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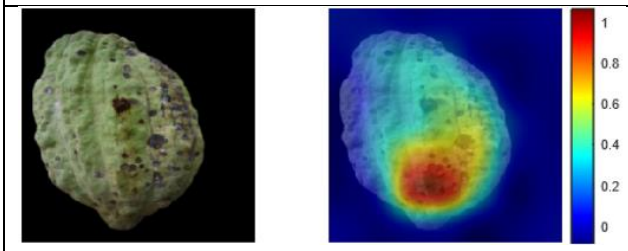
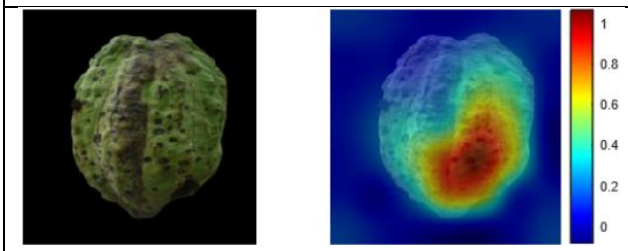
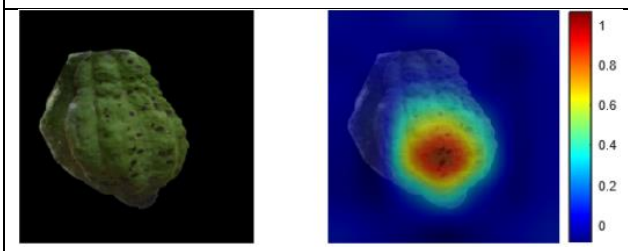
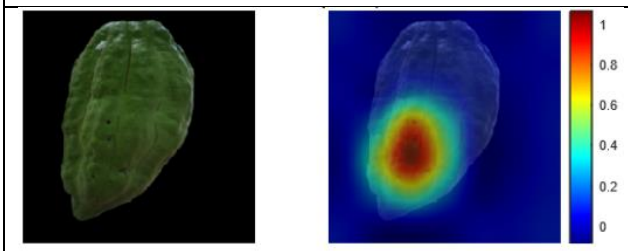
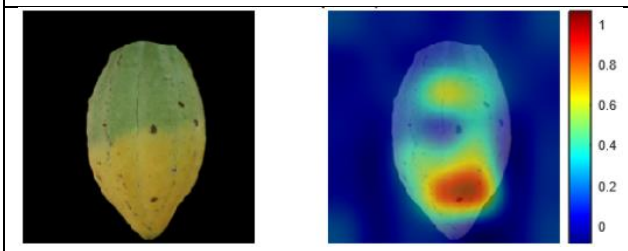
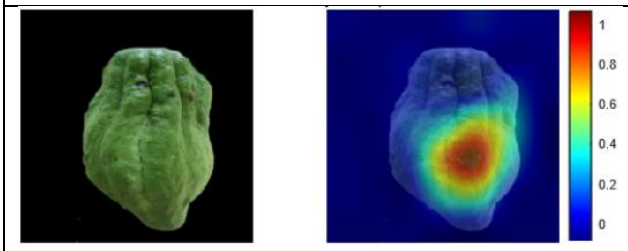
LAMPIRAN

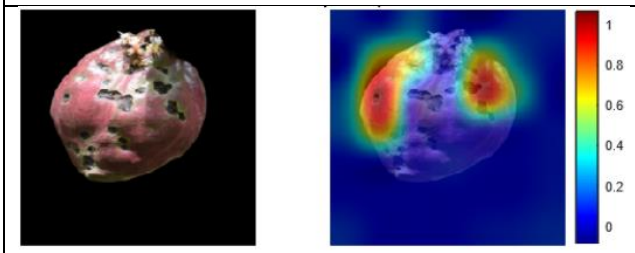
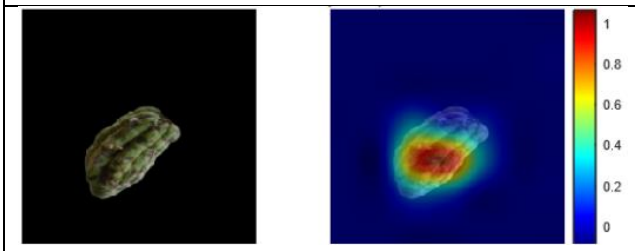
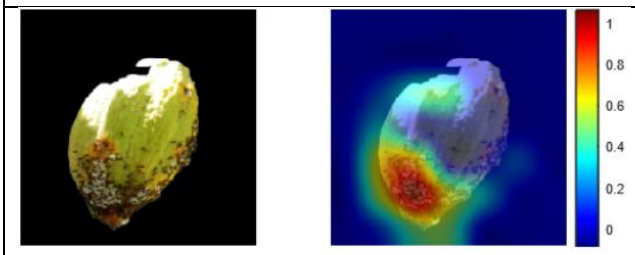
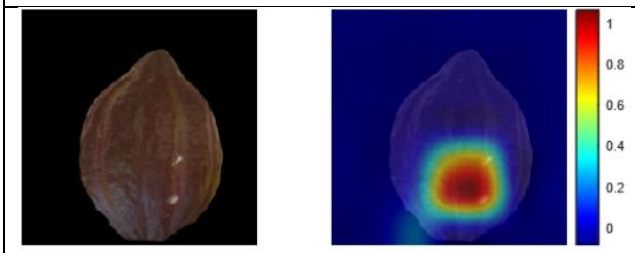
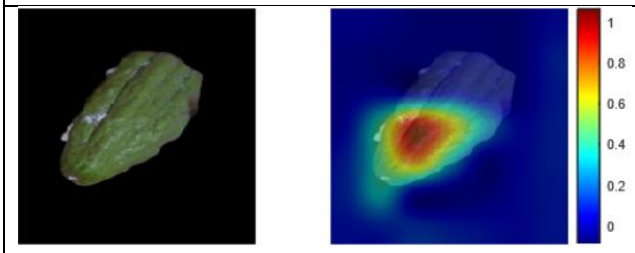
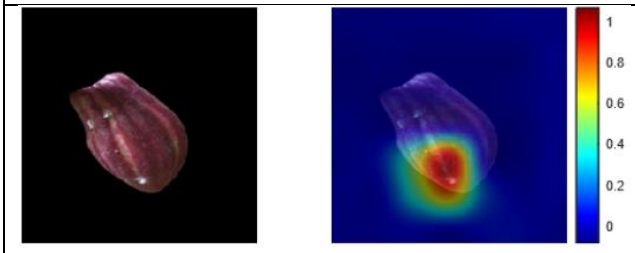
1. Nilai score masing-masing kelas pada data *test* (warna merah merupakan label pada kelas).

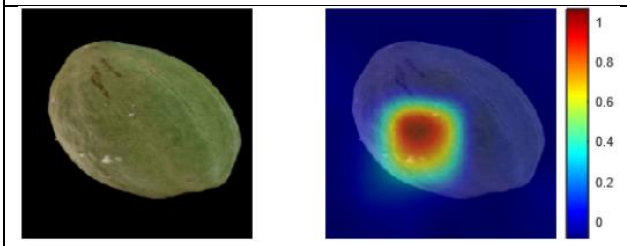
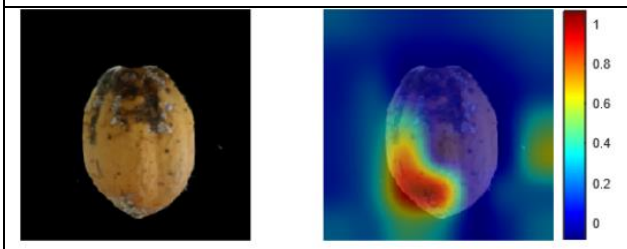
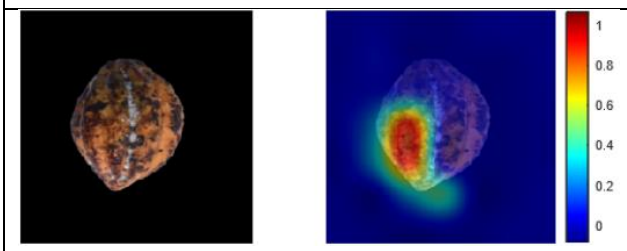
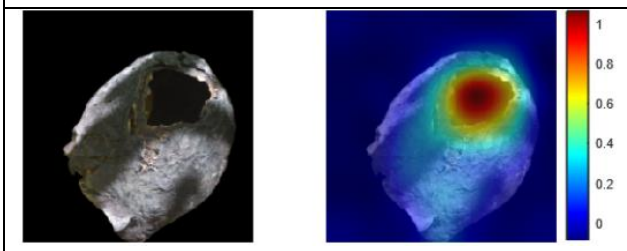
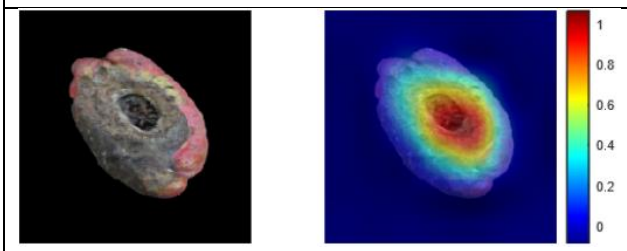
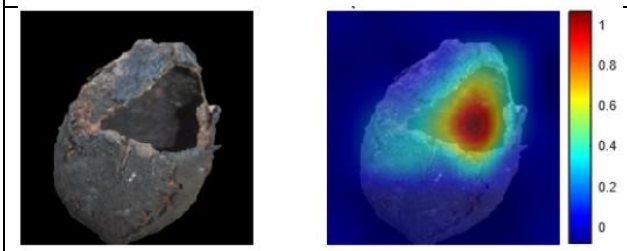
Helopeltis	Kutu Putih	Normal	Tikus/Tupai
0.0012	0.9986	1.09E-04	7.75E-06
0.0039	0.9961	1.32E-06	1.05E-06
0.0992	0.6769	0.0011	0.2228
0.9999	1.23E-04	6.65E-06	1.16E-05
0.0717	0.888	1.06E-04	0.0402
0.0307	0.9692	7.76E-05	6.08E-05
0.0381	0.9538	0.0054	0.0027
0.0401	0.9527	0.0043	0.0029
0.0077	0.9542	0.0378	3.62E-04
0.1025	0.8847	0.0123	4.74E-04
0.019	0.9392	0.0414	3.73E-04
0.004	5.86E-04	0.9951	3.04E-04
0.0015	0.0049	0.9935	5.45E-05
4.24E-04	4.73E-05	0.9995	2.49E-05
0.0011	0.0015	0.9974	1.35E-05
2.08E-05	2.40E-05	1	1.74E-06
0.1285	0.0249	0.8461	5.10E-04
0.0604	0.0111	0.9258	0.0027

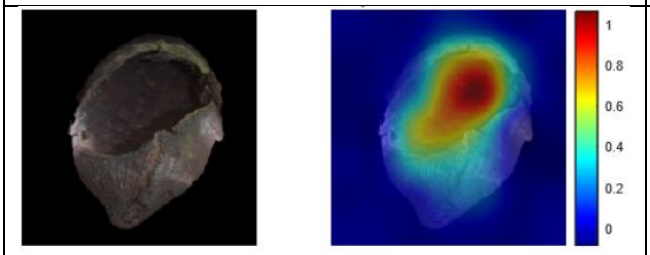
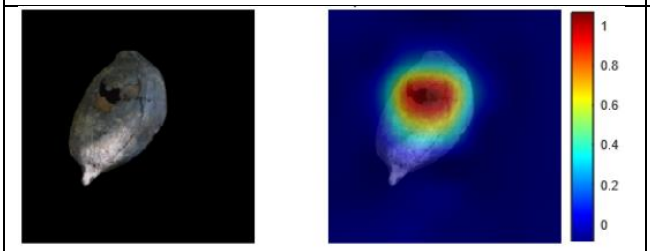
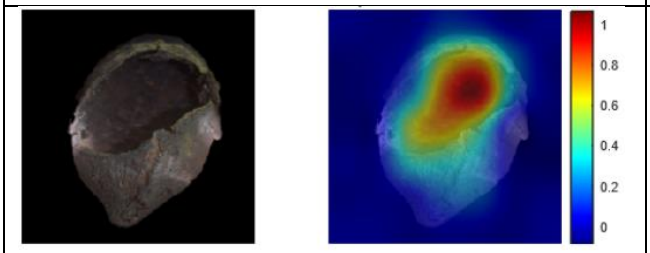
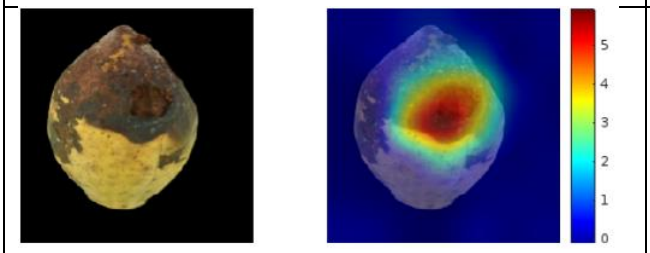
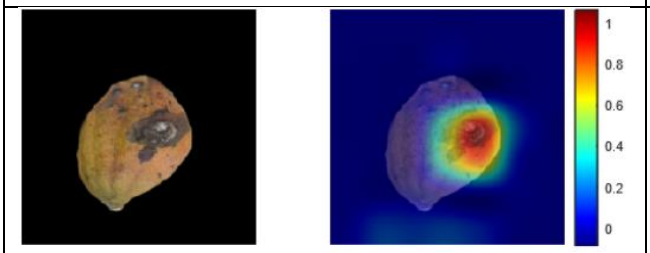
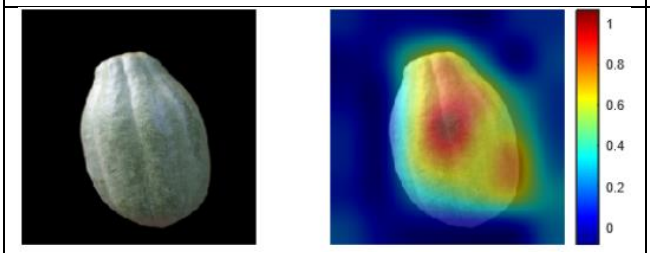
Helopeltis	Kutu Putih	Normal	Tikus/Tupai
0.0021	0.0101	0.9878	2.16E-05
5.38E-04	4.74E-04	0.999	3.93E-06
4.39E-04	2.95E-04	0.9992	2.84E-05
2.55E-04	1.24E-04	0.9996	1.61E-06
5.89E-04	1.24E-04	0.9993	3.32E-05
1.16E-05	6.92E-06	3.83E-06	1
6.28E-05	2.72E-05	7.88E-06	0.9999
1.01E-04	4.72E-05	2.01E-05	0.9998
2.96E-04	5.42E-05	2.97E-05	0.9996
1.76E-06	2.52E-07	9.88E-09	1
3.98E-08	2.26E-08	1.34E-08	1
2.89E-08	1.08E-08	1.96E-08	1
3.67E-05	5.09E-04	2.14E-06	0.9995
0.0365	0.0593	5.51E-04	0.9037
1.51E-04	6.45E-05	5.97E-06	0.9998
1.66E-06	2.21E-07	9.36E-09	1
0.3645	0.0052	0.0021	0.6282
4.39E-04	2.95E-04	0.9992	2.84E-05

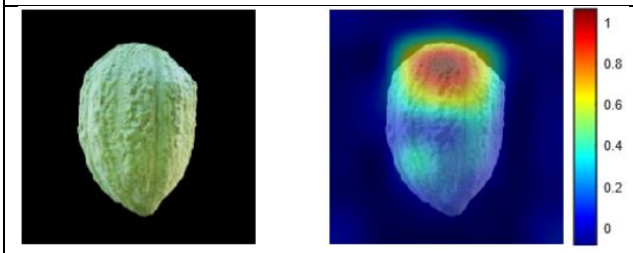
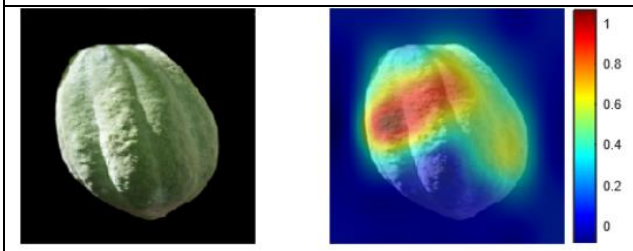
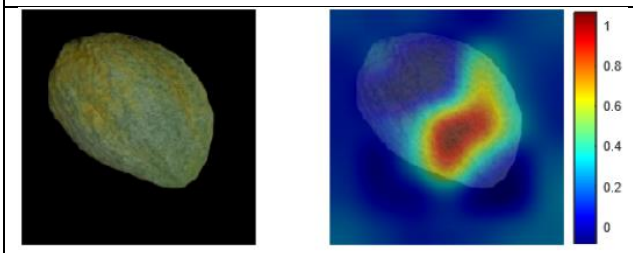
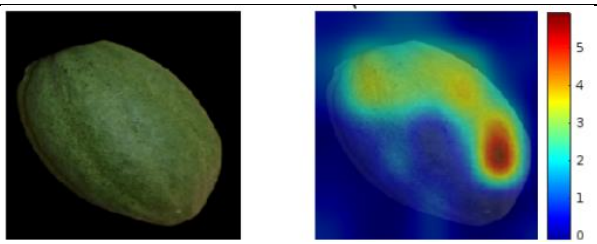
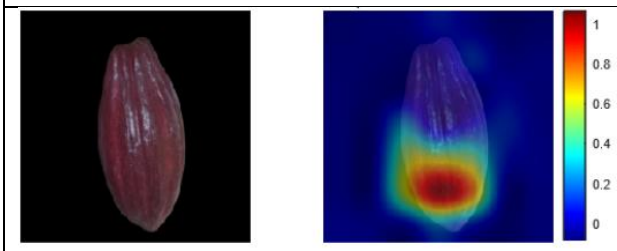
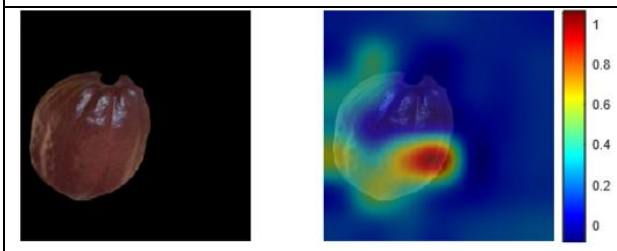
2. Hasil deteksi serangan hama kakao

