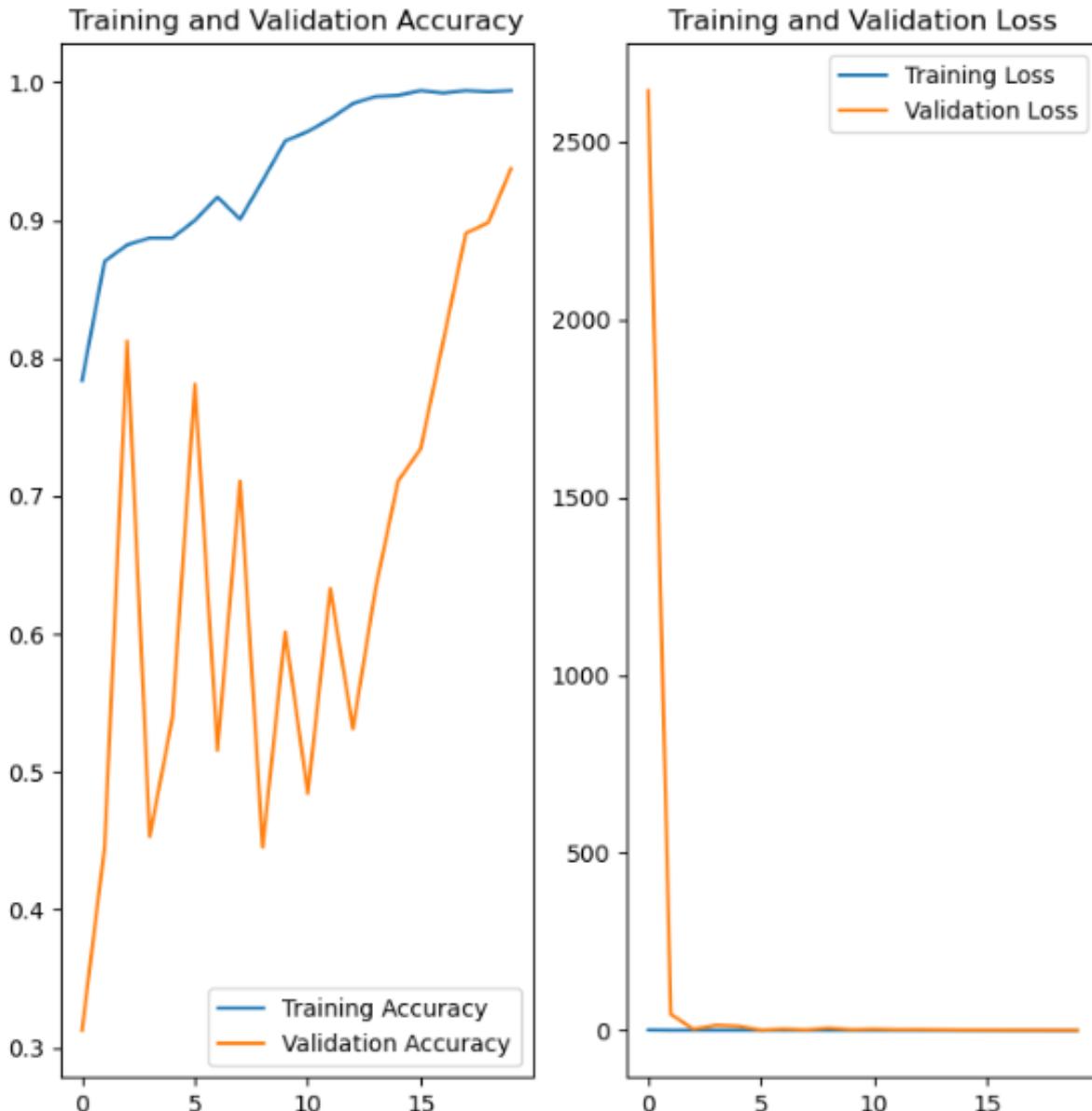
(a) 20

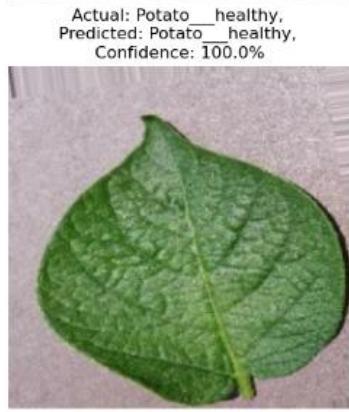
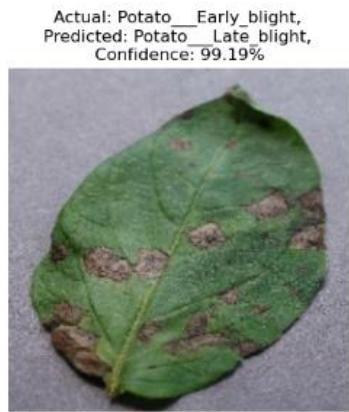
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

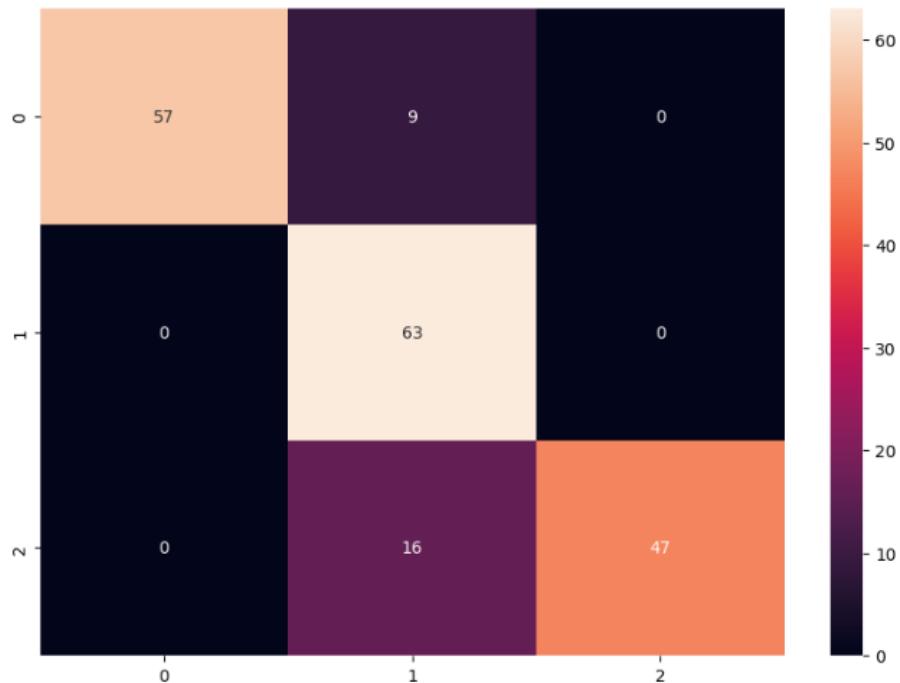
```
6/6 [=====] - 2s 197ms/step - loss: 0.3773 - accuracy: 0.8698  
[0.37729474902153015, 0.8697916865348816]
```

Average Time per Epoch: 50.30 s





Classification Report:					
	precision	recall	f1-score	support	
0	1.00	0.86	0.93	66	
1	0.72	1.00	0.83	63	
2	1.00	0.75	0.85	63	
accuracy			0.87	192	
macro avg	0.91	0.87	0.87	192	
weighted avg	0.91	0.87	0.87	192	



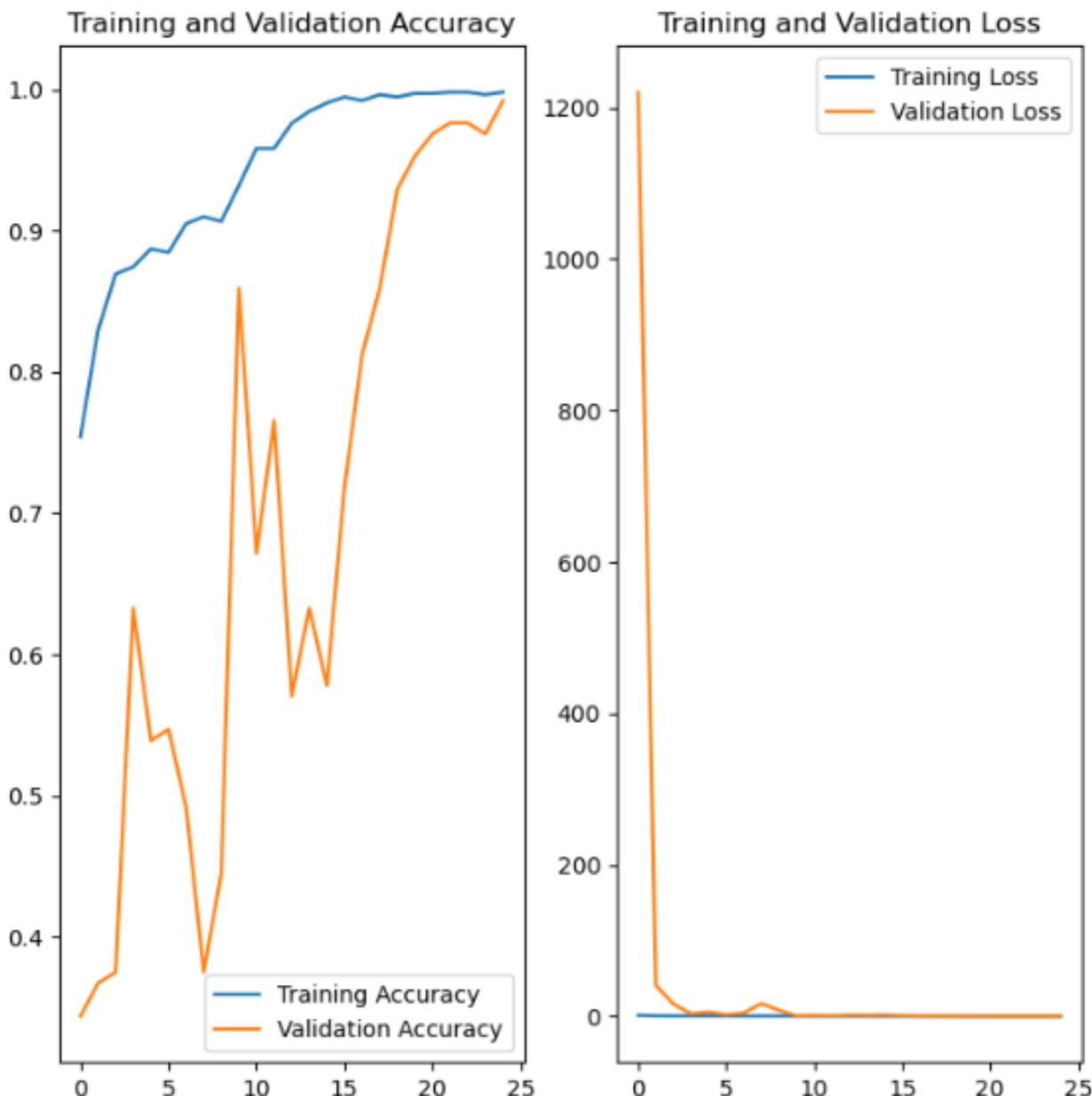
(b) 25

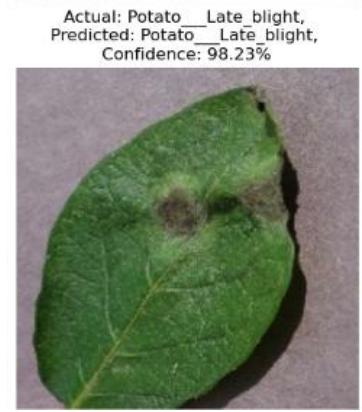
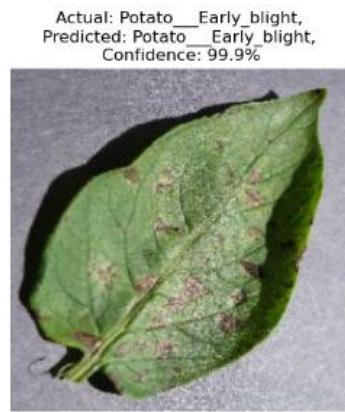
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=25
```

