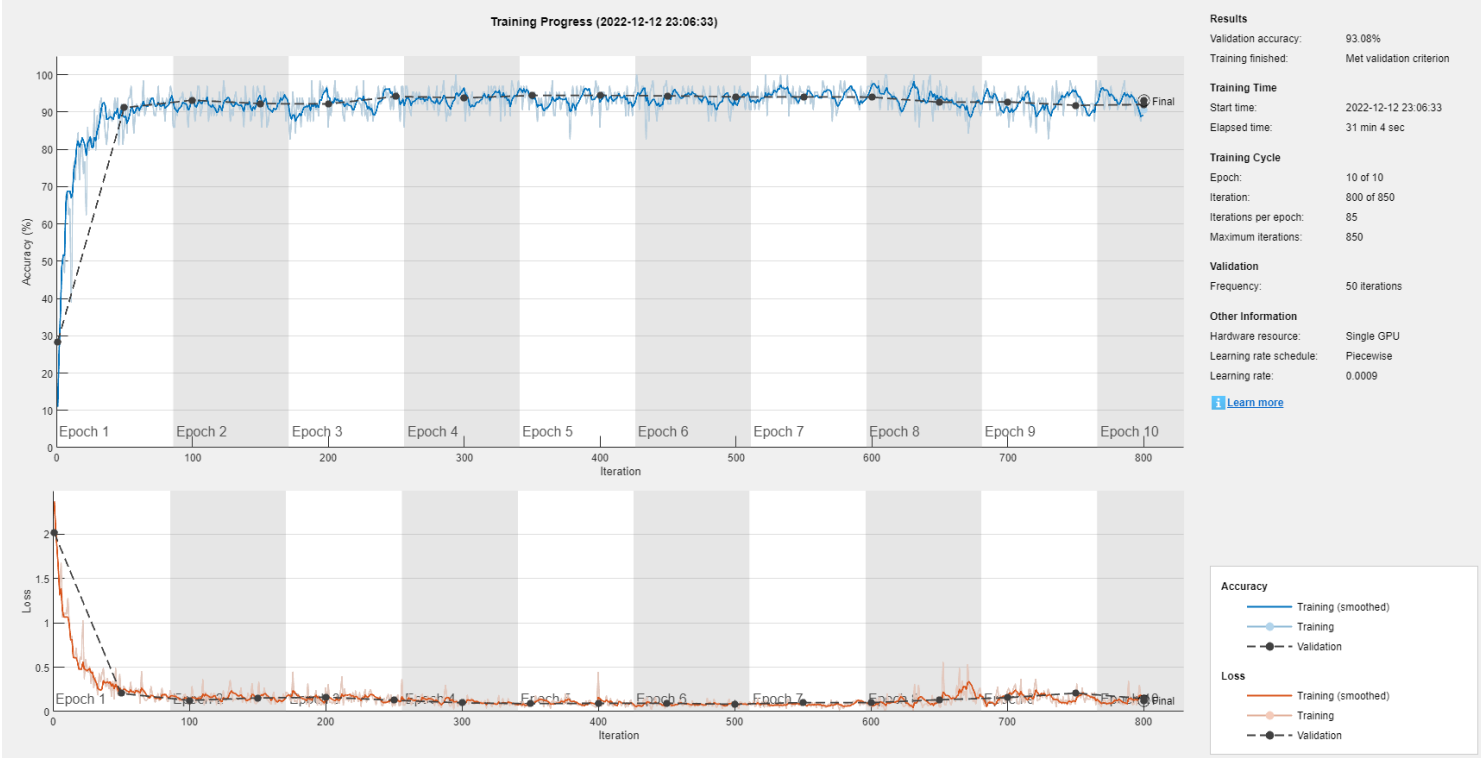
```
clc; clear
cd 'G:\Jiaxu Flashdrive Backup\code';
addpath 'G:\Jiaxu Flashdrive Backup\code\functions'
```

```
net = load("efficientnetB0_untrained.mat");
network = net.efficientnet_custom;
fracTrainFiles = 0.8;
fracValFiles = 0.2;
training_imds = imageDatastore("G:\Machine Learning\NW_depth_14NWs_upper_bound\train","IncludeS
    "LabelSource","foldernames");
shuffle_training_imds = shuffle(training_imds);
[trainImgs,validImgs] = splitEachLabel(shuffle_training_imds,fracTrainFiles,fracValFiles,"rando
numClasses = numel(categories(training_imds.Labels));
testing_imds = imageDatastore("G:\Machine Learning\NW_depth_14NWs_upper_bound\test","IncludeSub
    "LabelSource","foldernames");
```

```
options = trainingOptions('adam', ...