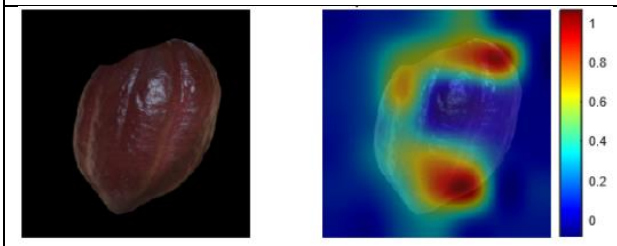
Visualisasi	Aktual	Prediksi
	Helopeltis	Helopeltis
	Helopeltis	Helopeltis
	Helopeltis	Helopeltis
	Helopeltis	Helopeltis
	Helopeltis	Helopeltis
	Helopeltis	Helopeltis

Visualisasi	Aktual	Prediksi
	Helopeltis	Helopeltis
	Helopeltis	Helopeltis
	Kutu putih	Kutu putih
	Kutu putih	Kutu putih
	Kutu putih	Kutu putih
	Kutu putih	Kutu putih

Visualisasi	Aktual	Prediksi
	Kutu putih	Kutu putih
	Kutu putih	Kutu putih
	Kutu putih	Kutu putih
	Tikus	Tikus
	Tikus	Tikus
	Tikus	Tikus

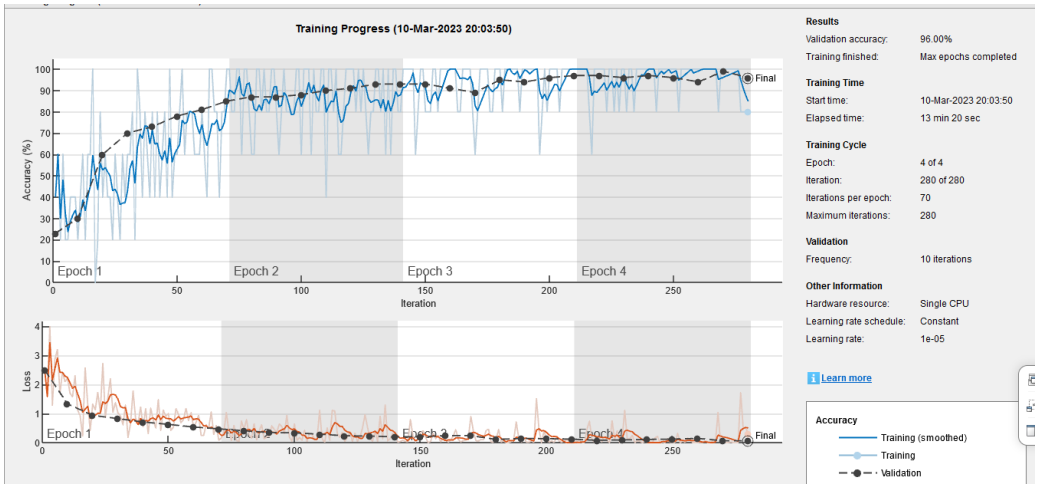
Visualisasi	Aktual	Prediksi
	Tikus	Tikus
	Tikus	Tikus
	Tikus	Tikus
	Tikus	Tikus
	Tikus	Tikus
	Normal	Normal

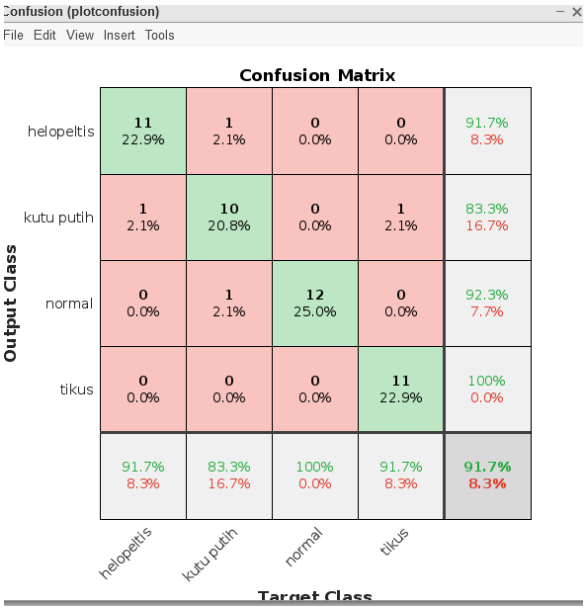
Visualisasi	Aktual	Prediksi
	Normal	Normal
	Normal	Normal
	Normal	Normal
	Normal	Normal
	Normal	Normal
	Normal	Normal