```
scores=model.evaluate(test_ds)  
scores
```

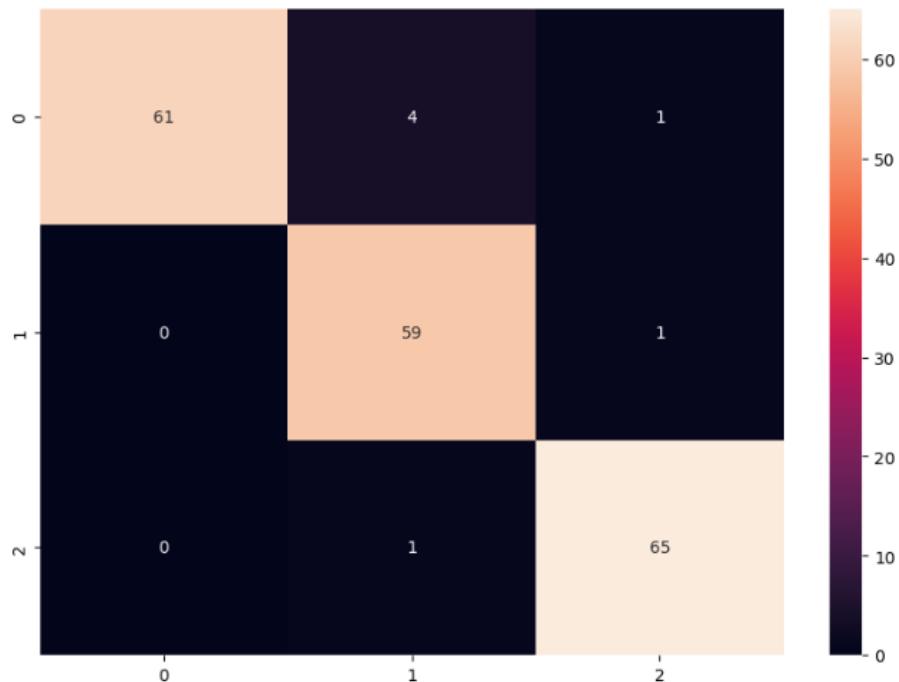
```
6/6 [=====] - 2s 198ms/step - loss: 0.0635 - accuracy: 0.9635  
[0.06347112357616425, 0.9635416865348816]
```

Average Time per Epoch: 51.52 s





Classification Report:					
	precision	recall	f1-score	support	
0	1.00	0.92	0.96	66	
1	0.92	0.98	0.95	60	
2	0.97	0.98	0.98	66	
accuracy			0.96	192	
macro avg	0.96	0.96	0.96	192	
weighted avg	0.97	0.96	0.96	192	



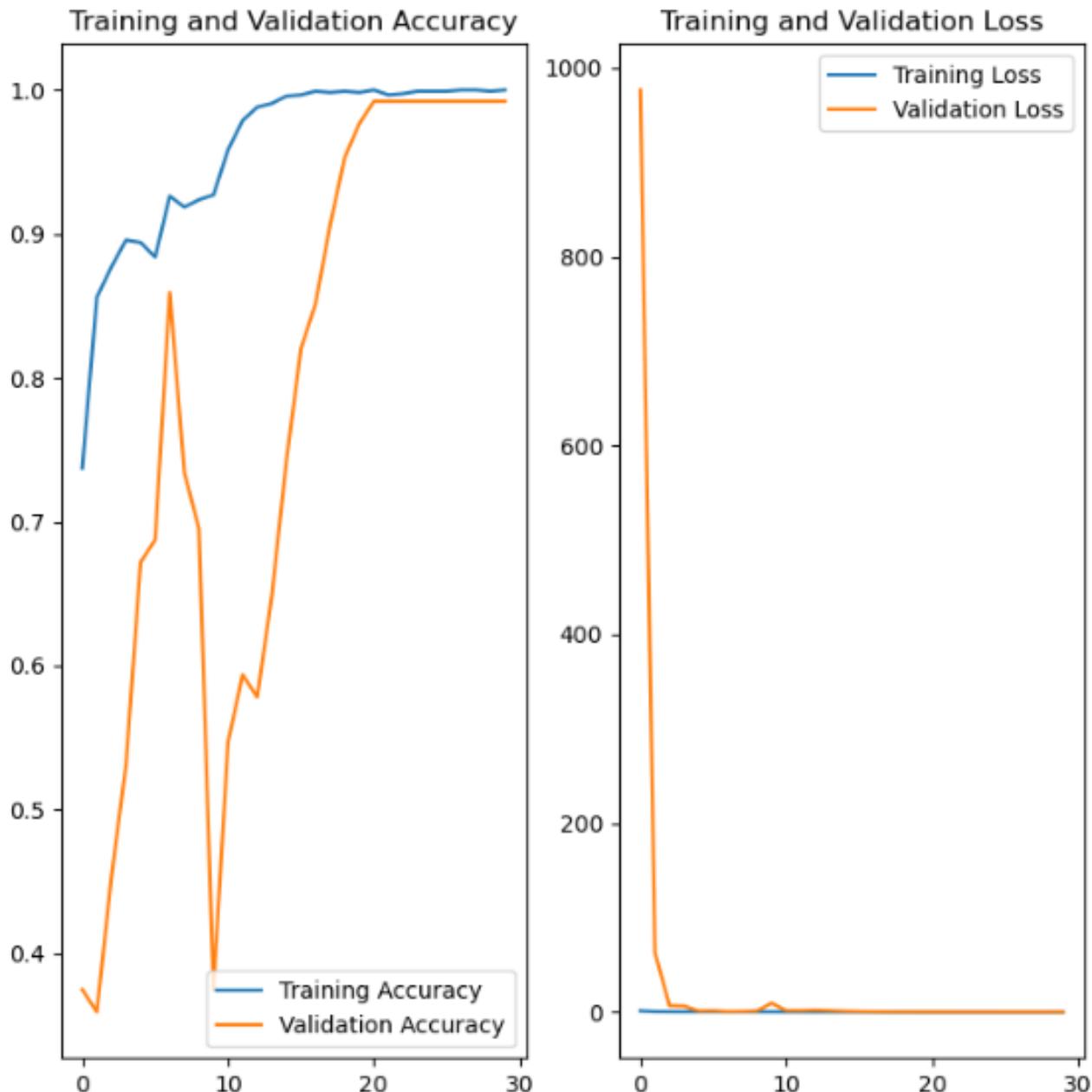
(c) 30

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=30
```

```
scores=model.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 2s 210ms/step - loss: 0.0600 - accuracy: 0.9740  
[0.06004173681139946, 0.9739583134651184]
```

Average Time per Epoch: 50.30 s



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.85%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.89%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.56%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 57.3%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.97%

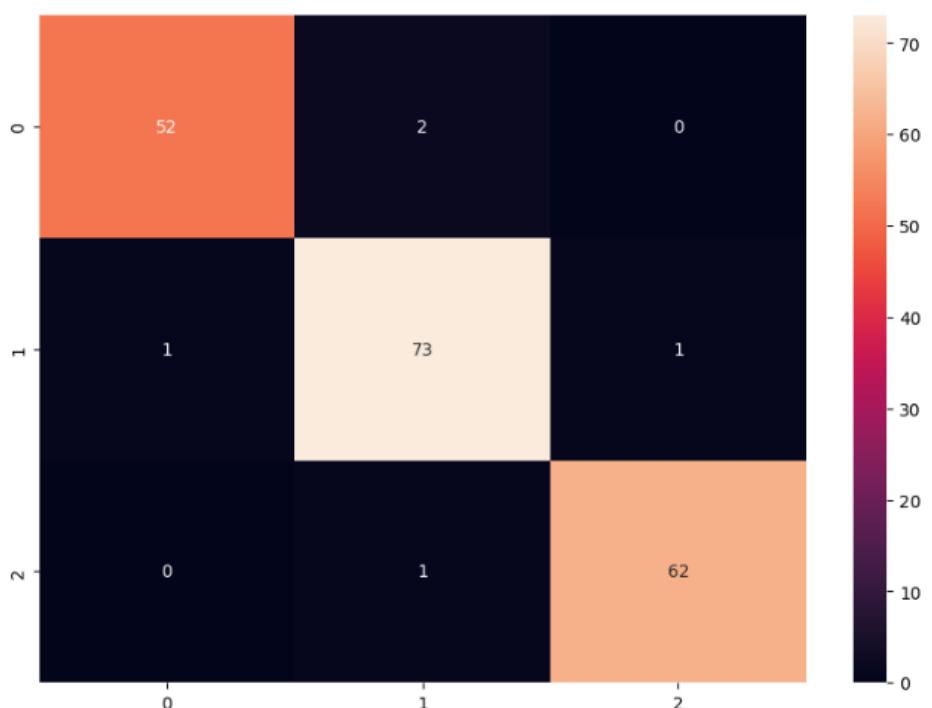


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.99%



Classification Report:

	precision	recall	f1-score	support
0	0.98	0.96	0.97	54
1	0.96	0.97	0.97	75
2	0.98	0.98	0.98	63
accuracy			0.97	192
macro avg	0.98	0.97	0.97	192
weighted avg	0.97	0.97	0.97	192



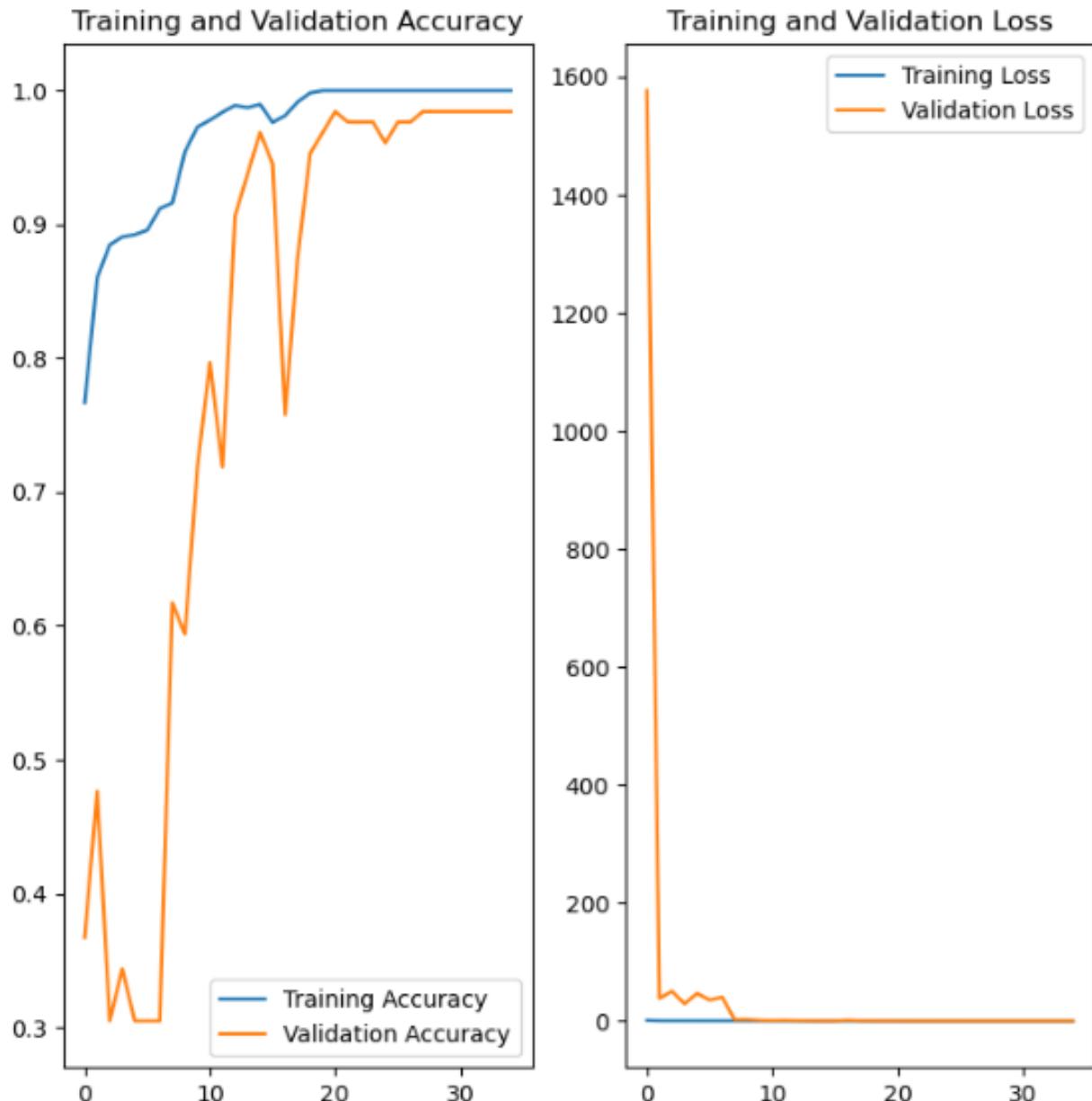
(d) 35

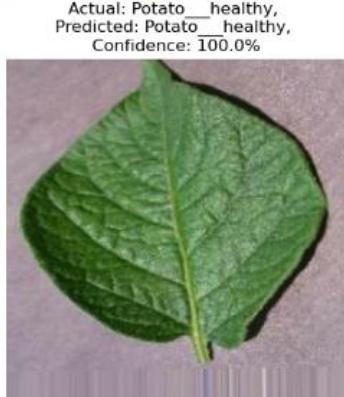
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=35
```