Visualisasi	Aktual	Prediksi
	Normal	Normal

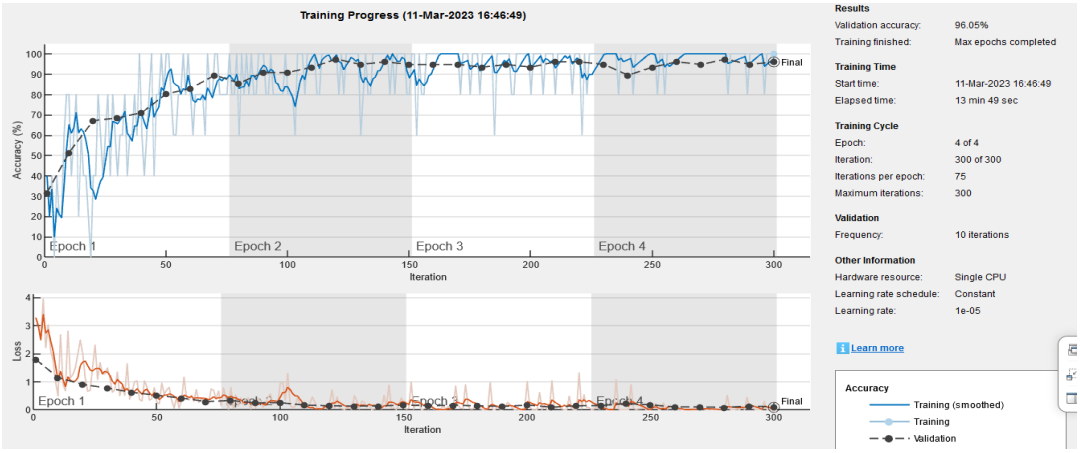
3. Hasil *Training* dan *Testing*

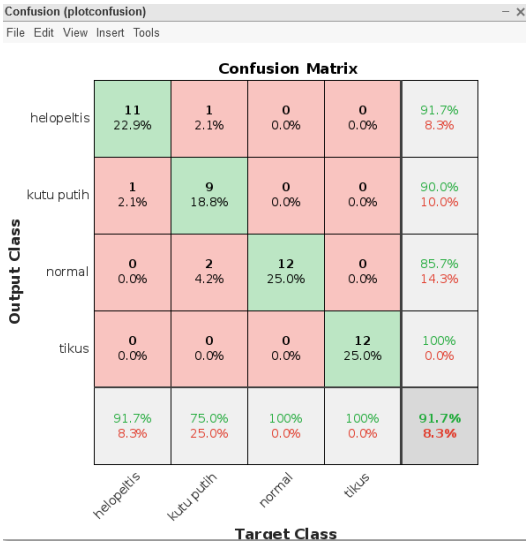
Pembagian data *training* rasio 70%



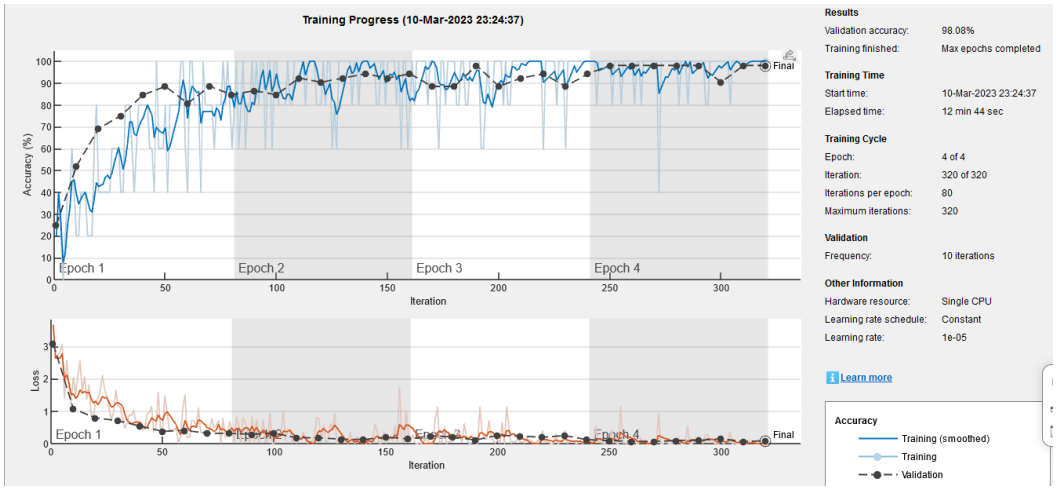


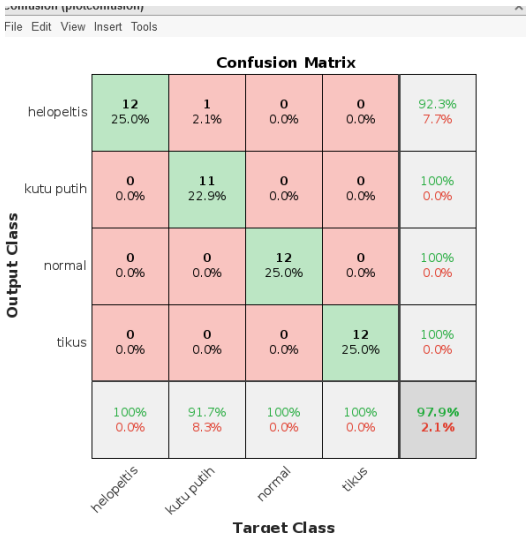
Pembagian data *training* 75%



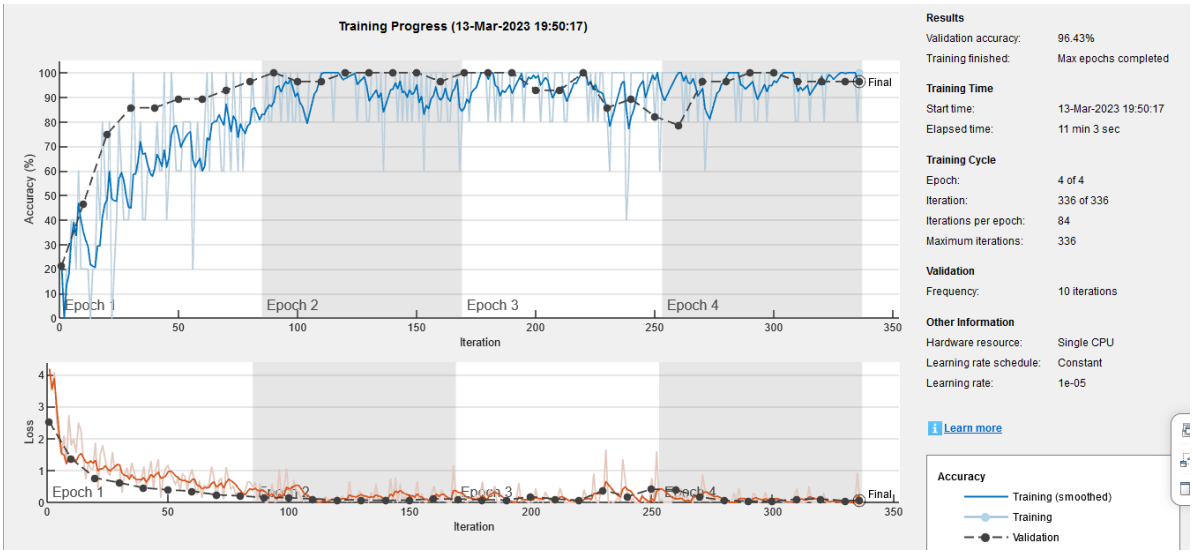


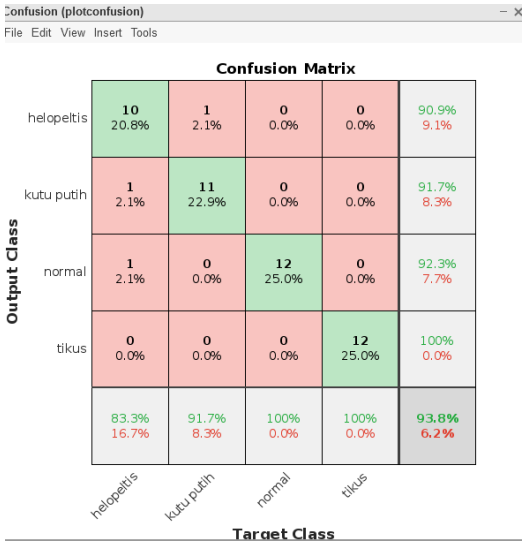
Pembagian data *training* 80%





Pembagian data *training* 85%

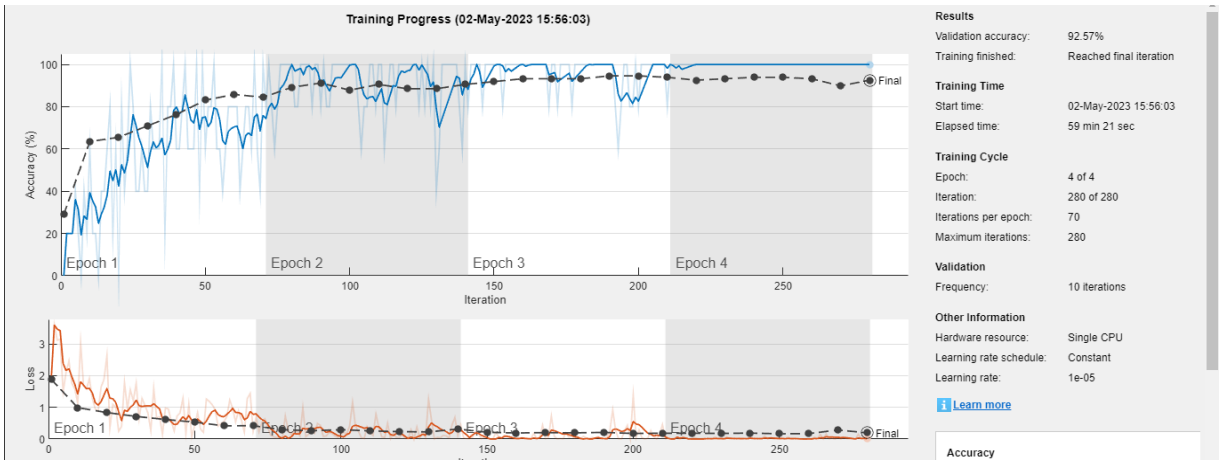




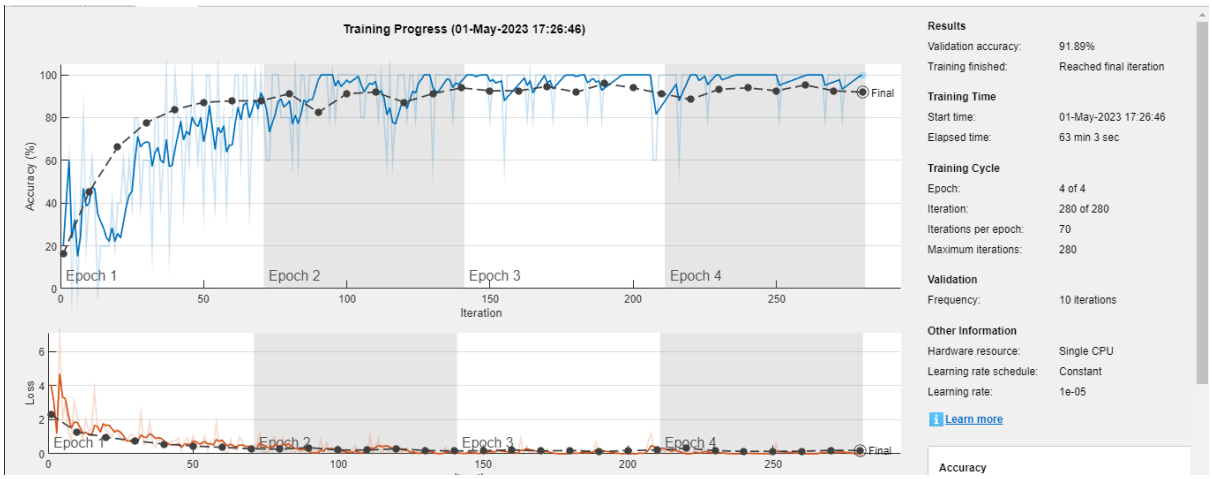
Perbedaan *Input size*

Rasio data *training* 70%

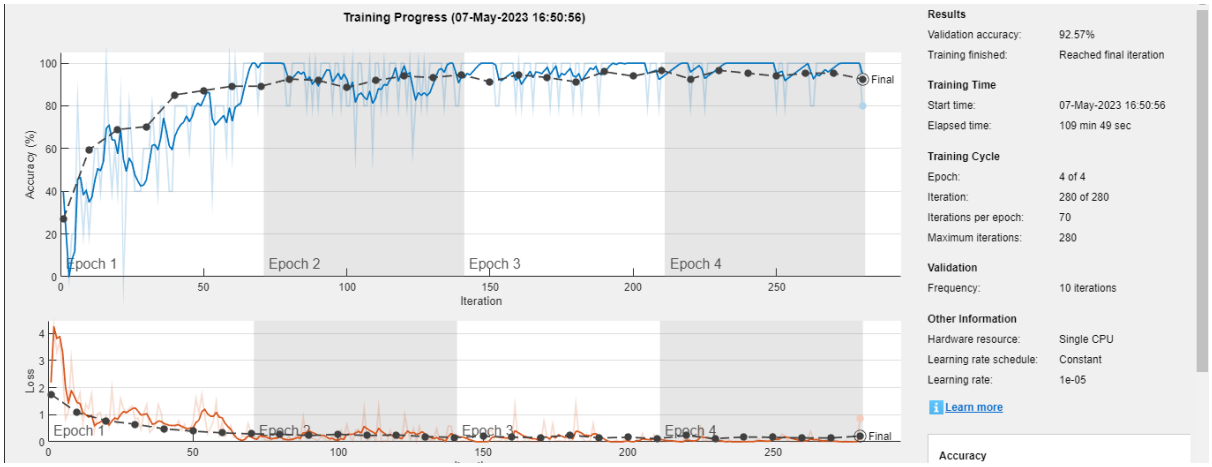
Input size 224x224



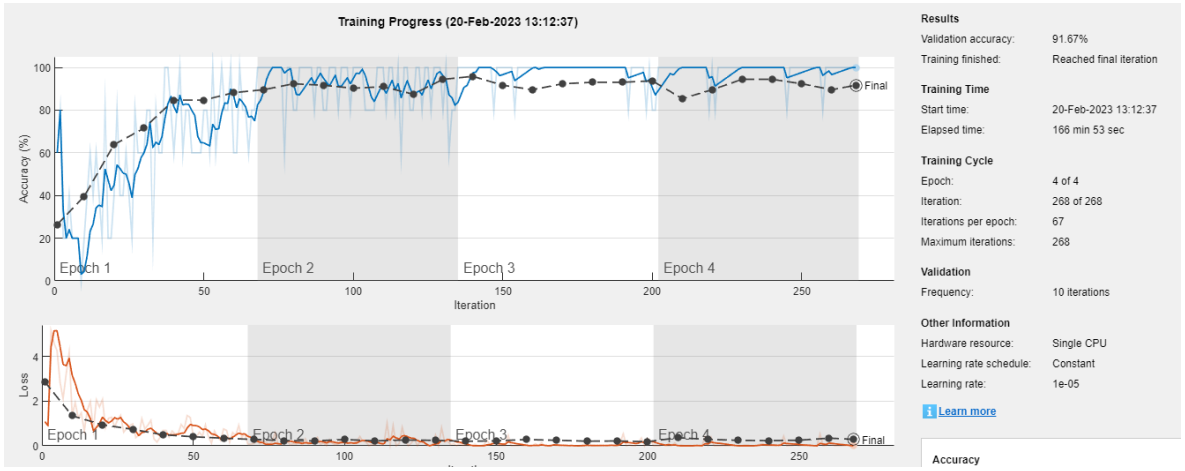
Input size 240x240



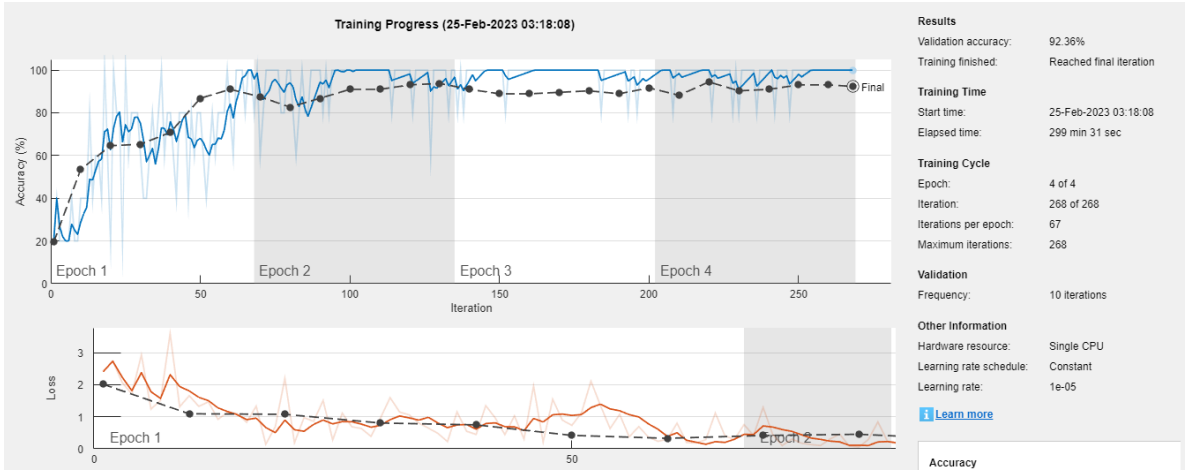
Input size 300x300



Input size 400x400

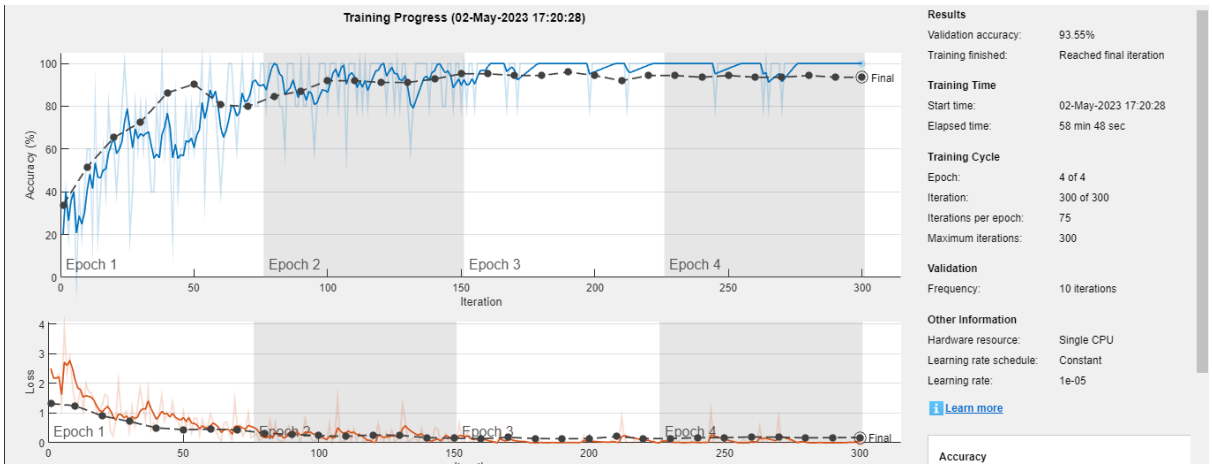


Input size 400x600

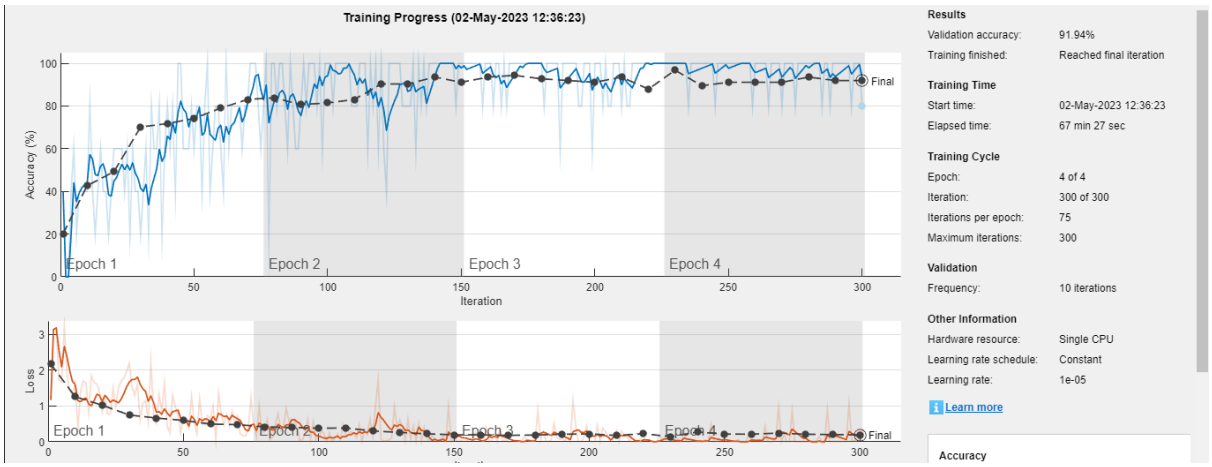


Rasio data *training* 75%

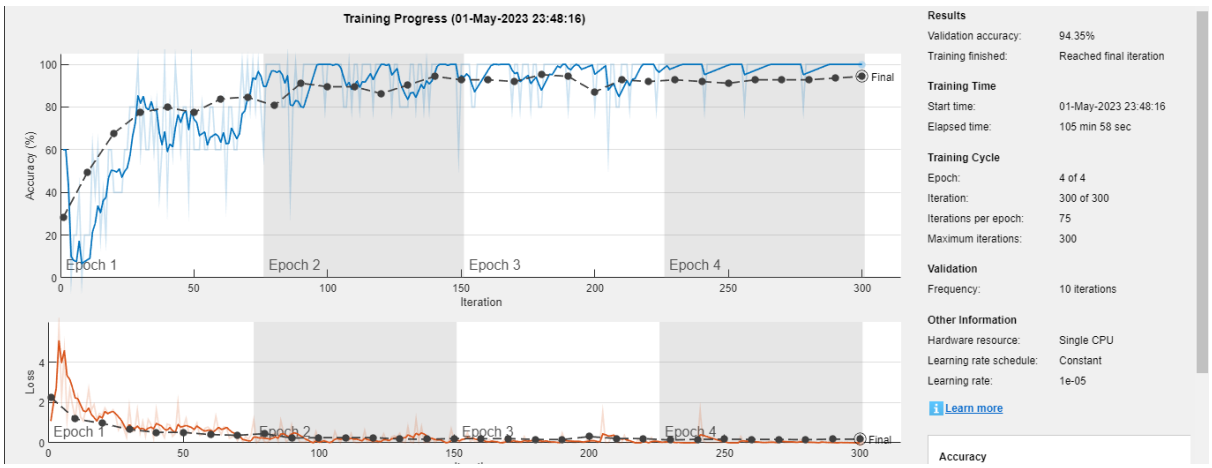
Input size 224x224



Input size 240x240

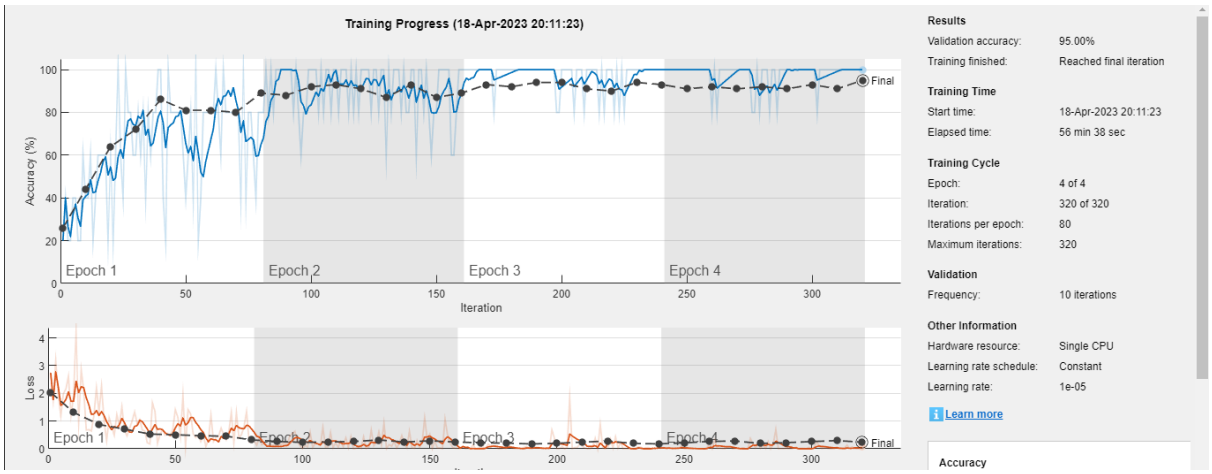


Input size 300x300

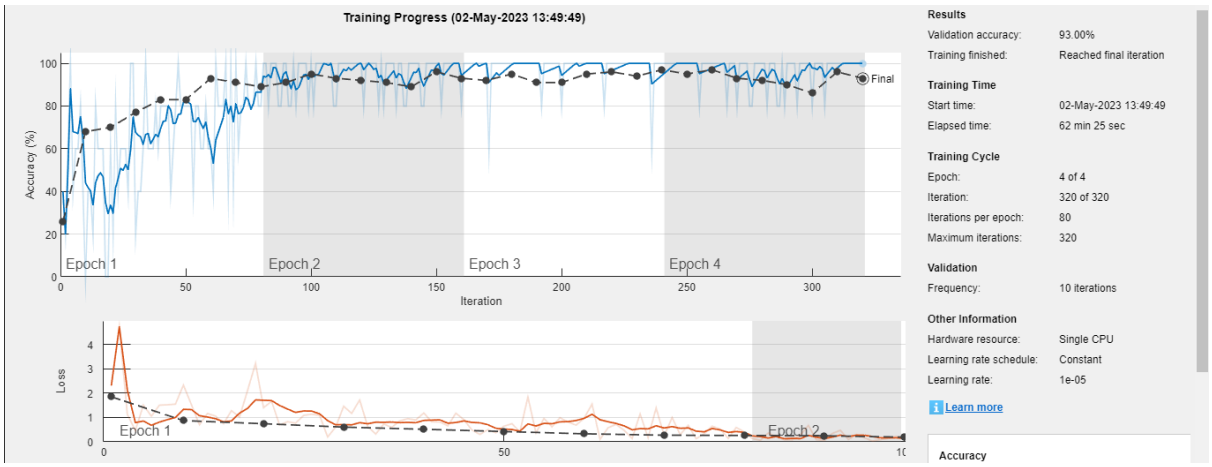


Rasio data *training* 80%

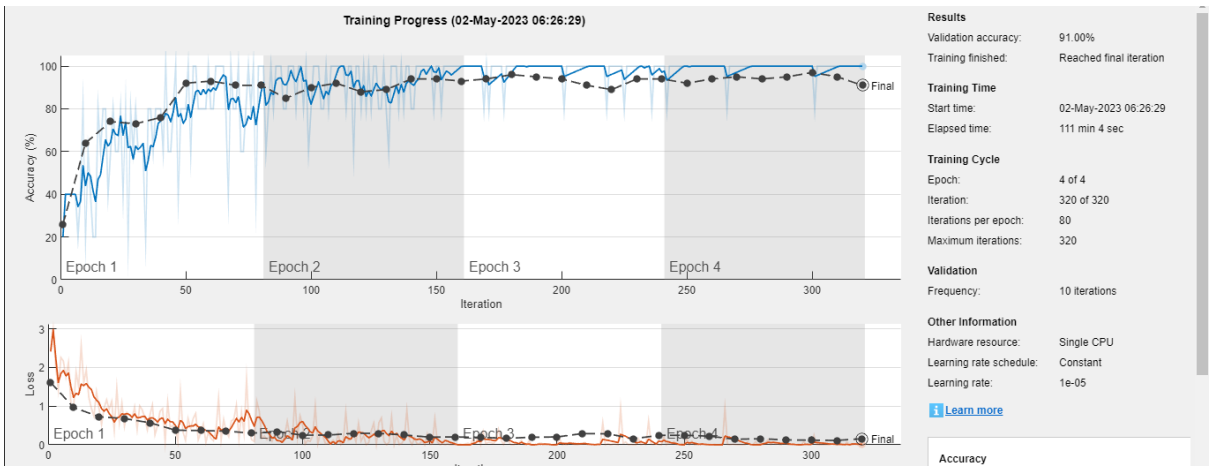
Input size 224x224



Input size 240x240

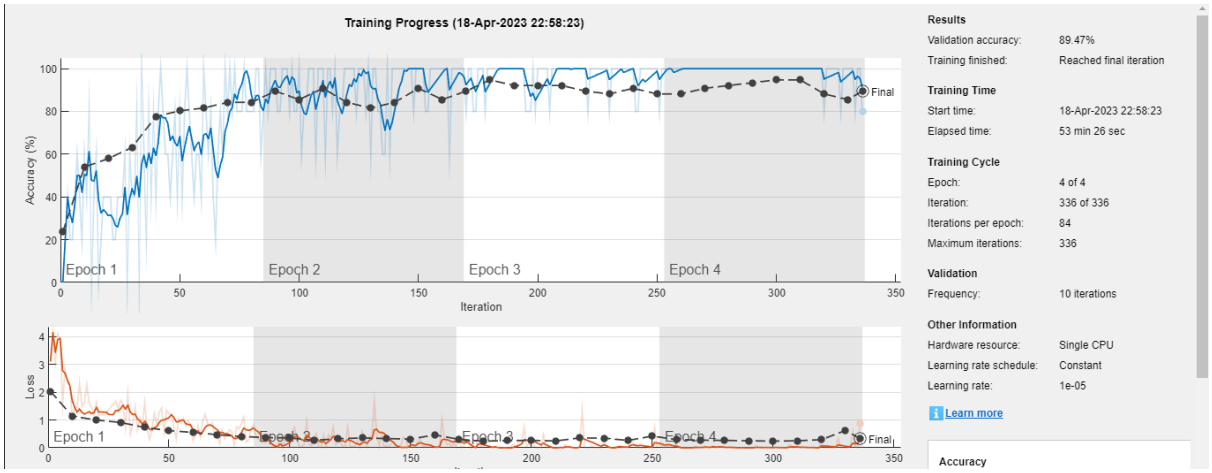


Input size 300x300

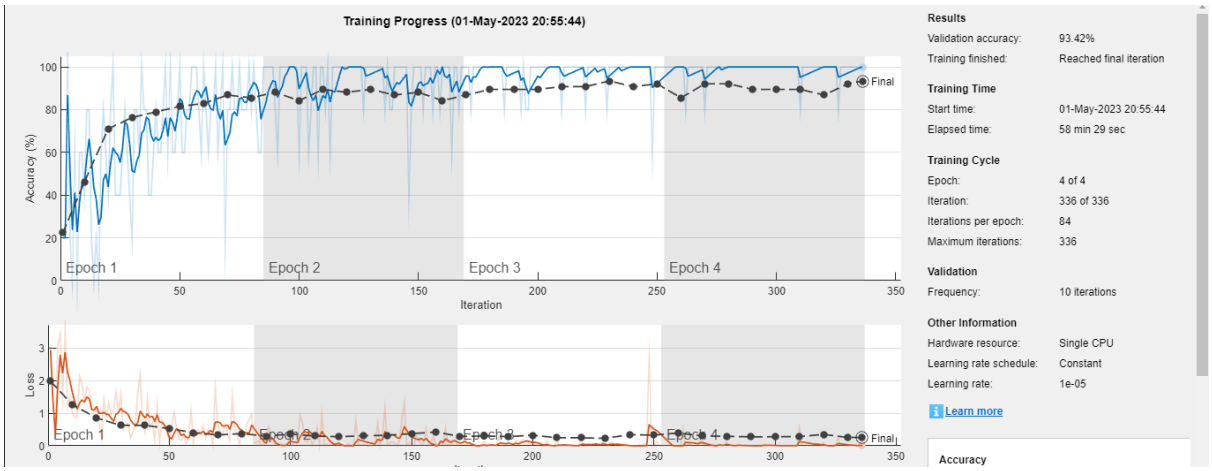


Rasio data *training* 85%

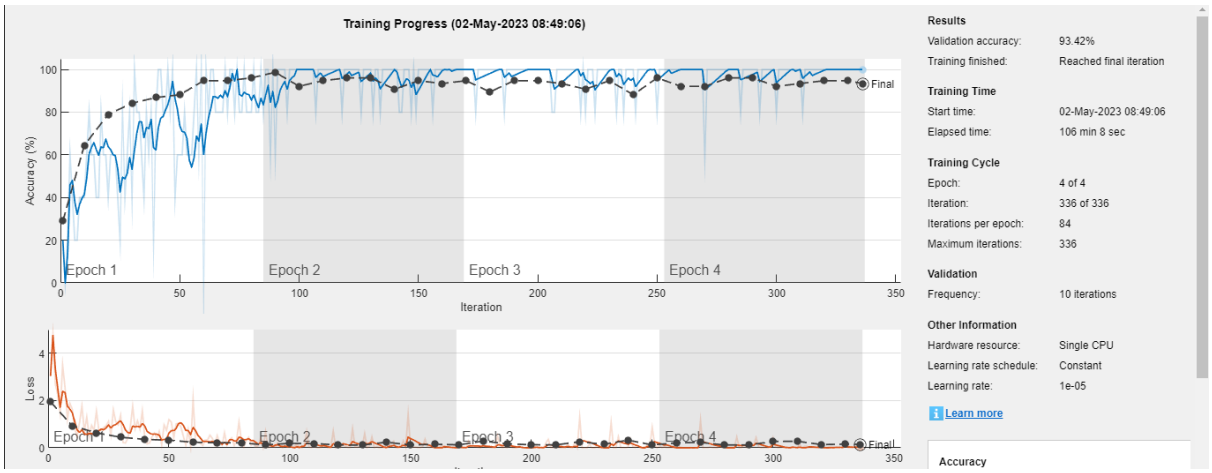
Input size 224x224



Input size 240x240

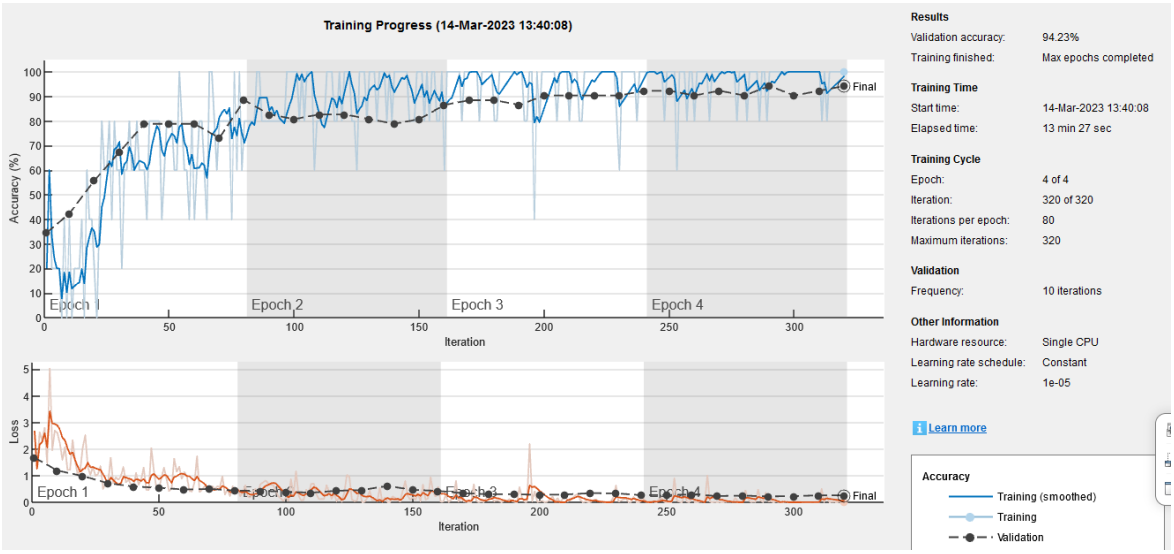


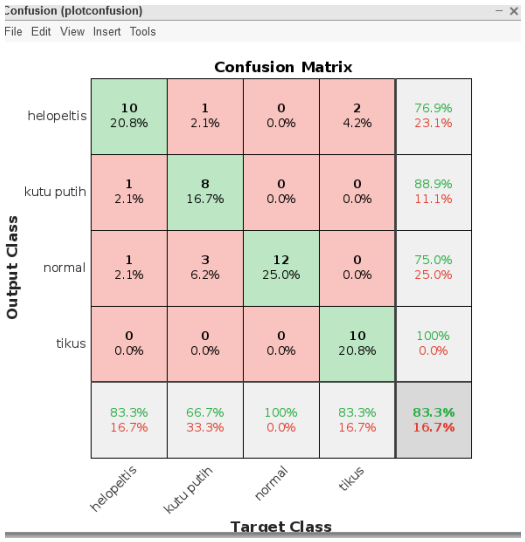
Input size 300x300



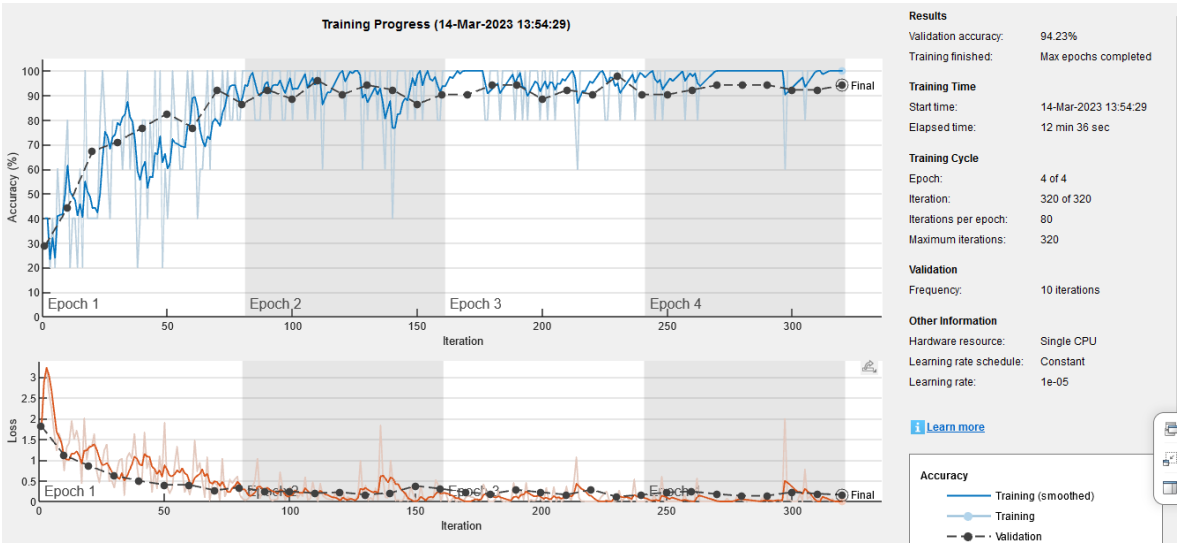
VGG16 tanpa Augmentasi Data

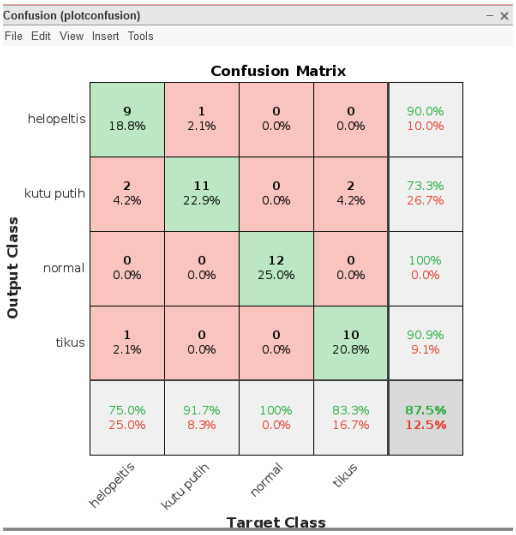
Percobaan 1



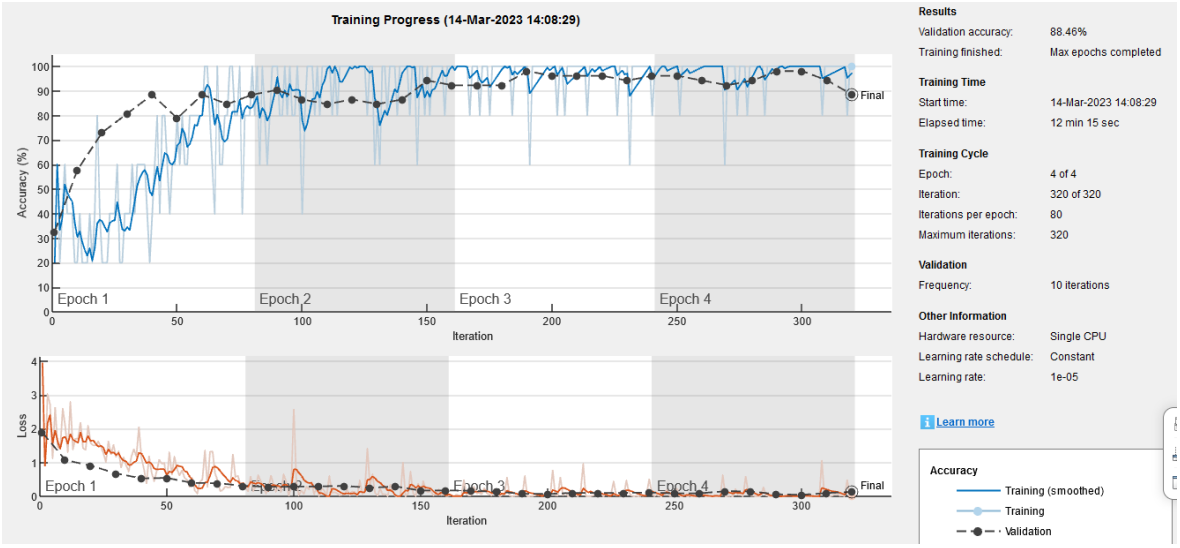


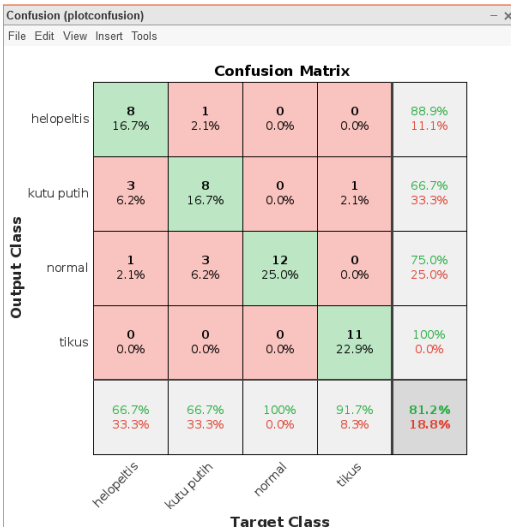
Percobaan 2



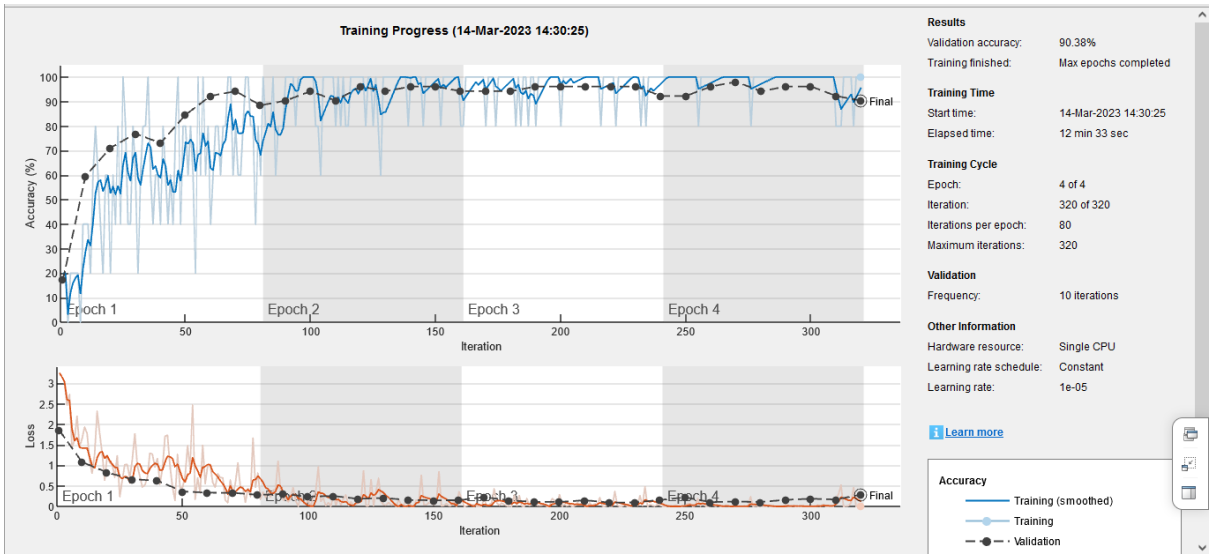


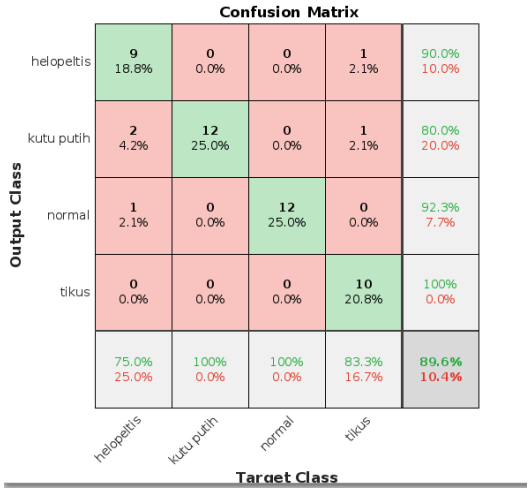
Percobaan 3



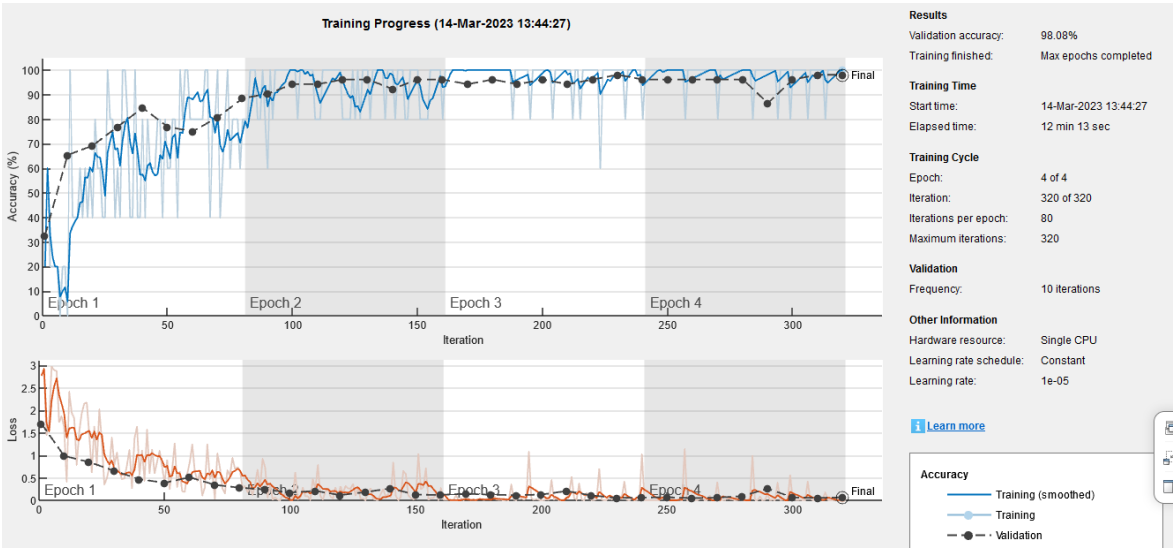

Confusion (plotconfusion)
File Edit View Insert Tools
Confusion Matrix
helopeltis
kutu putih
normal
tikus
Output Class
8 16.7%
1 2.1%
0 0.0%
0 0.0%
88.9% 11.1%
3 6.2%
8 16.7%
0 0.0%
1 2.1%
66.7% 33.3%
1 2.1%
3 6.2%
12 25.0%
0 0.0%
75.0% 25.0%
0 0.0%
0 0.0%
0 0.0%
11 22.9%
100% 0.0%
66.7% 33.3%
66.7% 33.3%
100% 0.0%
91.7% 8.3%
81.2% 18.8%
Target Class

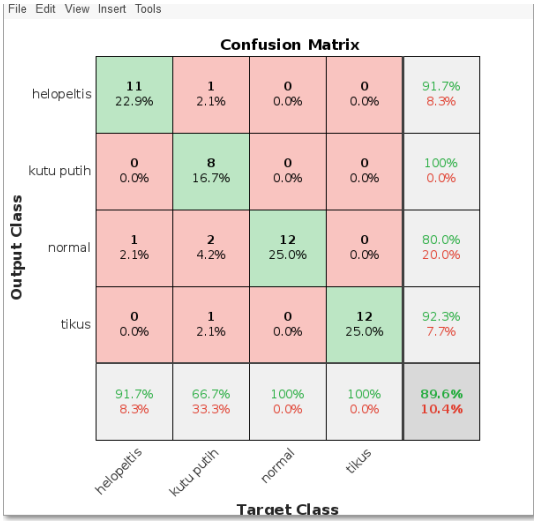
Percobaan 4


Training Progress (14-Mar-2023 14:30:25)
Accuracy (%)
Loss
Iteration
Epoch 1
Epoch 2
Epoch 3
Epoch 4
Final
Results
Validation accuracy: 90.38%
Training finished: Max epochs completed
Training Time
Start time: 14-Mar-2023 14:30:25
Elapsed time: 12 min 33 sec
Training Cycle
Epoch: 4 of 4
Iteration: 320 of 320
Iterations per epoch: 80
Maximum iterations: 320
Validation
Frequency: 10 iterations
Other Information
Hardware resource: Single CPU