```
scores=model.evaluate(test_ds)  
scores
```

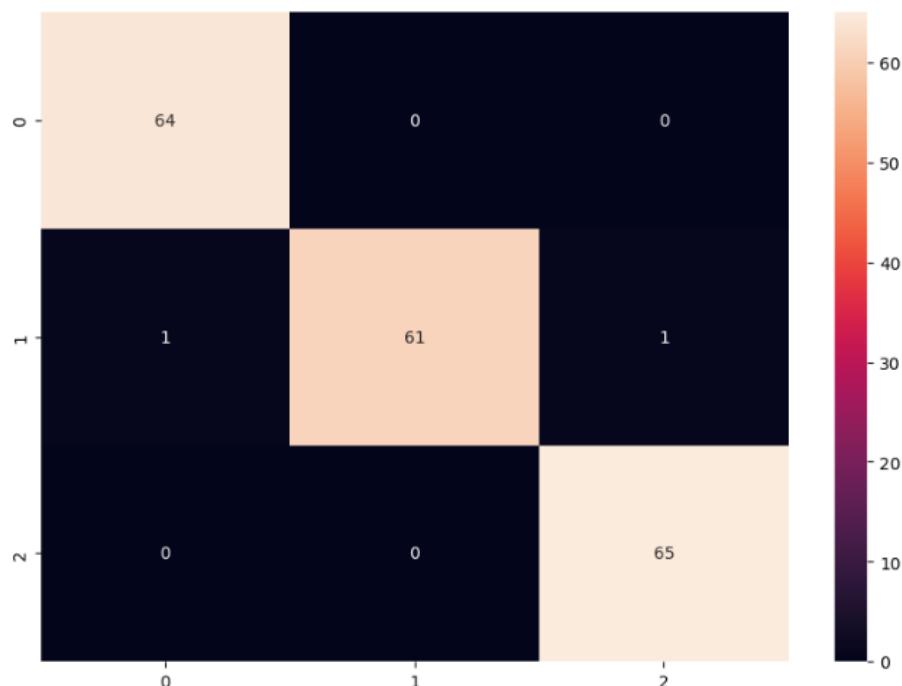
```
6/6 [=====] - 2s 197ms/step - loss: 0.0366 - accuracy: 0.9896  
[0.03660060465335846, 0.9895833134651184]
```

Average Time per Epoch: 49.26 s





Classification Report:					
	precision	recall	f1-score	support	
0	0.98	1.00	0.99	64	
1	1.00	0.97	0.98	63	
2	0.98	1.00	0.99	65	
accuracy			0.99	192	
macro avg	0.99	0.99	0.99	192	
weighted avg	0.99	0.99	0.99	192	



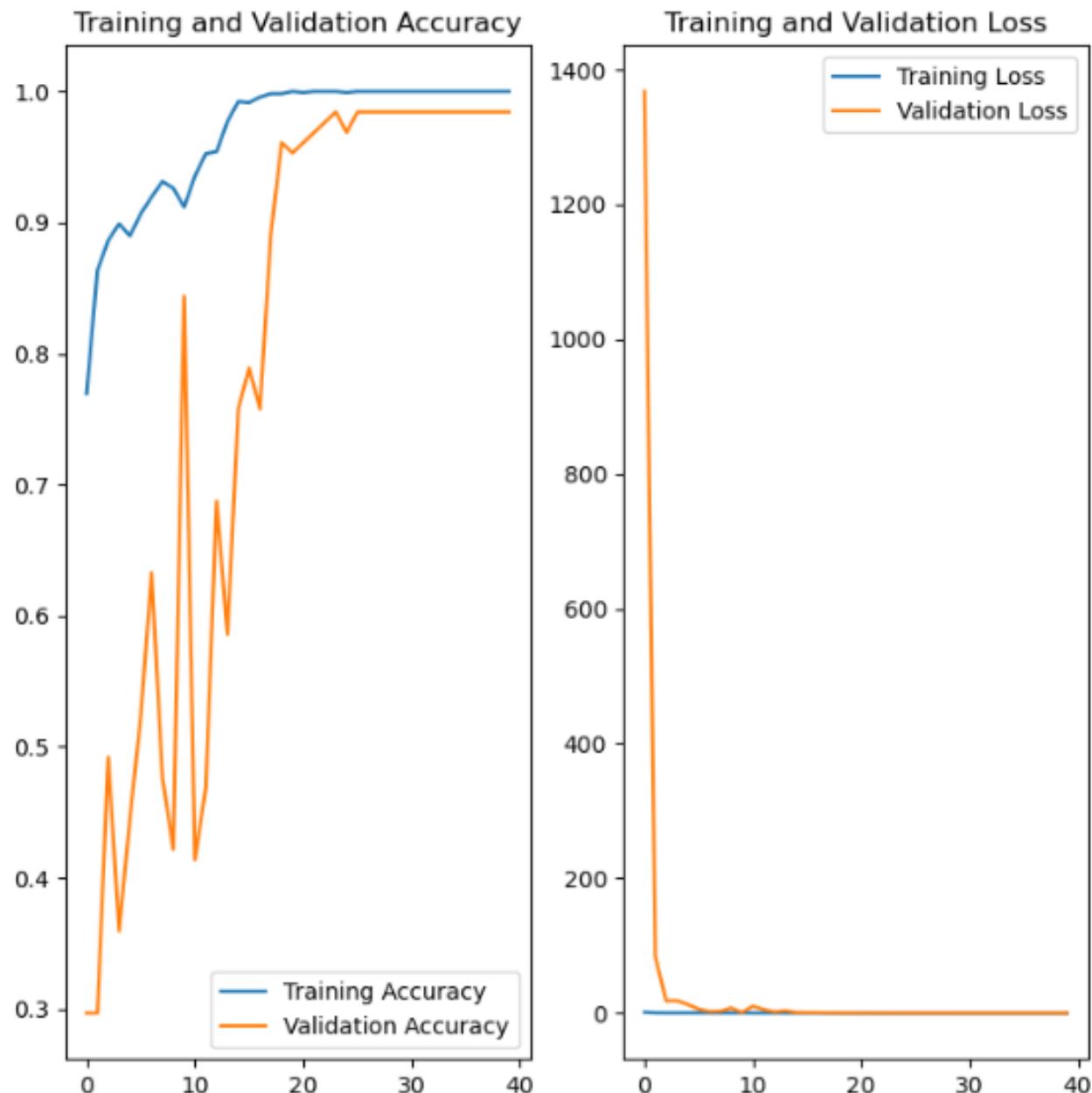
(e) 40

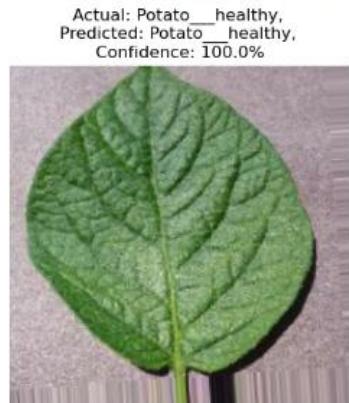
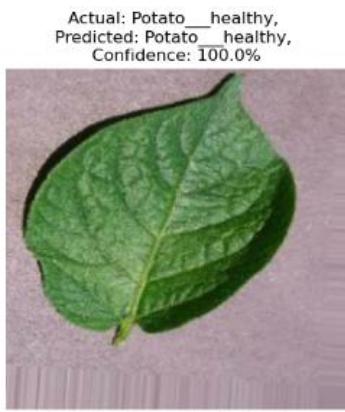
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=40
```

```
scores=model.evaluate(test_ds)  
scores
```

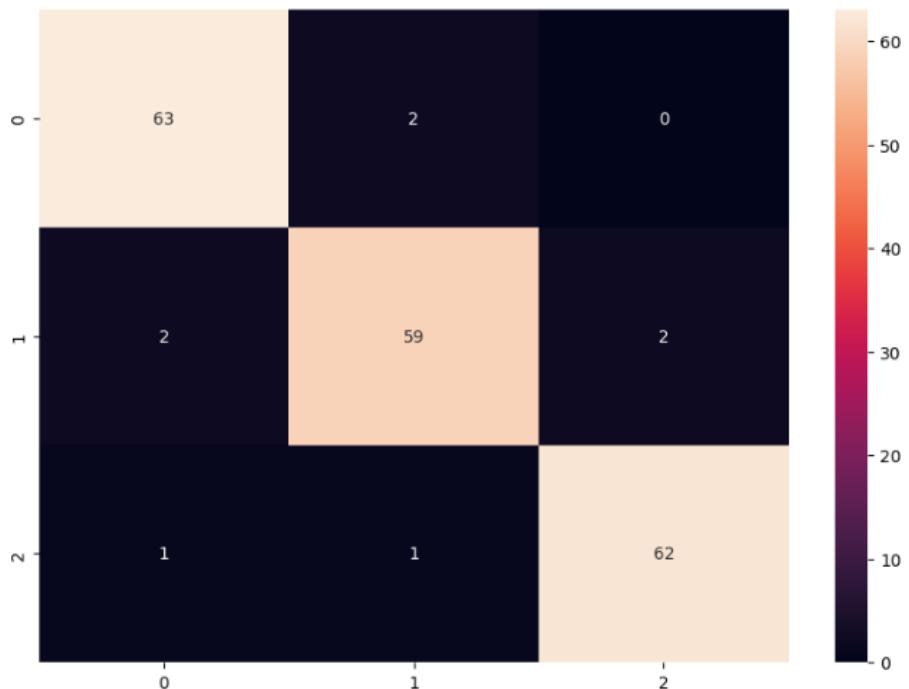
```
6/6 [=====] - 3s 202ms/step - loss: 0.1699 - accuracy: 0.9583  
[0.16988761723041534, 0.9583333134651184]
```

Average Time per Epoch: 51.50 s





Classification Report:					
	precision	recall	f1-score	support	
0	0.95	0.97	0.96	65	
1	0.95	0.94	0.94	63	
2	0.97	0.97	0.97	64	
accuracy			0.96	192	
macro avg	0.96	0.96	0.96	192	
weighted avg	0.96	0.96	0.96	192	