Learning rate schedule: Constant
Learning rate: 1e-05
Learn more
Accuracy
Training (smoothed)
Training
Validation


Confusion Matrix
helopeltis
kutu putih
normal
tikus
Output Class
9 18.8%
0 0.0%
0 0.0%
1 2.1%
90.0% 10.0%
2 4.2%
12 25.0%
0 0.0%
1 2.1%
80.0% 20.0%
1 2.1%
0 0.0%
12 25.0%
0 0.0%
92.3% 7.7%
0 0.0%
0 0.0%
0 0.0%
10 20.8%
100% 0.0%
75.0% 25.0%
100% 0.0%
100% 0.0%
83.3% 16.7%
89.6% 10.4%
Target Class

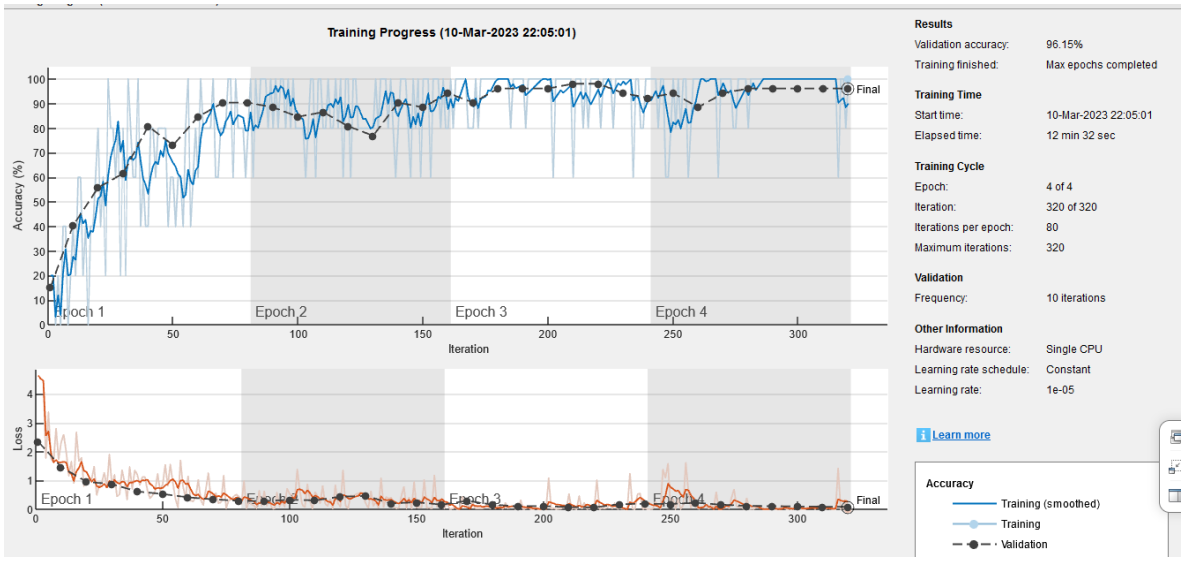
Percobaan 5

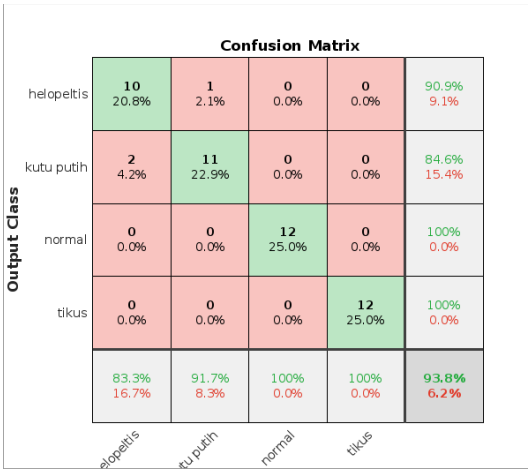

Training Progress (14-Mar-2023 13:44:27)
Accuracy (%)
Epoch 1
Epoch 2
Epoch 3
Epoch 4
Final
Iteration
Loss
Results
Validation accuracy: 98.08%
Training finished: Max epochs completed
Training Time
Start time: 14-Mar-2023 13:44:27
Elapsed time: 12 min 13 sec
Training Cycle
Epoch: 4 of 4
Iteration: 320 of 320
Iterations per epoch: 80
Maximum iterations: 320
Validation
Frequency: 10 iterations
Other Information
Hardware resource: Single CPU
Learning rate schedule: Constant
Learning rate: 1e-05
Learn more
Accuracy
Training (smoothed)
Training
Validation


File Edit View Insert Tools
Confusion Matrix
helopeltis
kutu putih
normal
tikus
Output Class
11 22.9%
1 2.1%
0 0.0%
0 0.0%
91.7% 8.3%
0 0.0%
8 16.7%
0 0.0%
0 0.0%
100% 0.0%
1 2.1%
2 4.2%
12 25.0%
0 0.0%
80.0% 20.0%
0 0.0%
1 2.1%
0 0.0%
12 25.0%
92.3% 7.7%
91.7% 8.3%
66.7% 33.3%
100% 0.0%
100% 0.0%
89.6% 10.4%
Target Class

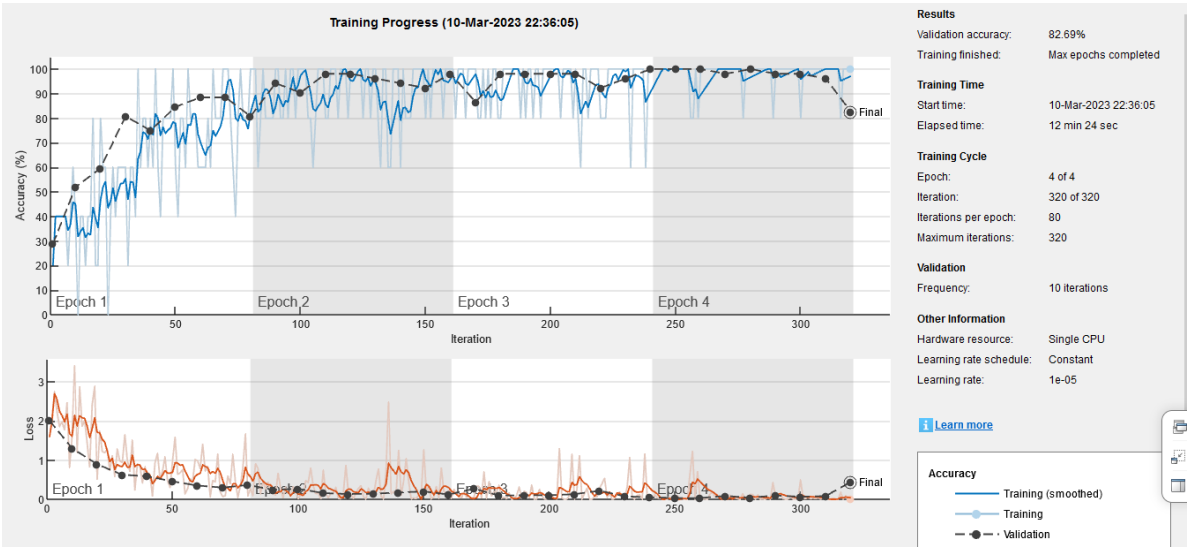
VGG16 menggunakan Augmentasi Data

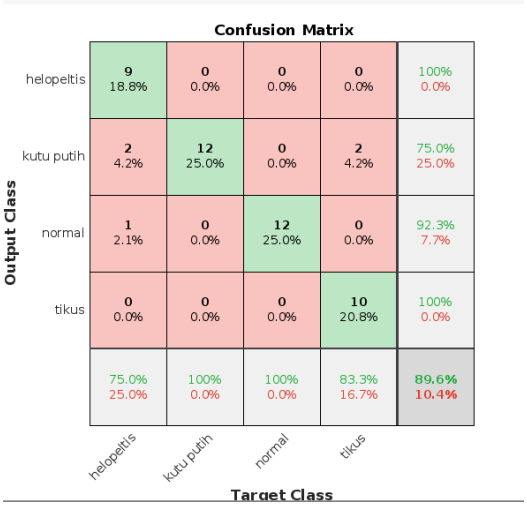
Percobaan 1



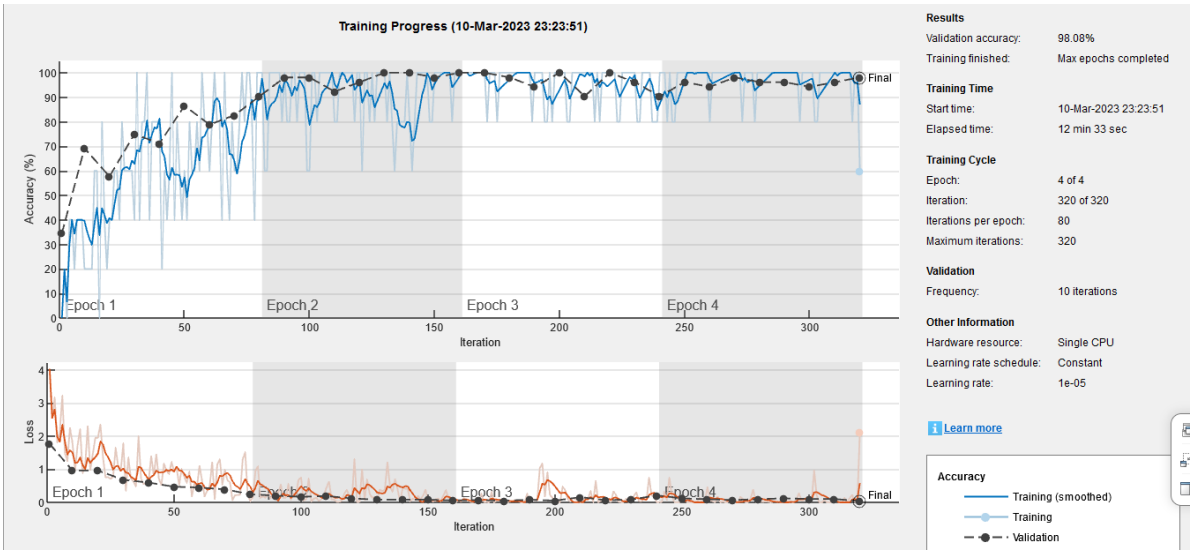


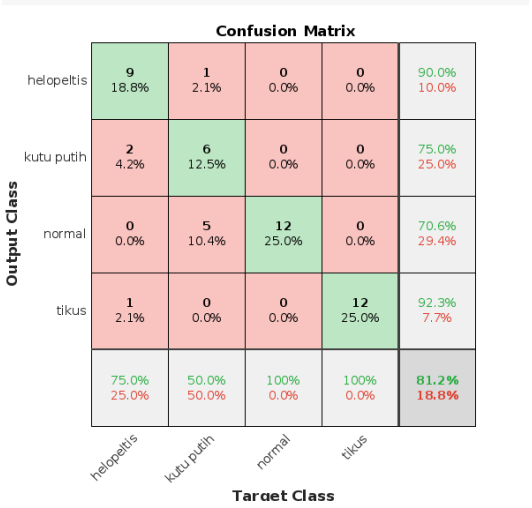
Percobaan 2



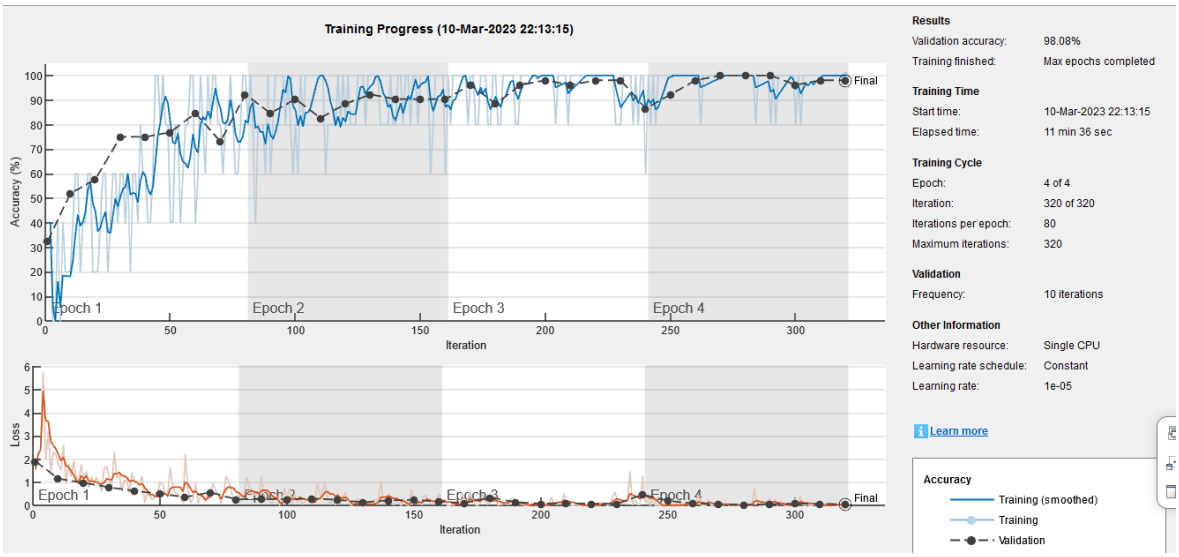


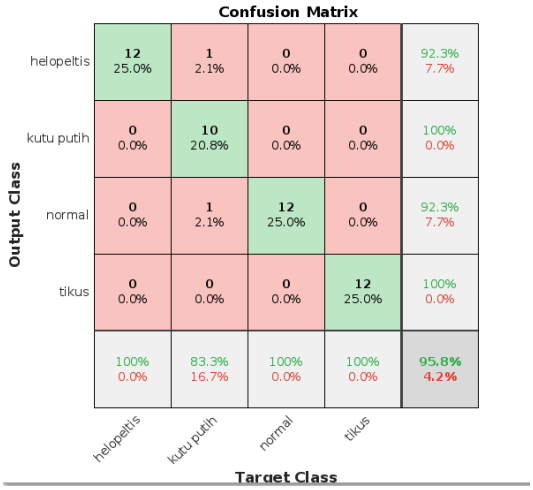
Percobaan 3



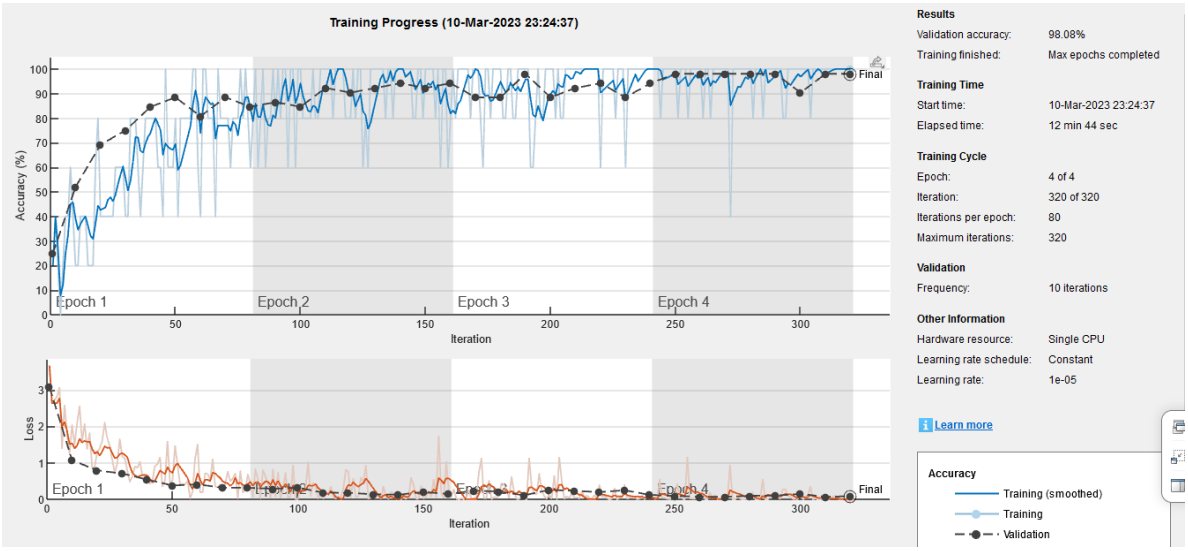

Confusion Matrix
helopeltis
kutu putih
normal
tikus
Output Class
9 18.8%
1 2.1%
0 0.0%
0 0.0%
90.0% 10.0%
2 4.2%
6 12.5%
0 0.0%
0 0.0%
75.0% 25.0%
0 0.0%
5 10.4%
12 25.0%
0 0.0%
70.6% 29.4%
1 2.1%
0 0.0%
0 0.0%
12 25.0%
92.3% 7.7%
75.0% 25.0%
50.0% 50.0%
100% 0.0%
100% 0.0%
81.2% 18.8%
helopeltis
kutu putih
normal
tikus
Target Class

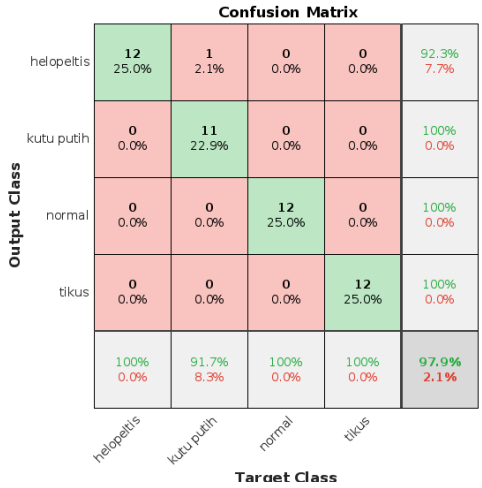
Percobaan 4


Training Progress (10-Mar-2023 22:13:15)
Accuracy (%)
Iteration
Epoch 1
Epoch 2
Epoch 3
Epoch 4
Final
Loss
Iteration
Epoch 1
Epoch 2
Epoch 3
Epoch 4
Final
Results
Validation accuracy: 98.08%
Training finished: Max epochs completed
Training Time
Start time: 10-Mar-2023 22:13:15
Elapsed time: 11 min 36 sec
Training Cycle
Epoch: 4 of 4
Iteration: 320 of 320
Iterations per epoch: 80
Maximum iterations: 320
Validation
Frequency: 10 iterations
Other Information
Hardware resource: Single CPU
Learning rate schedule: Constant
Learning rate: 1e-05
Learn more
Accuracy
Training (smoothed)
Training
Validation


Confusion Matrix
helopeltis
kutu putih
normal
tikus
Output Class
12 25.0%
1 2.1%
0 0.0%
0 0.0%
92.3% 7.7%
0 0.0%
10 20.8%
0 0.0%
0 0.0%
100% 0.0%
0 0.0%
1 2.1%
12 25.0%
0 0.0%
92.3% 7.7%
0 0.0%
0 0.0%
0 0.0%
12 25.0%
100% 0.0%
100% 0.0%
83.3% 16.7%
100% 0.0%
100% 0.0%
95.8% 4.2%
helopeltis
kutu putih
normal
tikus
Target Class

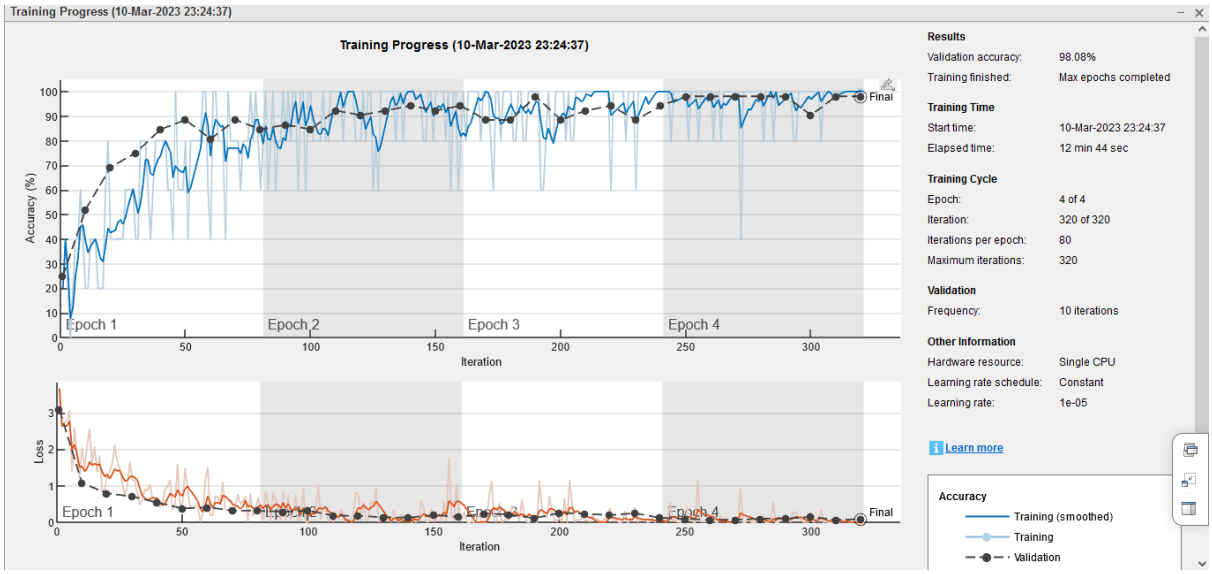
Percobaan 5

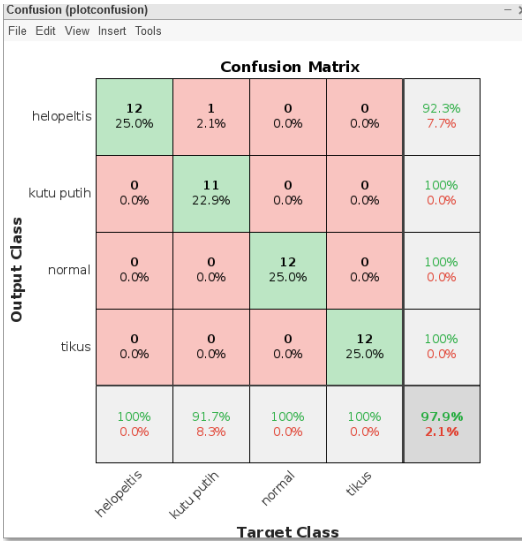

Training Progress (10-Mar-2023 23:24:37)
Accuracy (%)
Epoch 1
Epoch 2
Epoch 3
Epoch 4
Final
Iteration
Loss
Iteration
Results
Validation accuracy: 98.08%
Training finished: Max epochs completed
Training Time
Start time: 10-Mar-2023 23:24:37
Elapsed time: 12 min 44 sec
Training Cycle
Epoch: 4 of 4
Iteration: 320 of 320
Iterations per epoch: 80
Maximum iterations: 320
Validation
Frequency: 10 iterations
Other Information
Hardware resource: Single CPU
Learning rate schedule: Constant
Learning rate: 1e-05
Learn more
Accuracy
Training (smoothed)
Training
Validation


Confusion Matrix
helopeltis
kutu putih
normal
tikus
Output Class
12 25.0%
1 2.1%
0 0.0%
0 0.0%
92.3% 7.7%
0 0.0%
11 22.9%
0 0.0%
0 0.0%
100% 0.0%
0 0.0%
0 0.0%
12 25.0%
0 0.0%
100% 0.0%
0 0.0%
0 0.0%
0 0.0%
12 25.0%
100% 0.0%
100% 0.0%
91.7% 8.3%
100% 0.0%
100% 0.0%
97.9% 2.1%
Target Class

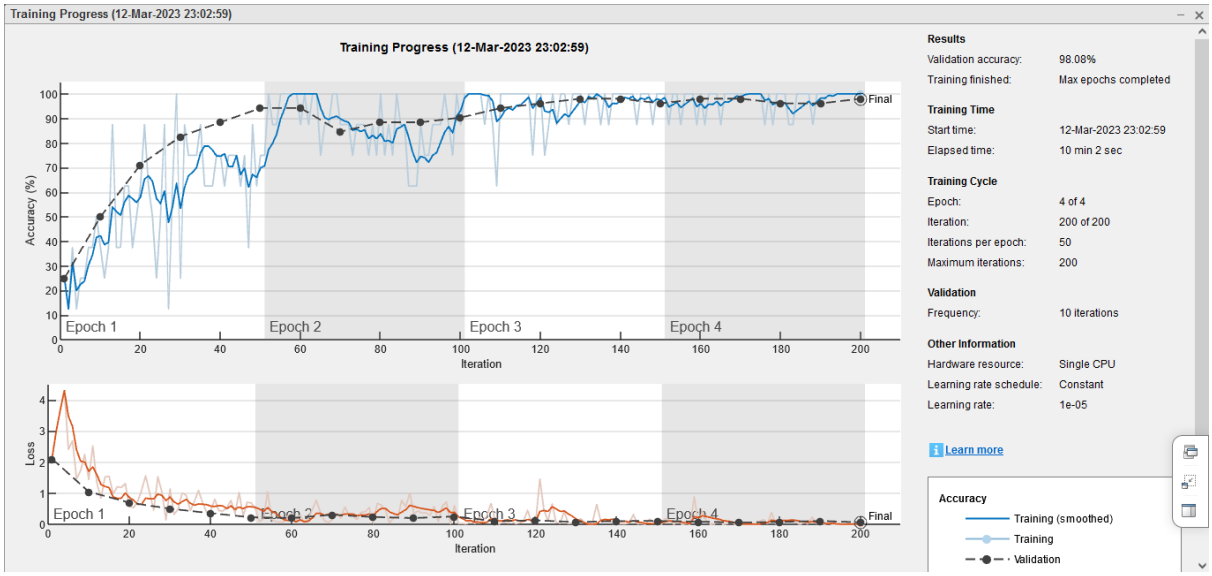
Perbedaan *Batchsize*

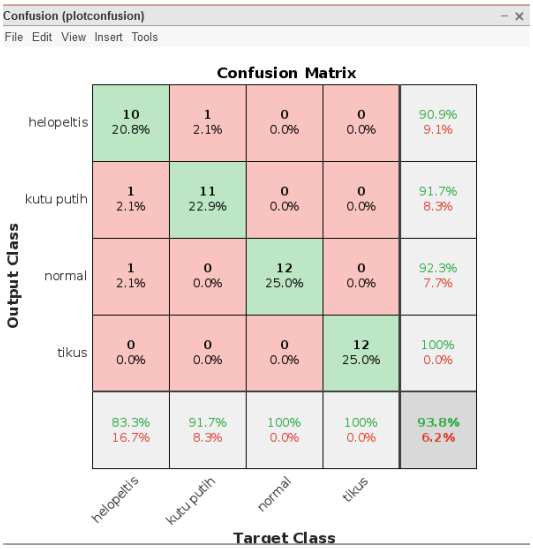
Batchsize 5



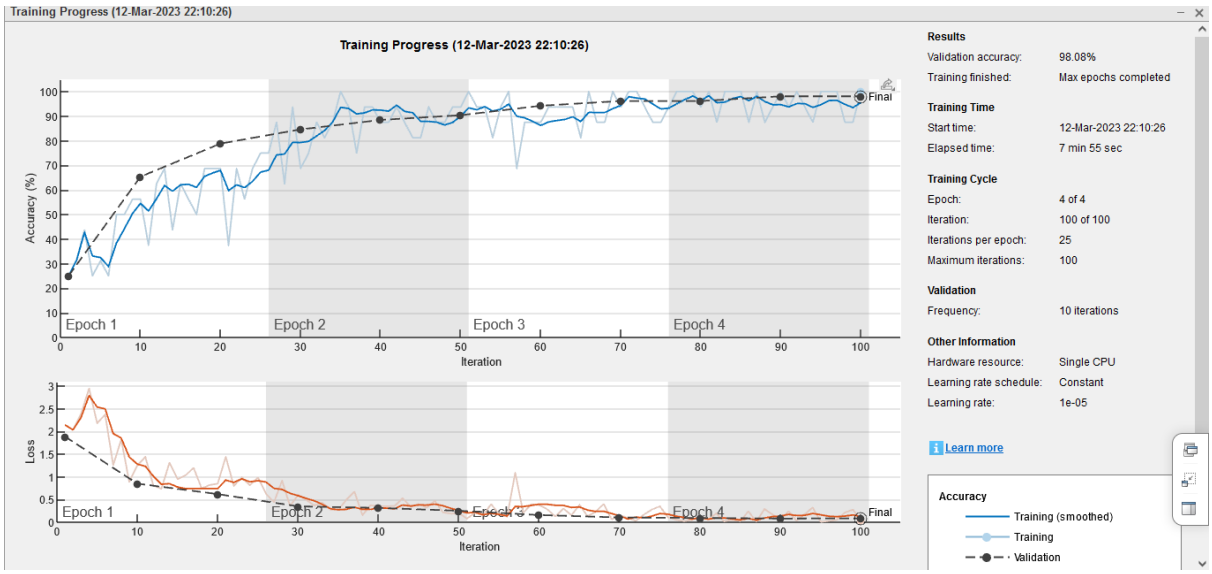


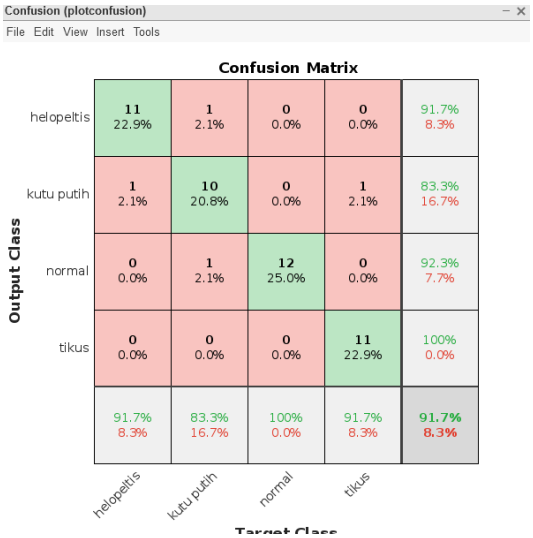
Batcsize 8


Training Progress (12-Mar-2023 23:02:59)
Training Progress (12-Mar-2023 23:02:59)
Accuracy (%)
Epoch 1
Epoch 2
Epoch 3
Epoch 4
Final
Iteration
Loss
Iteration
Results
Validation accuracy: 98.08%
Training finished: Max epochs completed
Training Time
Start time: 12-Mar-2023 23:02:59
Elapsed time: 10 min 2 sec
Training Cycle
Epoch: 4 of 4
Iteration: 200 of 200
Iterations per epoch: 50
Maximum iterations: 200
Validation
Frequency: 10 iterations
Other Information
Hardware resource: Single CPU
Learning rate schedule: Constant
Learning rate: 1e-05
Learn more
Accuracy
Training (smoothed)
Training
Validation