BATCH SIZE

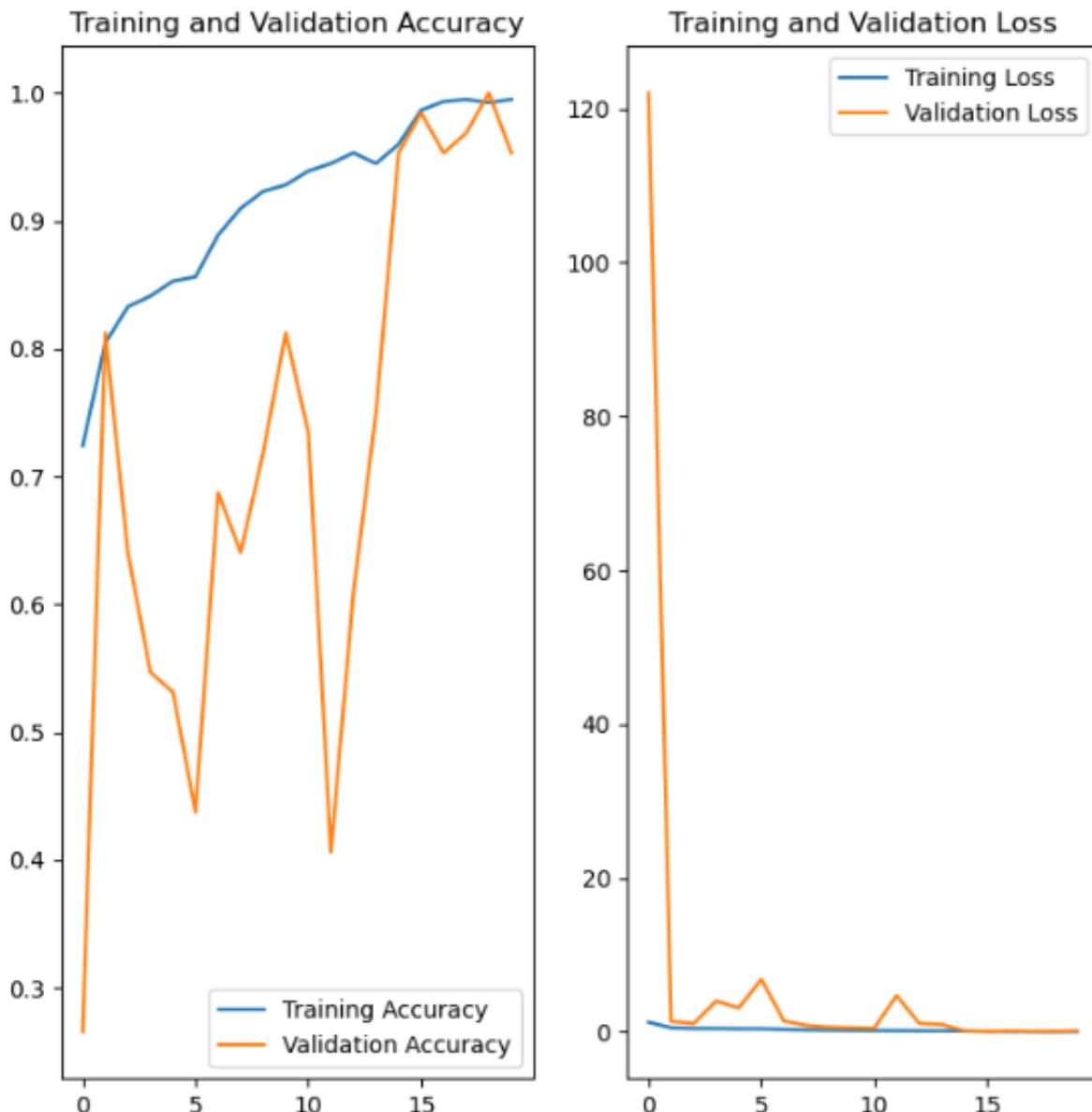
(a) 16

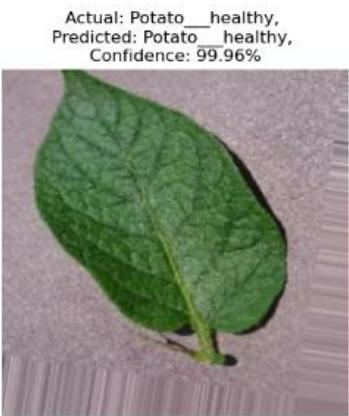
```
IMAGE_SIZE=224  
BATCH_SIZE=16  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

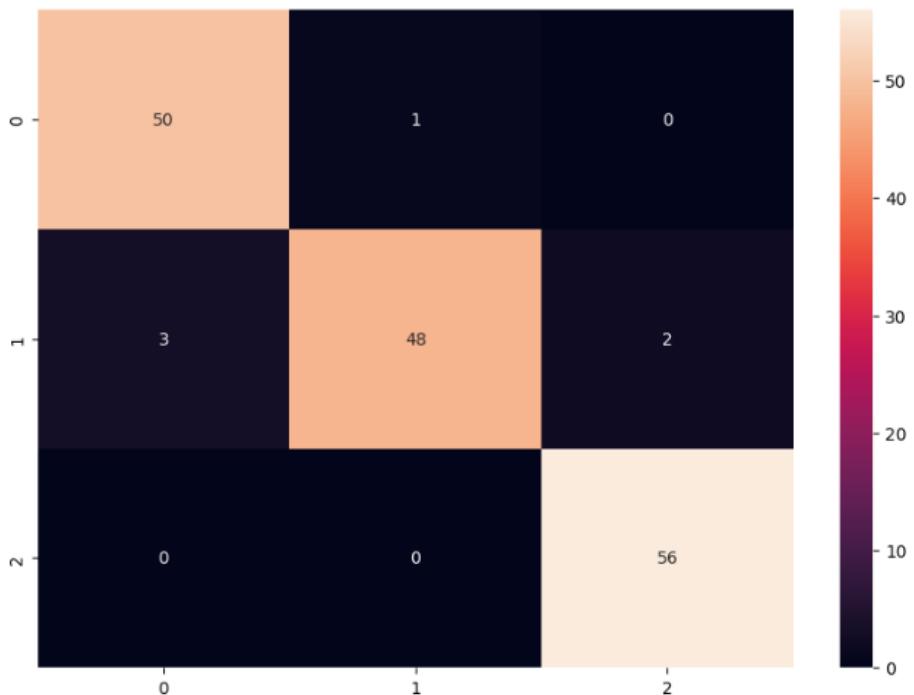
```
10/10 [=====] - 2s 115ms/step - loss: 0.1788 - accuracy: 0.9625  
[0.17878946661949158, 0.9624999761581421]
```

Average Time per Epoch: 60.20 s





Classification Report:					
	precision	recall	f1-score	support	
0	0.94	0.98	0.96	51	
1	0.98	0.91	0.94	53	
2	0.97	1.00	0.98	56	
accuracy			0.96	160	
macro avg	0.96	0.96	0.96	160	
weighted avg	0.96	0.96	0.96	160	



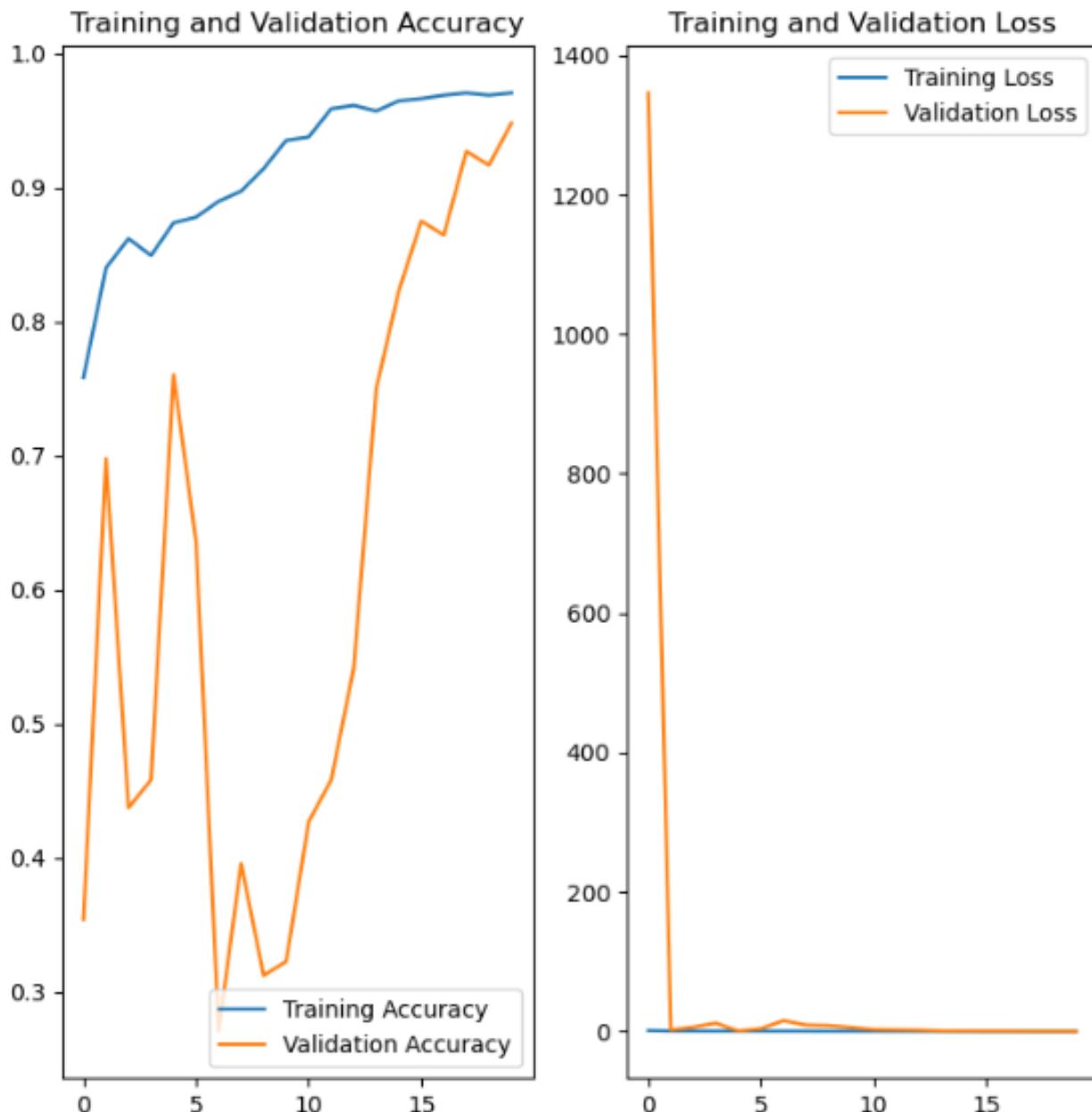
(b) 24

```
IMAGE_SIZE=224  
BATCH_SIZE=24  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

```
7/7 [=====] - 2s 169ms/step - loss: 0.0936 - accuracy: 0.9702  
[0.09362805634737015, 0.9702380895614624]
```

Average Time per Epoch: 54.40 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 89.38%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 98.73%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 84.06%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.07%

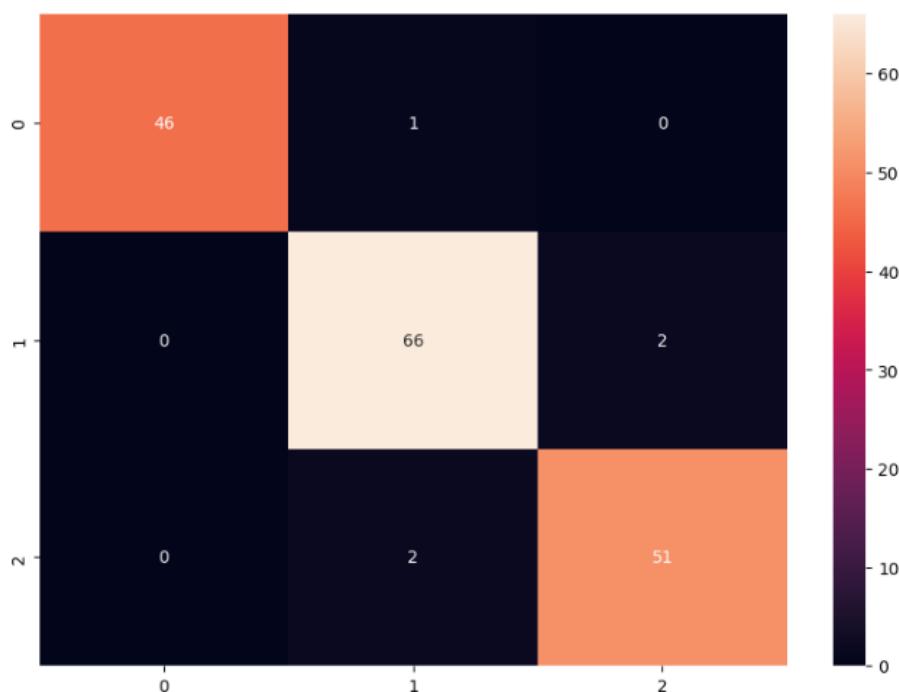


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Classification Report:

	precision	recall	f1-score	support
0	1.00	0.98	0.99	47
1	0.96	0.97	0.96	68
2	0.96	0.96	0.96	53
accuracy			0.97	168
macro avg	0.97	0.97	0.97	168
weighted avg	0.97	0.97	0.97	168