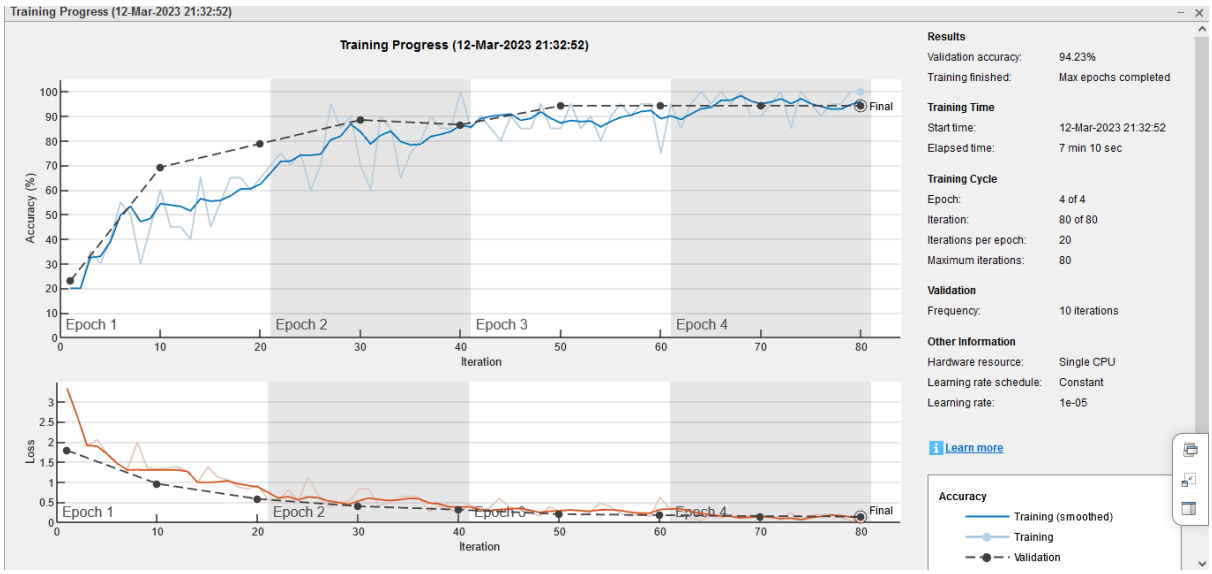

Confusion (plotconfusion)
File Edit View Insert Tools
Confusion Matrix
helopeltis
kutu putih
normal
tikus
Output Class
10 20.8%
1 2.1%
0 0.0%
0 0.0%
90.9% 9.1%
1 2.1%
11 22.9%
0 0.0%
0 0.0%
91.7% 8.3%
1 2.1%
0 0.0%
12 25.0%
0 0.0%
92.3% 7.7%
0 0.0%
0 0.0%
0 0.0%
12 25.0%
100% 0.0%
83.3% 16.7%
91.7% 8.3%
100% 0.0%
100% 0.0%
93.8% 6.2%
helopeltis
kutu putih
normal
tikus
Target Class

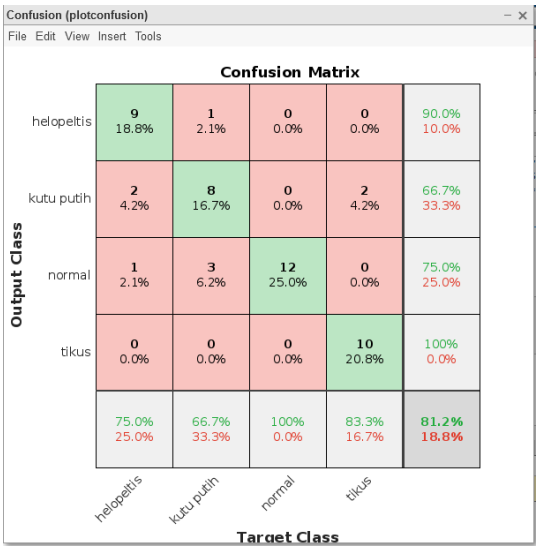
Batchsize 16



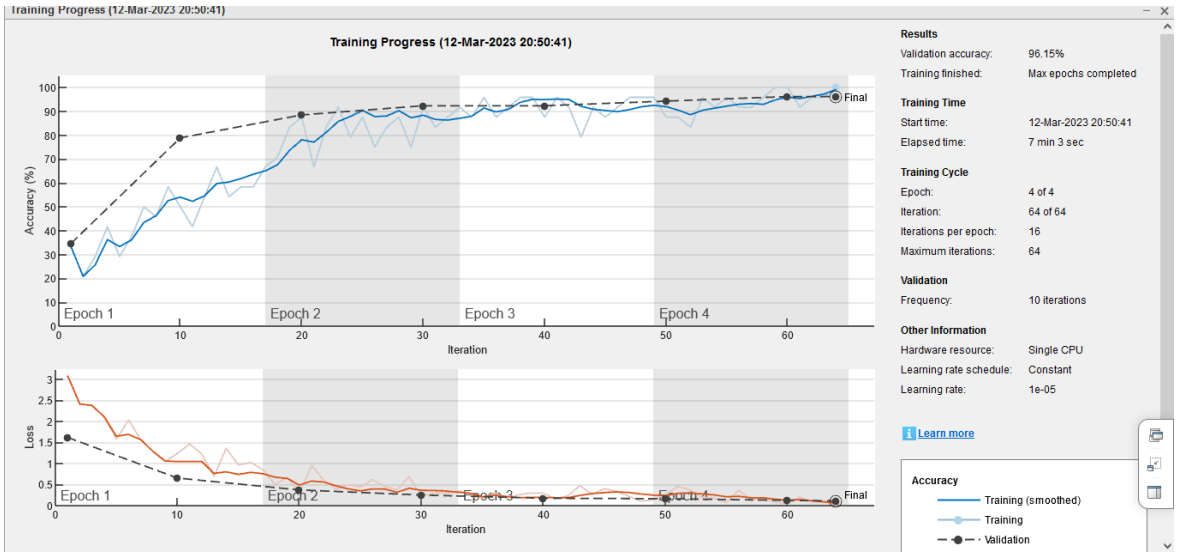


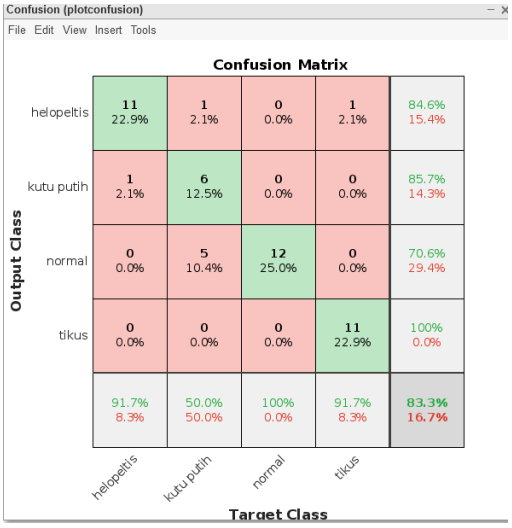
Batchsize 20



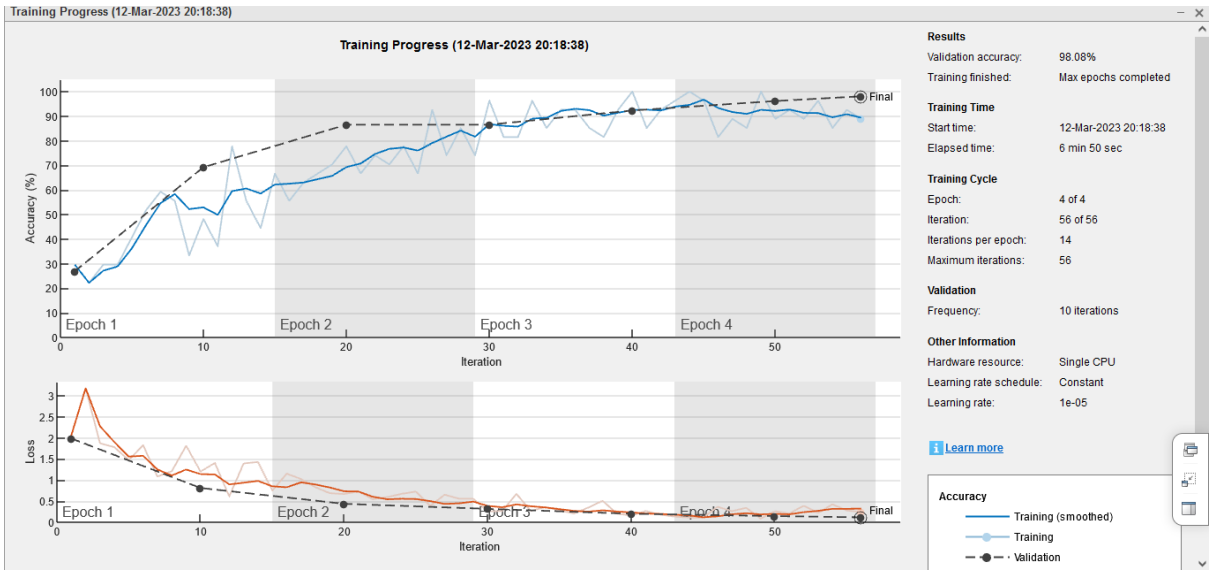


Batchsize 24

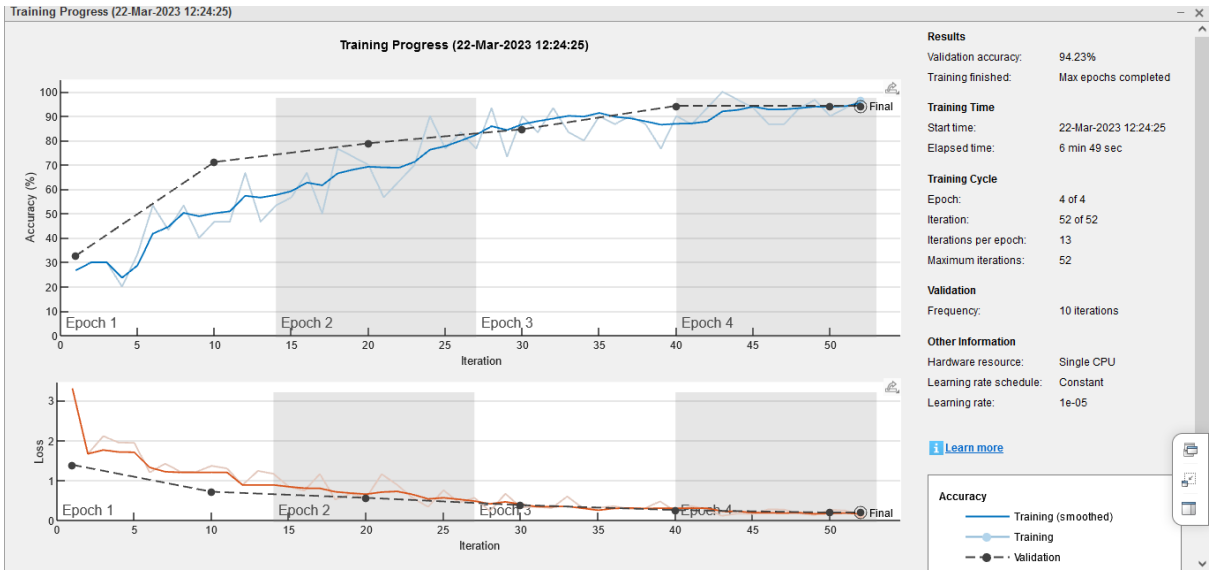


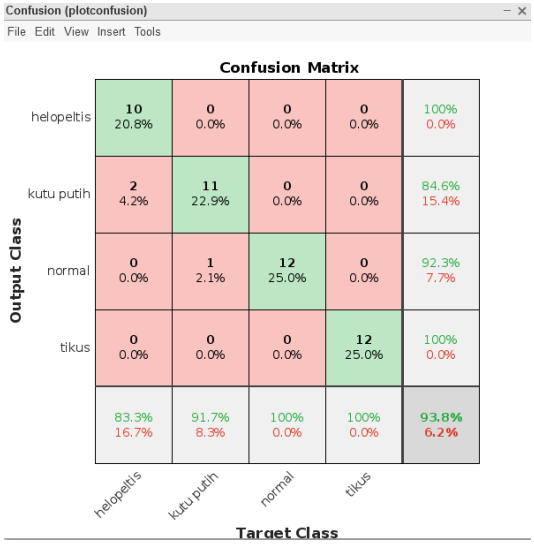


Batchsize 27

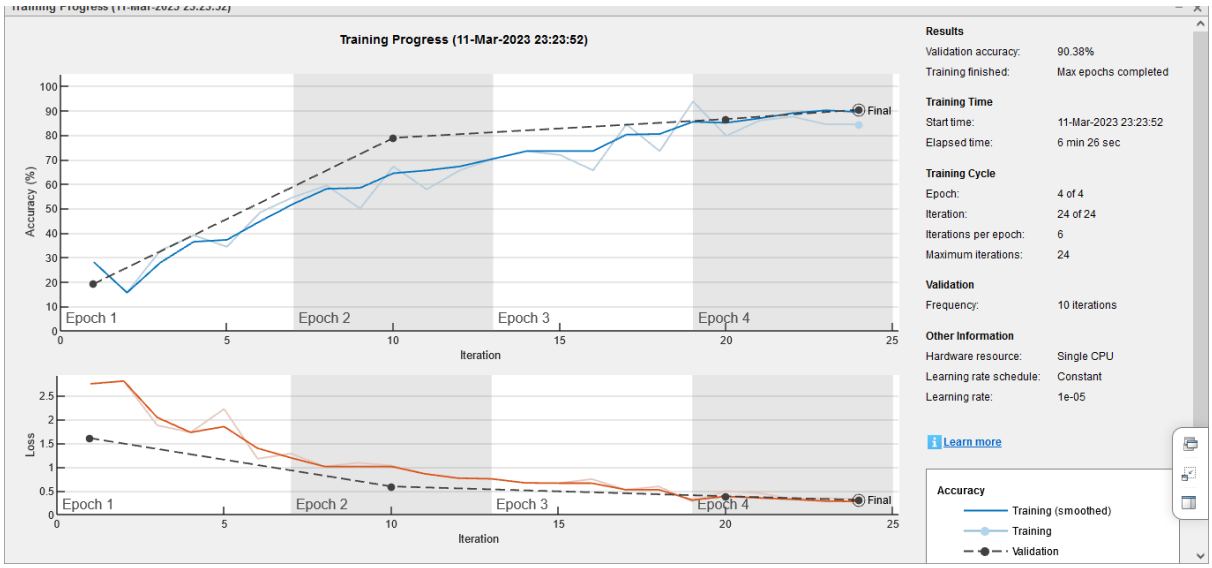


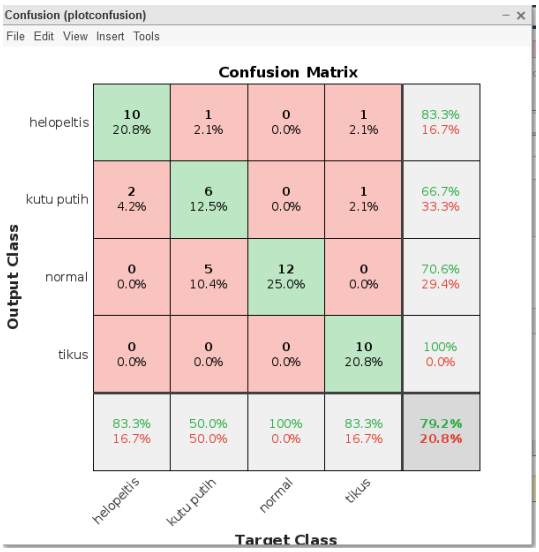
Batchsize 32





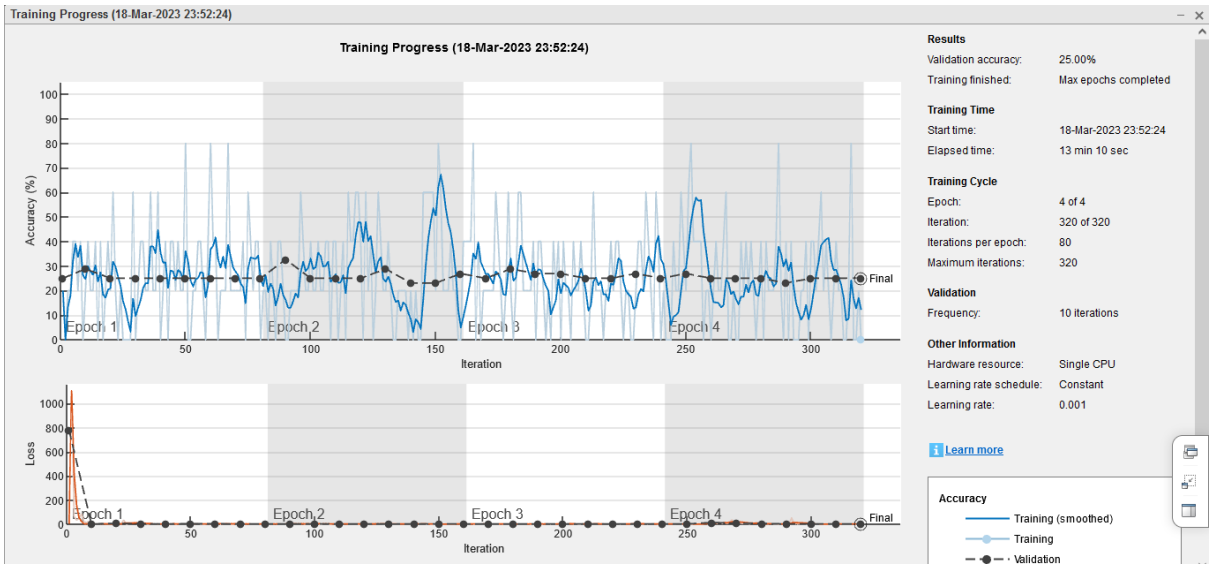
Batchsize 64

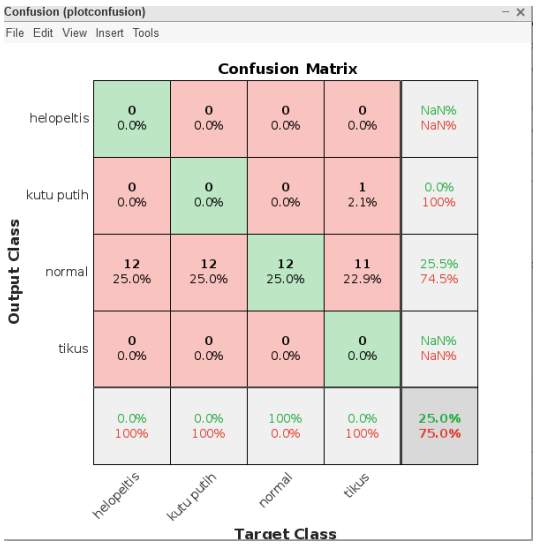




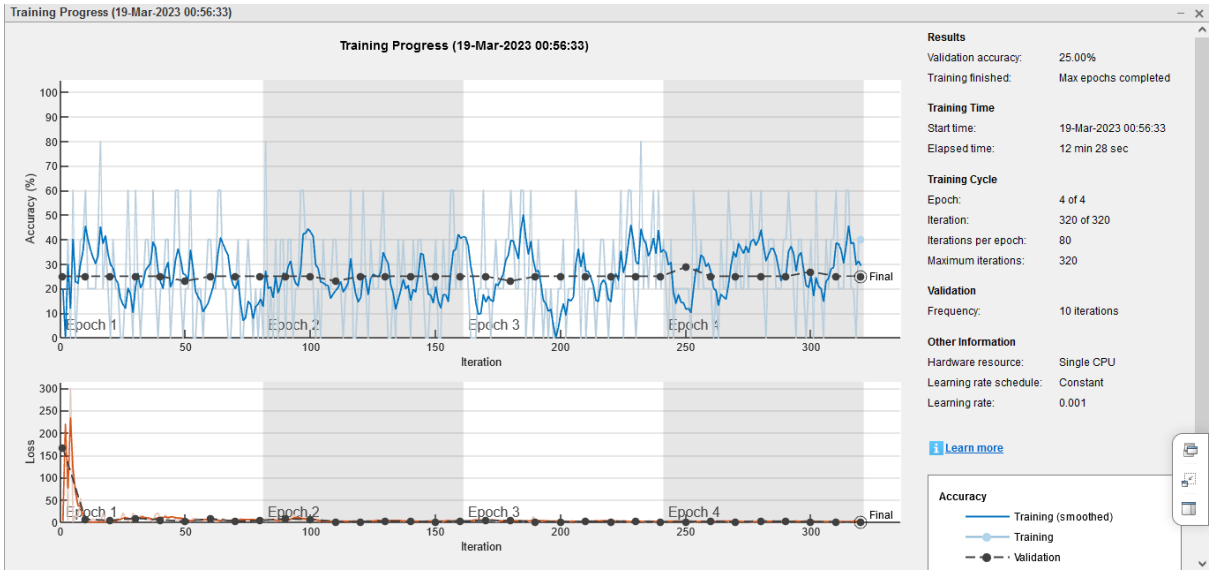
Learning rate

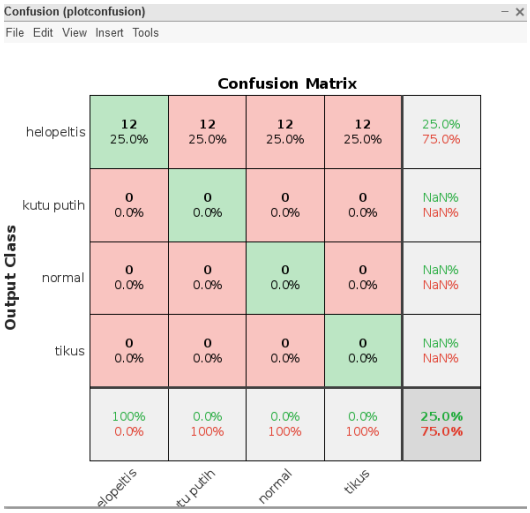
Learning rate 10^{-2}



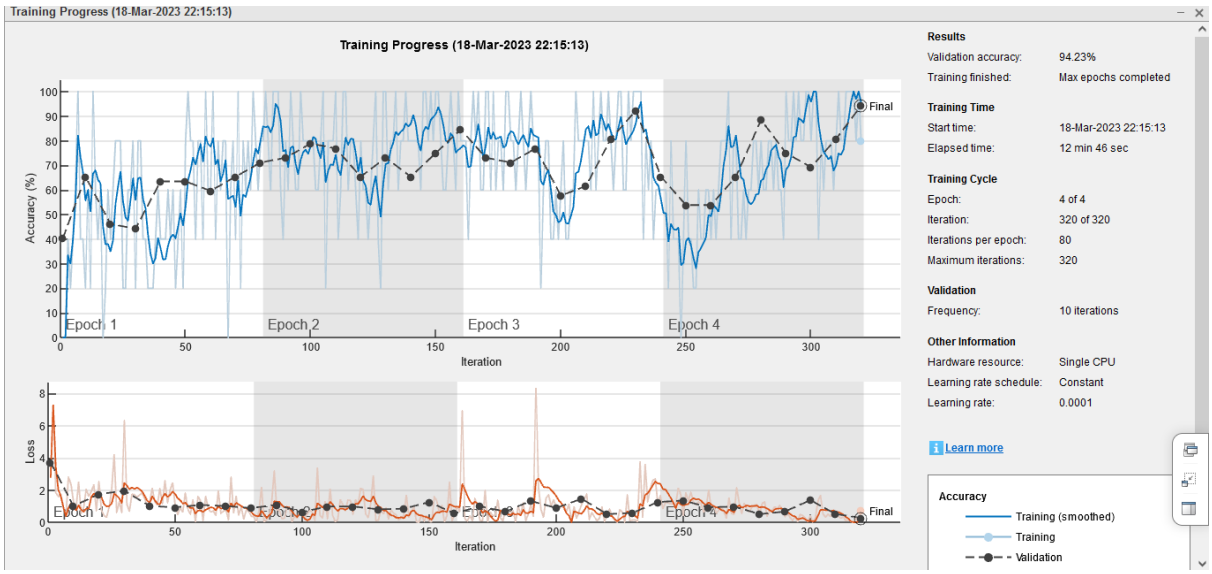


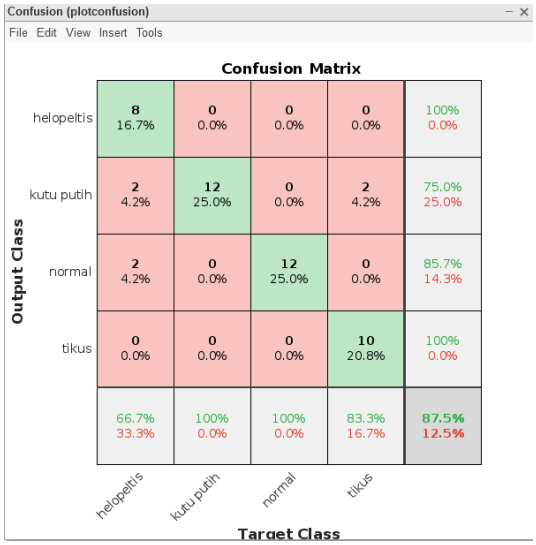
Learning rate 10^{-3}



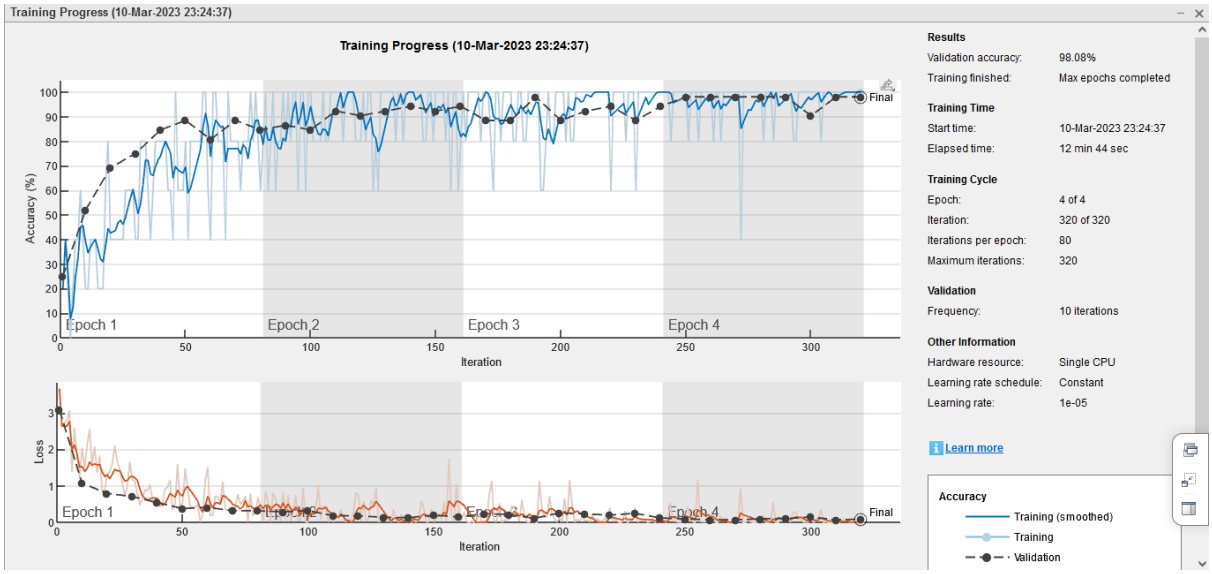


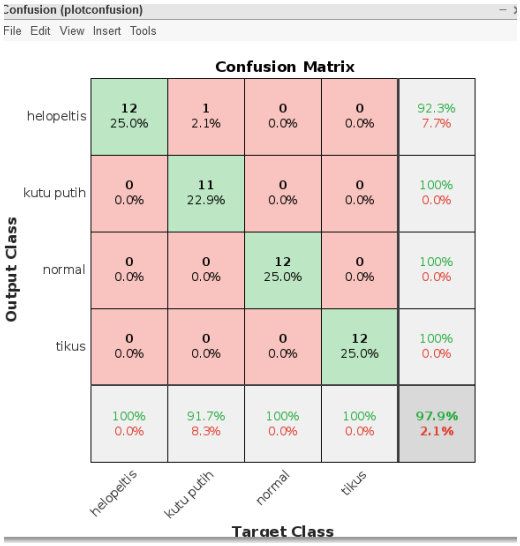
Learning rate 10^{-4}



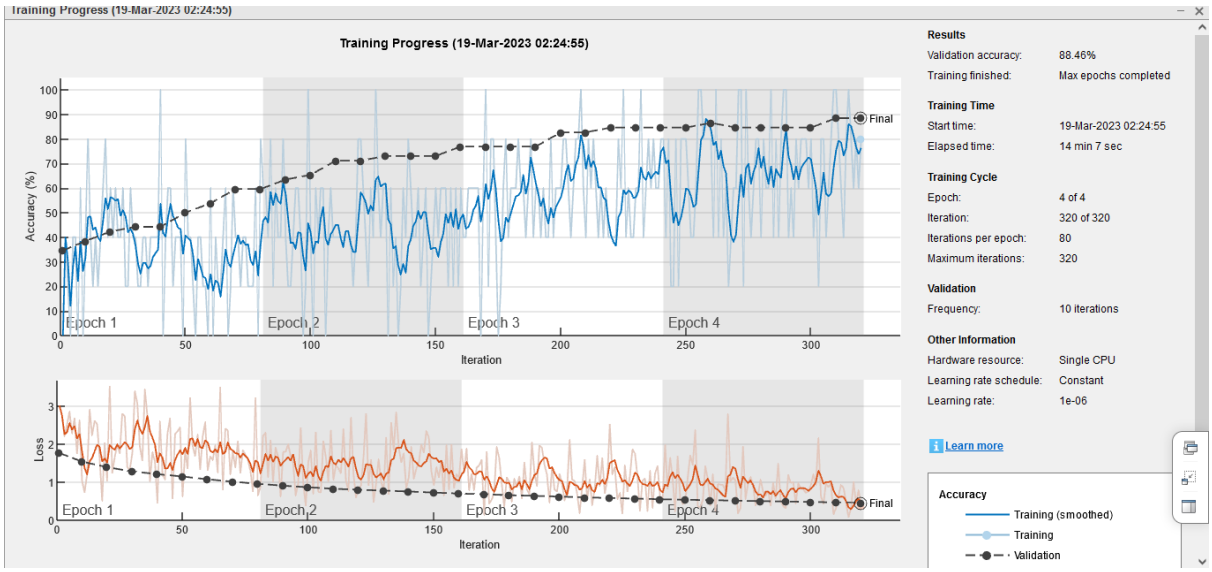


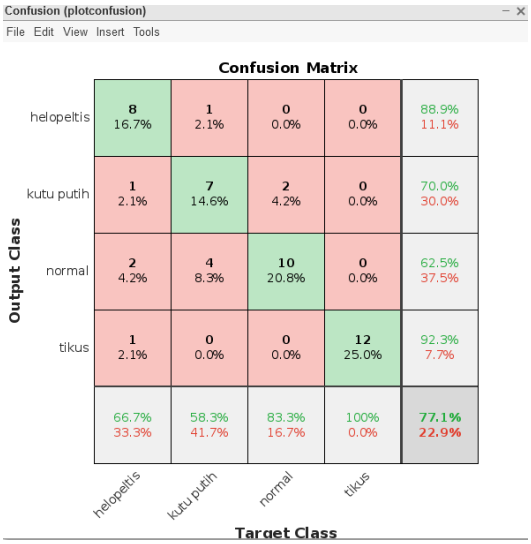
Learning rate 10^{-5}





Learning rate 10^{-6}





LEMBAR PERBAIKAN SKRIPSI

"IDENTIFIKASI JENIS SERANGAN HAMA PADA BUAH KAKAO MENGGUNAKAN IMAGE PROCESSING"

OLEH:

NURUL MUSFIRAH
D42116521

Skripsi ini telah dipertahankan pada Ujian Akhir Sarjana tanggal 12 April 2023.

Telah dilakukan perbaikan penulisan dan isi skripsi berdasarkan usulan dari penguji dan pembimbing skripsi.

Persetujuan perbaikan oleh tim penguji:

	Nama	Tanda Tangan
Ketua	Prof. Dr. Ir. Indrabayu., ST, MT, M.Bus.Sys., IPM, ASEAN. Eng.	
Sekretaris	Dr. Ir. Ingrid Nurtanio, M.T.	
Anggota	Ir. Christoforrus Yohannes, M.T.	
	Dr. Eng. Zulkifli Tahir, S.T., M.Sc.	

Persetujuan Perbaikan oleh pembimbing:

Pembimbing	Nama	Tanda Tangan
I	Prof. Dr. Ir. Indrabayu., ST, MT, M.Bus.Sys., IPM, ASEAN. Eng.	
II	Dr. Ir. Ingrid Nurtanio, M.T.	