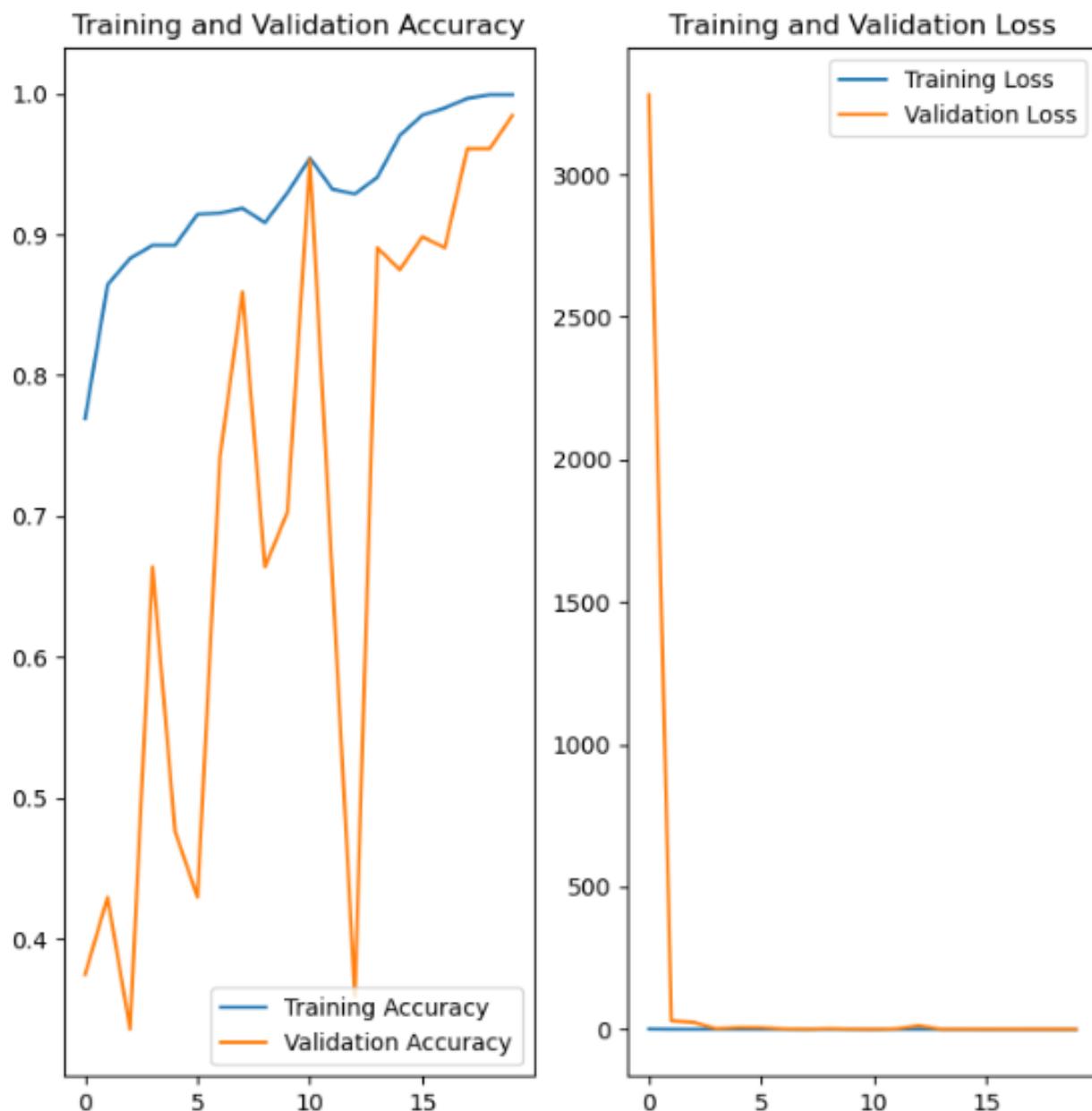


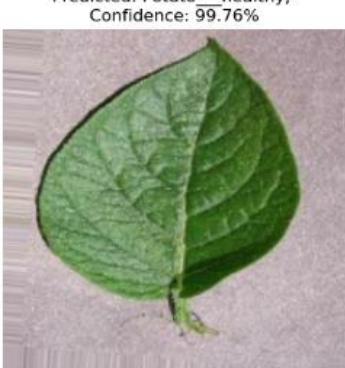
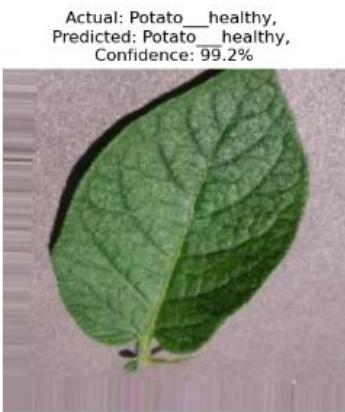
(c) 32

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=20
```

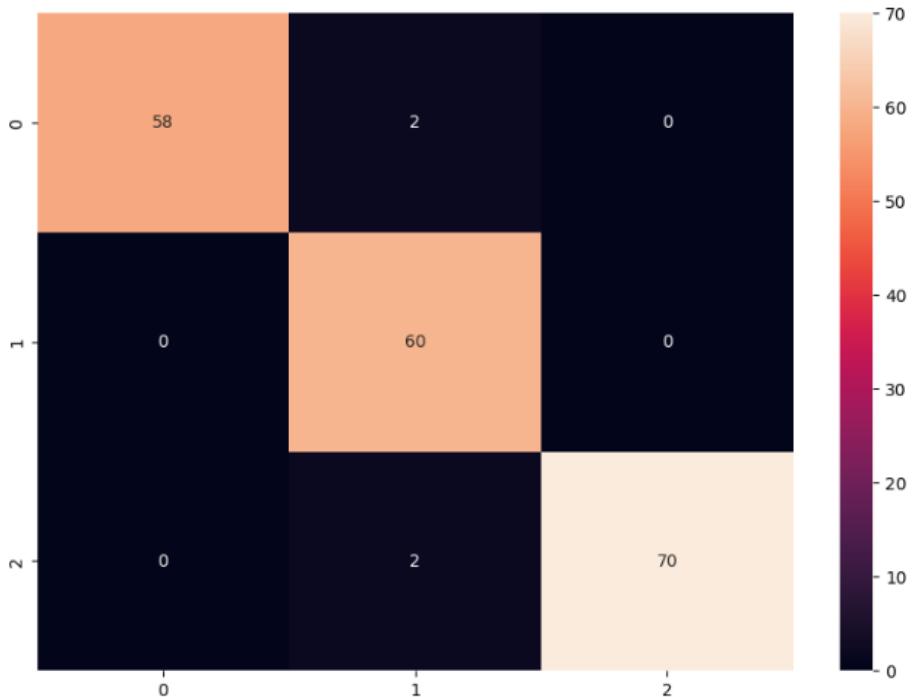
```
scores=model.evaluate(test_ds)  
scores  
  
6/6 [=====] - 2s 233ms/step - loss: 0.0629 - accuracy: 0.9792  
[0.06290849298238754, 0.9791666865348816]
```

Average Time per Epoch: 53.05 s





Classification Report:					
	precision	recall	f1-score	support	
0	1.00	0.97	0.98	60	
1	0.94	1.00	0.97	60	
2	1.00	0.97	0.99	72	
accuracy			0.98	192	
macro avg	0.98	0.98	0.98	192	
weighted avg	0.98	0.98	0.98	192	



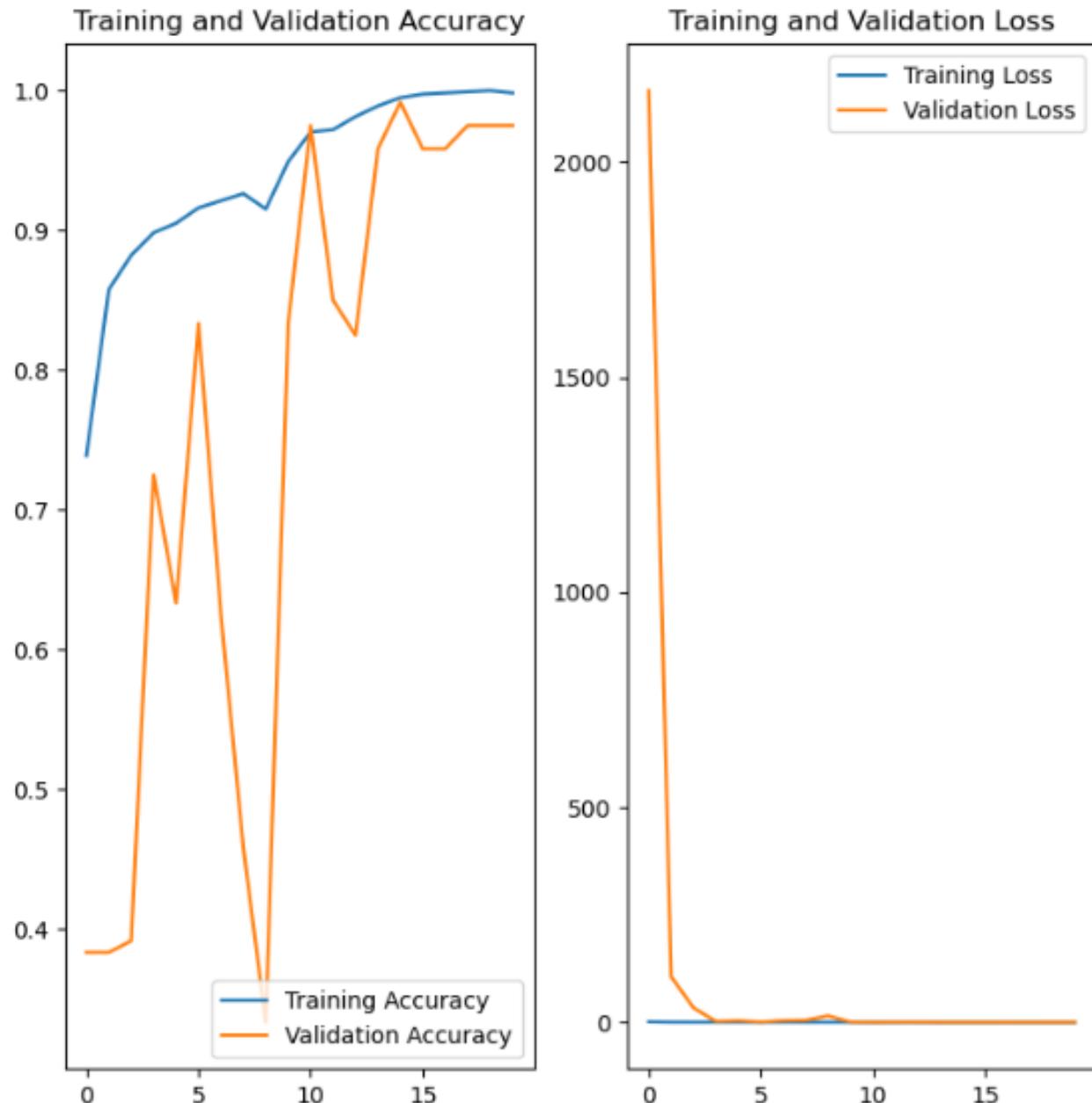
(d) 40

```
IMAGE_SIZE=224  
BATCH_SIZE=40  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

```
5/5 [=====] - 2s 262ms/step - loss: 0.0780 - accuracy: 0.9750  
[0.0780230164527893, 0.9750000238418579]
```

Average Time per Epoch: 52.50 s



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 99.98%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 98.65%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 98.09%

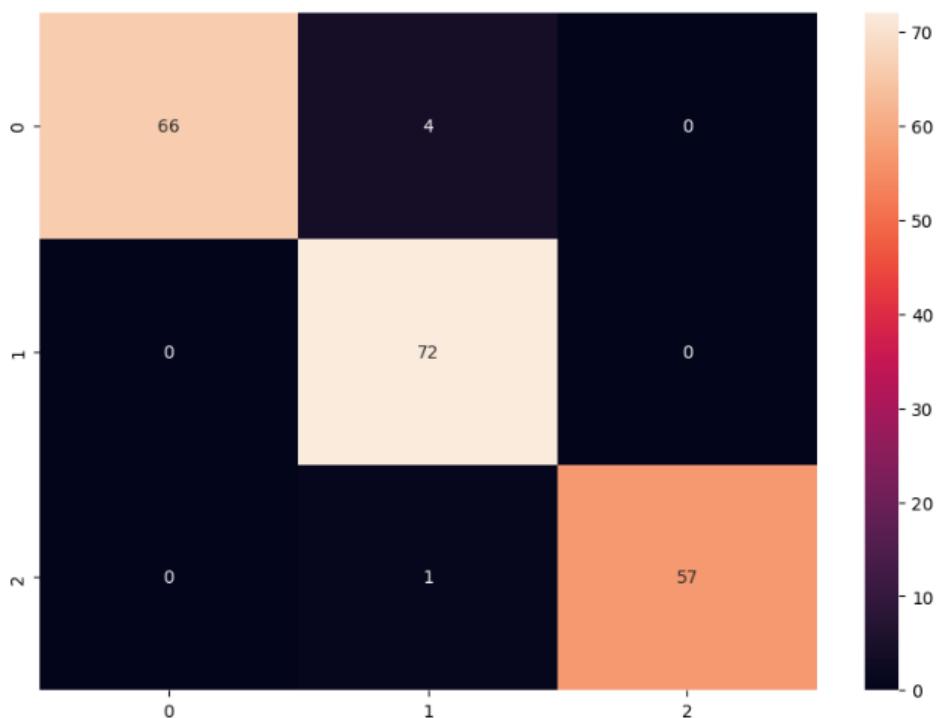


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 99.95%



Classification Report:

	precision	recall	f1-score	support
0	1.00	0.94	0.97	70
1	0.94	1.00	0.97	72
2	1.00	0.98	0.99	58
accuracy				0.97
macro avg	0.98	0.98	0.98	200
weighted avg	0.98	0.97	0.98	200



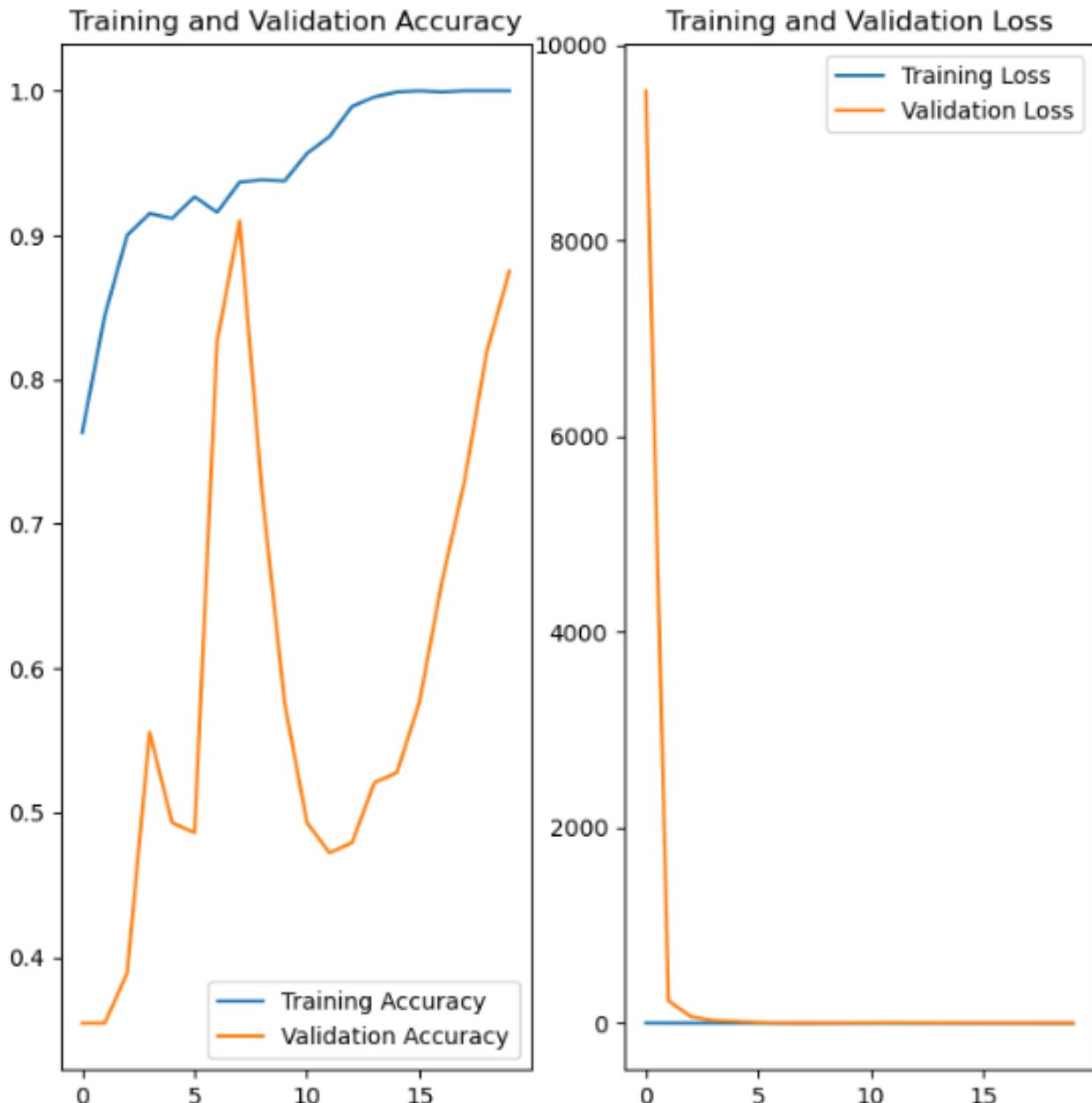
(e) 48

```
IMAGE_SIZE=224  
BATCH_SIZE=48  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

```
4/4 [=====] - 2s 332ms/step - loss: 0.4008 - accuracy: 0.8646  
[0.4007858335971832, 0.8645833134651184]
```

Average Time per Epoch: 49.85 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 98.58%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 86.19%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 98.74%



Actual: Potato_Early_blight,
Predicted: Potato_healthy,
Confidence: 69.85%

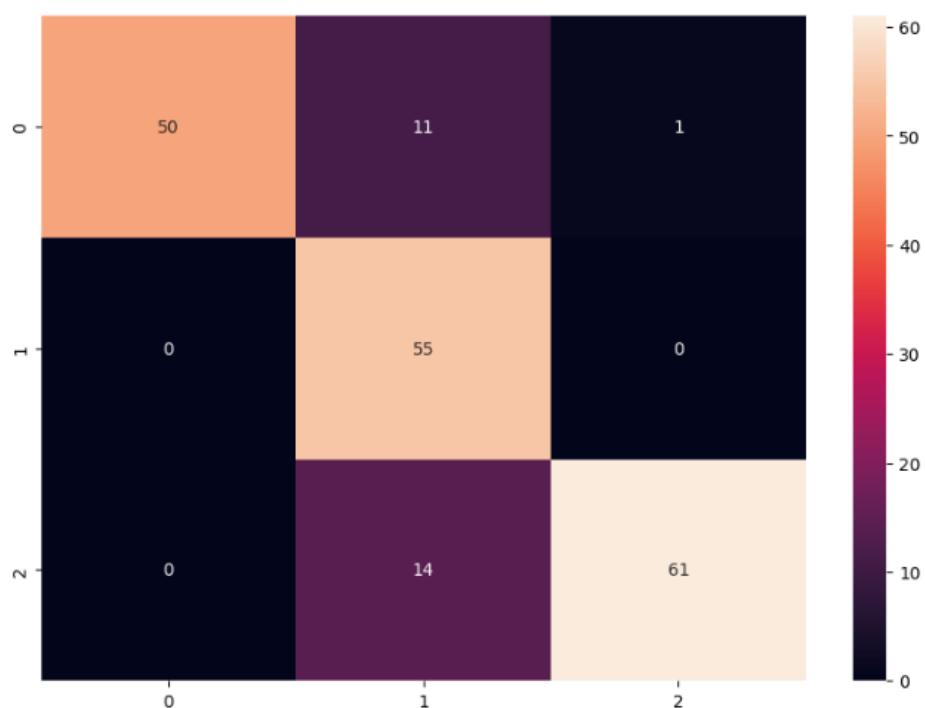


Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 88.86%



Classification Report:

	precision	recall	f1-score	support
0	1.00	0.81	0.89	62
1	0.69	1.00	0.81	55
2	0.98	0.81	0.89	75
accuracy			0.86	192
macro avg	0.89	0.87	0.87	192
weighted avg	0.90	0.86	0.87	192



DATASET SPLIT RATIO

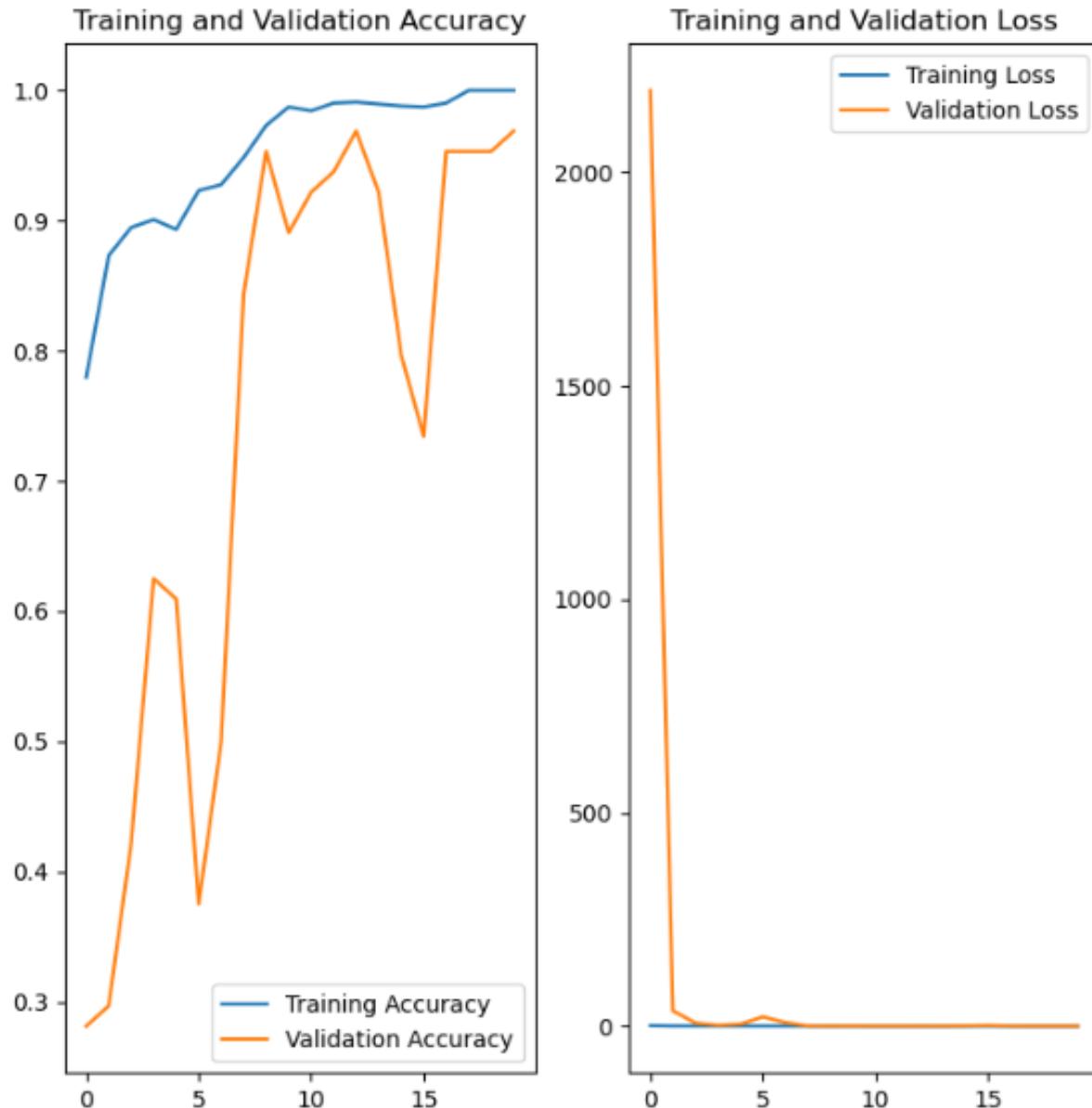
(a) 90:5:5

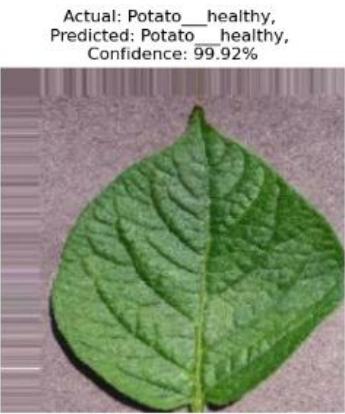
```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

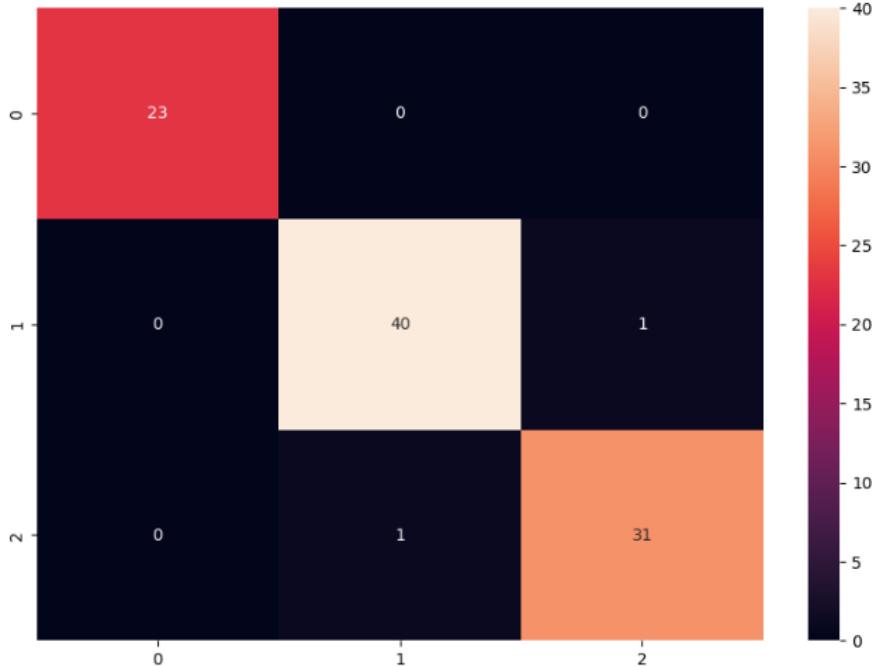
```
3/3 [=====] - 1s 230ms/step - loss: 0.0297 - accuracy: 0.9792  
[0.029729431495070457, 0.9791666865348816]
```

Average Time per Epoch: 60.35 s





Classification Report:				
	precision	recall	f1-score	support
0	1.00	1.00	1.00	23
1	0.98	0.98	0.98	41
2	0.97	0.97	0.97	32
accuracy			0.98	96
macro avg	0.98	0.98	0.98	96
weighted avg	0.98	0.98	0.98	96



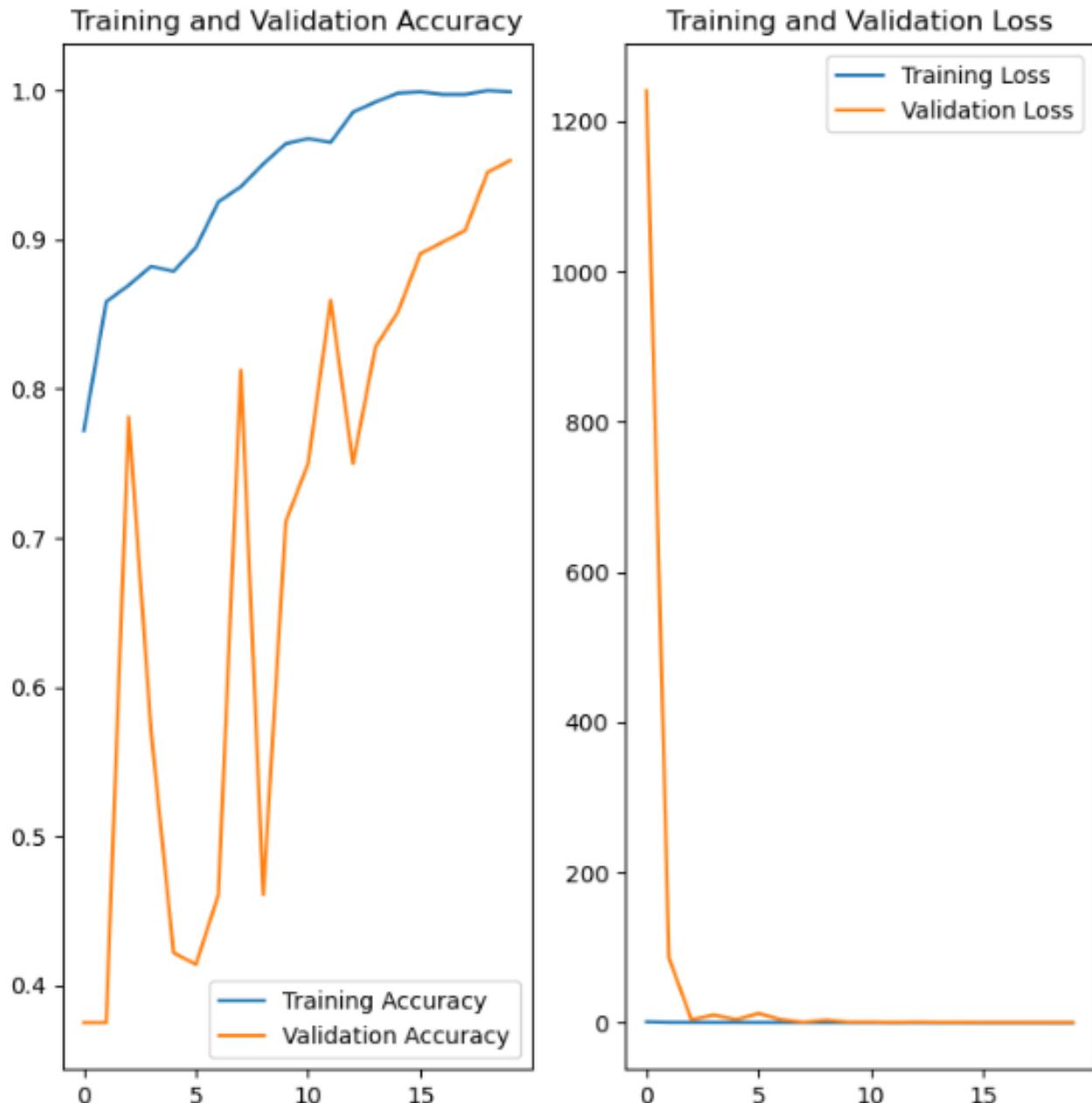
(b) 80:10:10

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

```
6/6 [=====] - 2s 227ms/step - loss: 0.0860 - accuracy: 0.9635  
[0.08600044995546341, 0.9635416865348816]
```

Average Time per Epoch: 54.35 s



Actual: Potato_Early_blight,
Predicted: Potato_Late_blight,
Confidence: 78.51%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.91%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 90.86%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%

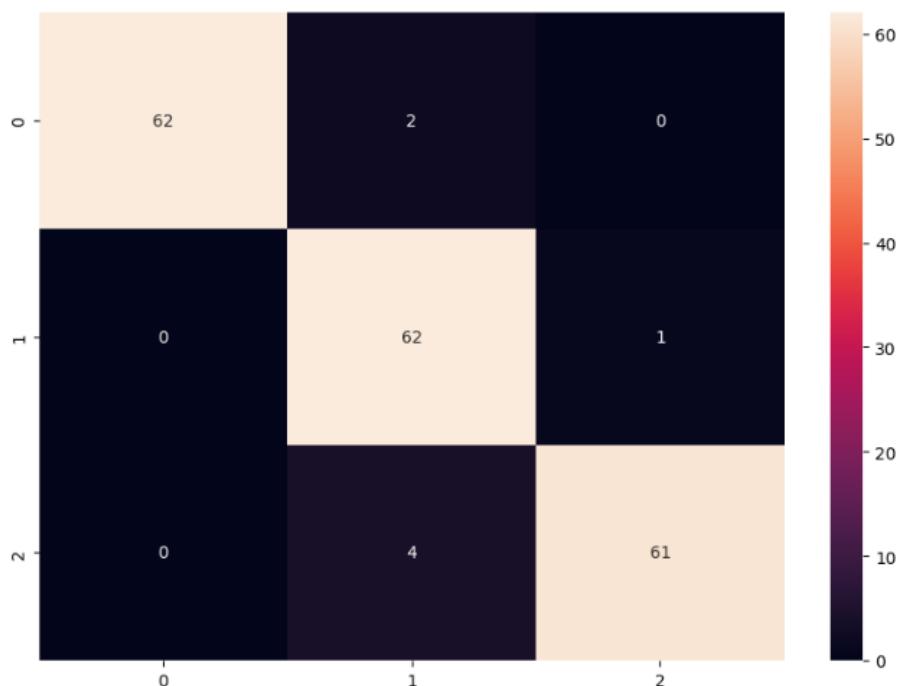


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.52%



Classification Report:

	precision	recall	f1-score	support
0	1.00	0.97	0.98	64
1	0.91	0.98	0.95	63
2	0.98	0.94	0.96	65
accuracy			0.96	192
macro avg	0.97	0.96	0.96	192
weighted avg	0.97	0.96	0.96	192



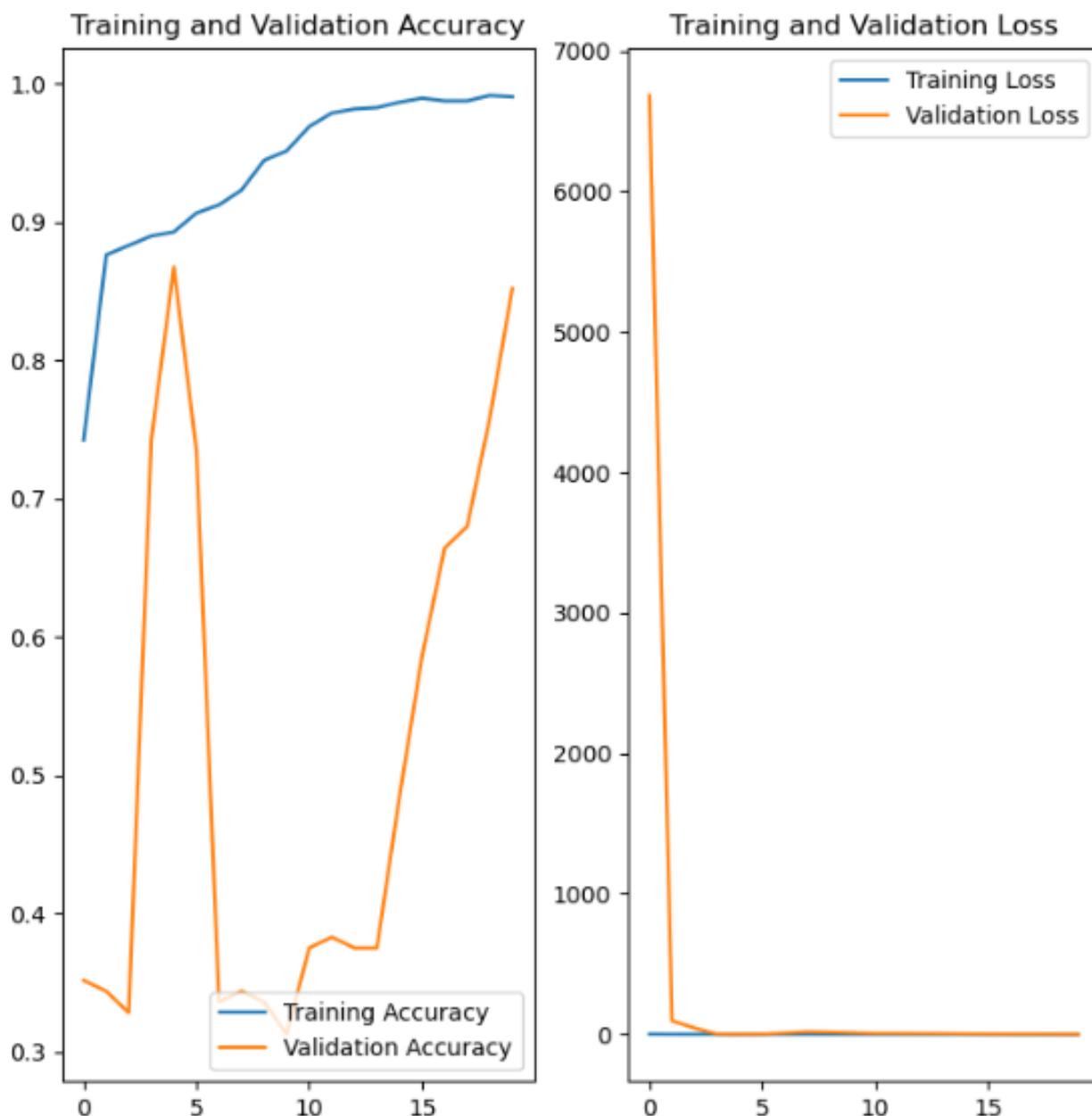
(c) 70:15:15

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

```
8/8 [=====] - 2s 233ms/step - loss: 0.7333 - accuracy: 0.8086  
[0.7332587838172913, 0.80859375]
```

Average Time per Epoch: 45.00 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 82.53%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 74.1%



Actual: Potato_healthy,
Predicted: Potato_Late_blight,
Confidence: 99.19%



Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%

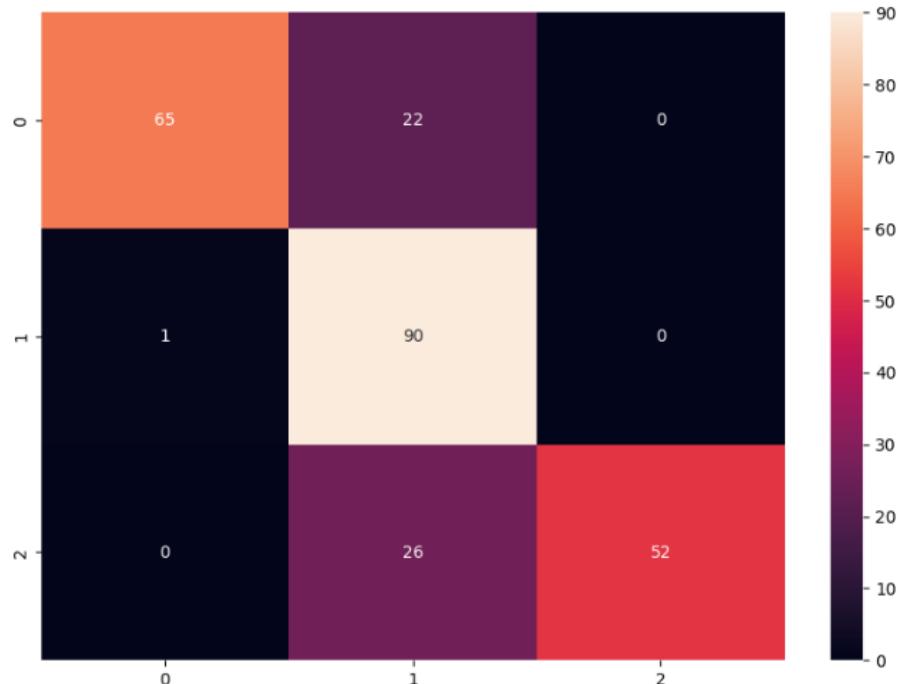


Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 59.23%



Classification Report:

	precision	recall	f1-score	support
0	0.98	0.75	0.85	87
1	0.65	0.99	0.79	91
2	1.00	0.67	0.80	78
accuracy			0.81	256
macro avg	0.88	0.80	0.81	256
weighted avg	0.87	0.81	0.81	256

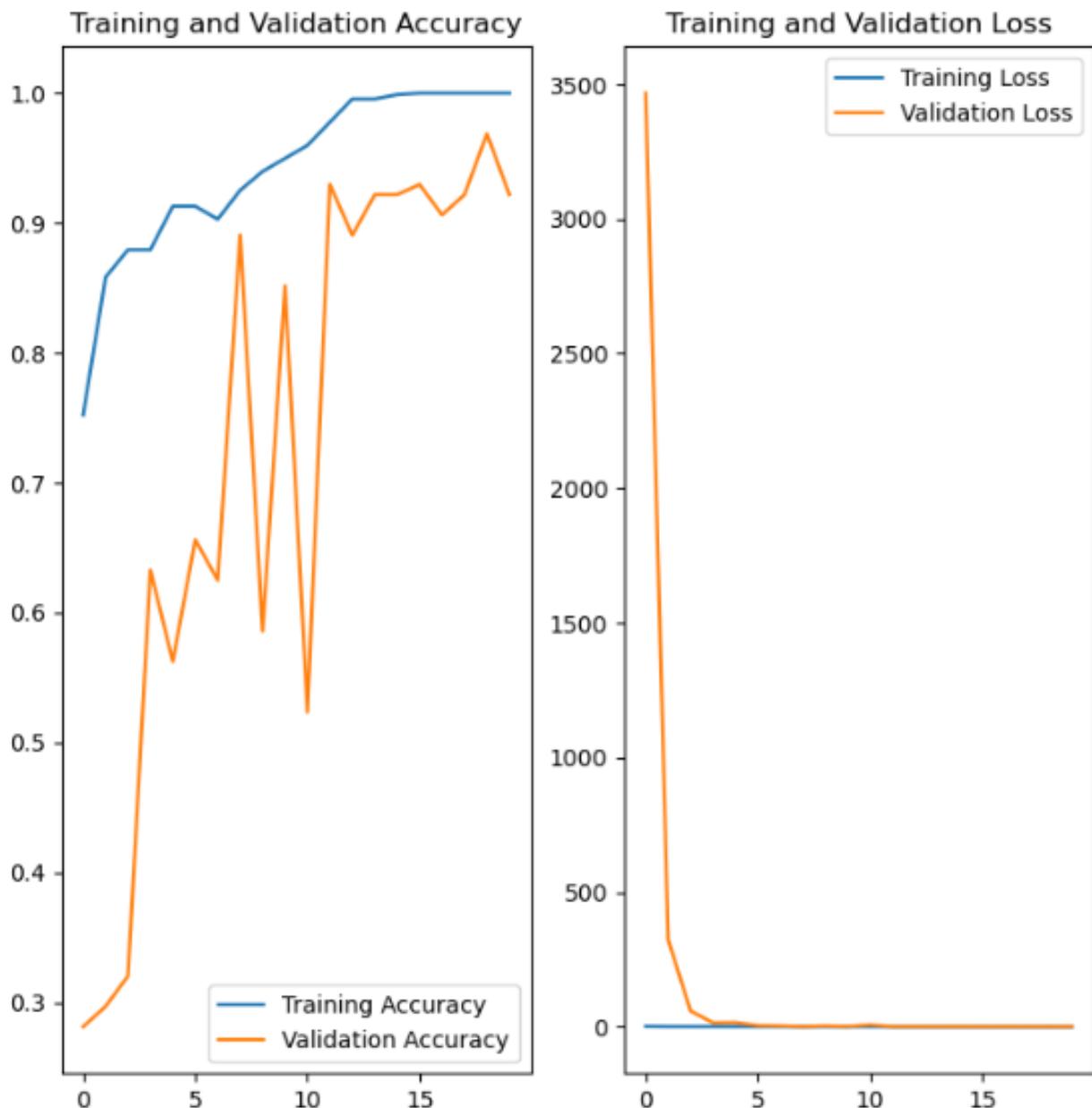


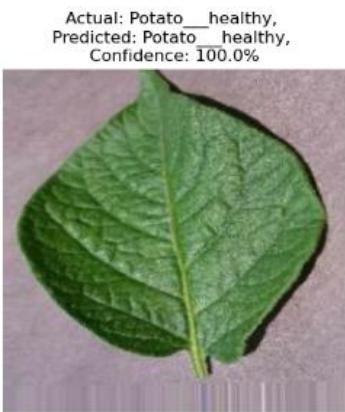
(d) 60:20:20

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=20
```

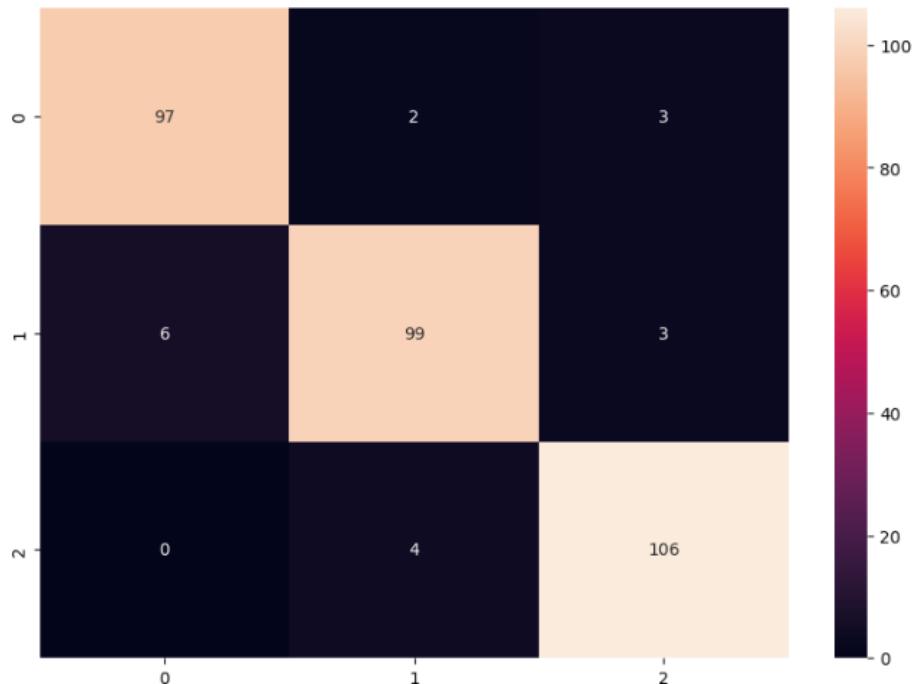
```
scores=model.evaluate(test_ds)  
scores  
  
10/10 [=====] - 3s 220ms/step - loss: 0.1997 - accuracy: 0.9438  
[0.19971871376037598, 0.9437500238418579]
```

Average Time per Epoch: 39.35 s





Classification Report:					
	precision	recall	f1-score	support	
0	0.94	0.95	0.95	102	
1	0.94	0.92	0.93	108	
2	0.95	0.96	0.95	110	
accuracy			0.94	320	
macro avg	0.94	0.94	0.94	320	
weighted avg	0.94	0.94	0.94	320	



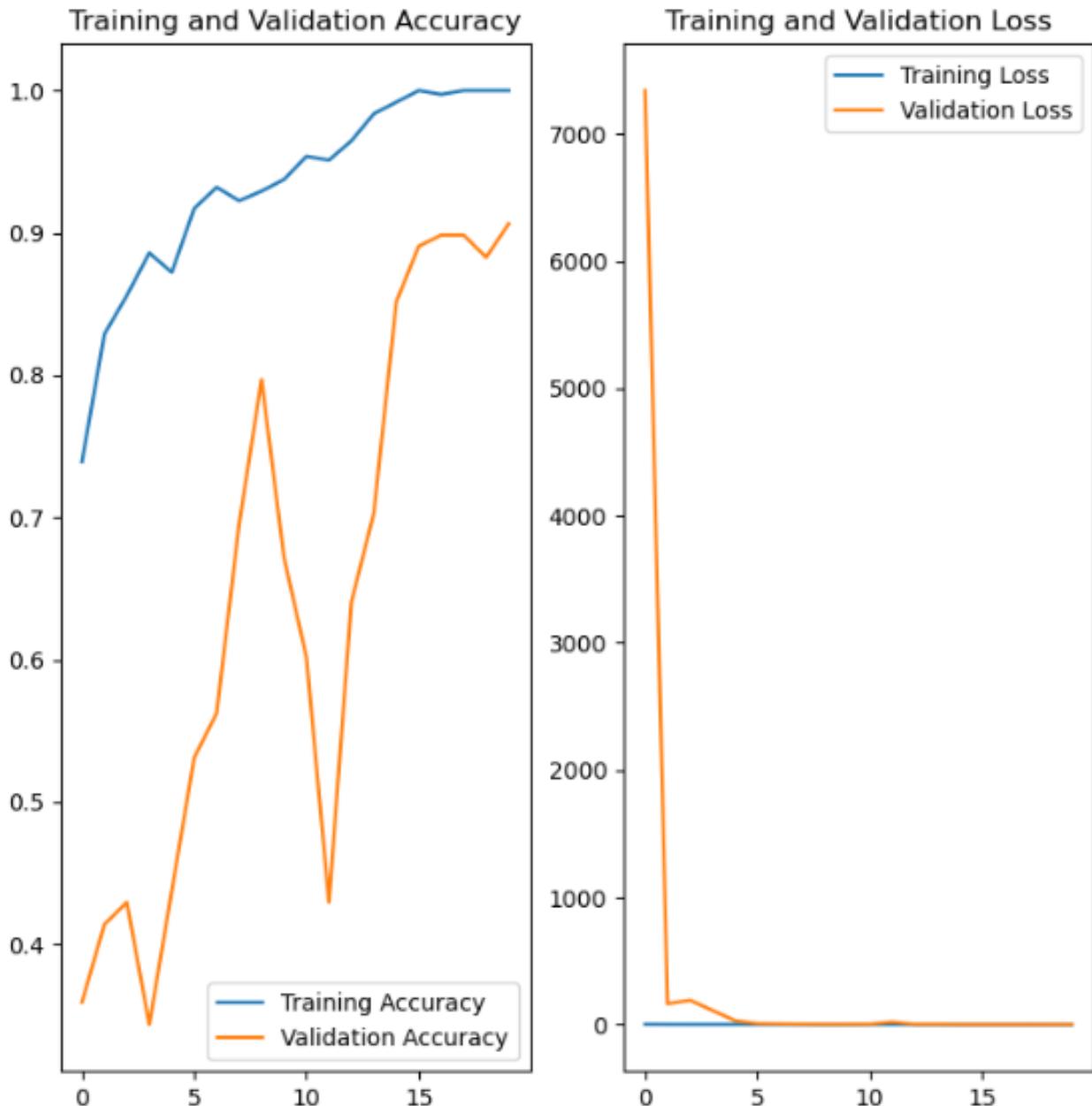
(e) 50:25:25

```
IMAGE_SIZE=224  
BATCH_SIZE=32  
CHANNELS=3  
EPOCHS=20
```

```
scores=model.evaluate(test_ds)  
scores
```

```
13/13 [=====] - 3s 215ms/step - loss: 0.2516 - accuracy: 0.9175  
[0.2515880763530731, 0.917475700378418]
```

Average Time per Epoch: 32.95 s



Actual: Potato_Early_blight,
Predicted: Potato_Early_blight,
Confidence: 95.44%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.65%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 100.0%



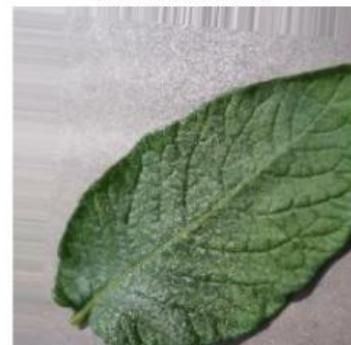
Actual: Potato_Late_blight,
Predicted: Potato_Late_blight,
Confidence: 100.0%



Actual: Potato_Early_blight,
Predicted: Potato_Late_blight,
Confidence: 99.63%



Actual: Potato_healthy,
Predicted: Potato_healthy,
Confidence: 99.81%



Classification Report:

	precision	recall	f1-score	support
0	0.99	0.82	0.90	136
1	0.81	0.99	0.89	135
2	0.99	0.95	0.97	141
accuracy			0.92	412
macro avg	0.93	0.92	0.92	412
weighted avg	0.93	0.92	0.92	412