    'InitialLearnRate',0.001, ...
    'MaxEpochs',10, ...
    'Shuffle','every-epoch', ...
    'ValidationData',validImgs,...
    'MiniBatchSize',64,...
    'LearnRateSchedule','piecewise',...
    'LearnRateDropFactor',0.9,...
    'LearnRateDropPeriod',5,...
    'ValidationPatience',6,...
    'ExecutionEnvironment','multi-gpu',...
    'Plots','training-progress');
```

```
[ef_test_1,info] = trainNetwork(training_imds,network,options);
```

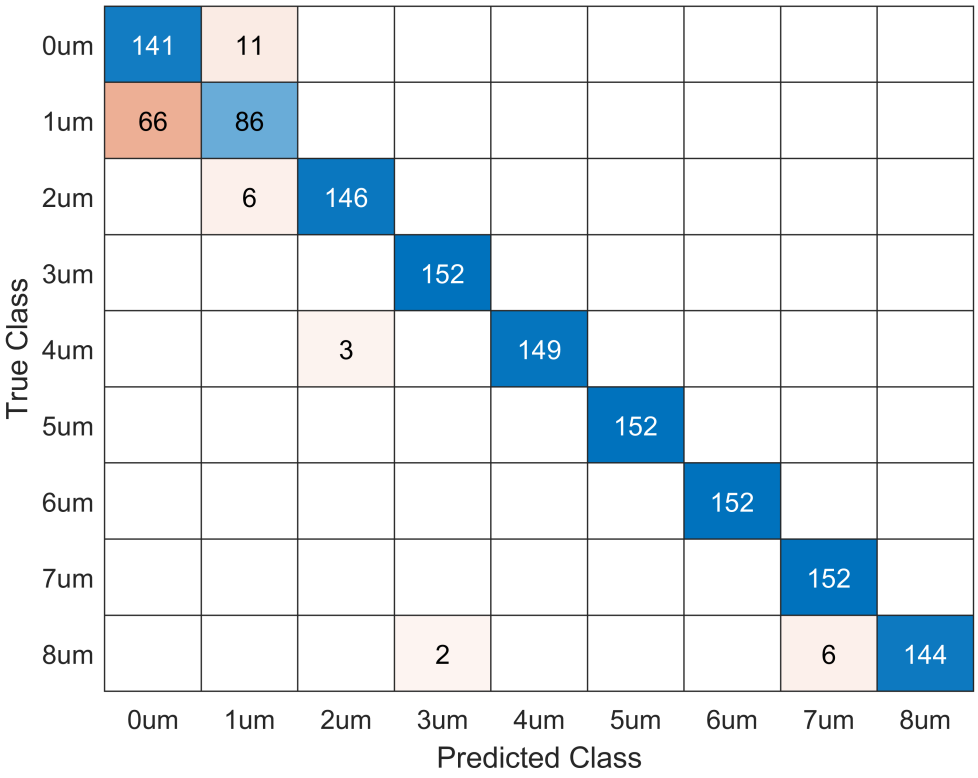
```
Initializing input data normalization.
|=========================================================================================================================
|  Epoch  |  Iteration  |  Time Elapsed  |  Mini-batch  |  Validation  |  Mini-batch  |  Validation  |  Base Learni
|         |             |   (hh:mm:ss)   |   Accuracy   |   Accuracy   |     Loss     |     Loss     |      Rate
|=========================================================================================================================
|       1 |           1 |       00:00:07 |       10.94% |       28.42% |       2.3721 |       2.0147 |          0.0
|       1 |          50 |       00:02:00 |       85.94% |       91.17% |       0.2063 |       0.2046 |          0.0
|       2 |         100 |       00:03:52 |       93.75% |       93.17% |       0.1418 |       0.1261 |          0.0
|       2 |         150 |       00:05:49 |       95.31% |       92.26% |       0.1057 |       0.1537 |          0.0
|       3 |         200 |       00:07:48 |       85.94% |       92.17% |       0.2676 |       0.1619 |          0.0
|       3 |         250 |       00:09:42 |       93.75% |       94.17% |       0.0993 |       0.1279 |          0.0
|       4 |         300 |       00:11:36 |       93.75% |       93.81% |       0.1094 |       0.0991 |          0.0
|       5 |         350 |       00:13:30 |       92.19% |       94.44% |       0.1053 |       0.0890 |          0.0
|       5 |         400 |       00:15:26 |       85.94% |       94.44% |       0.4401 |       0.0927 |          0.0
|       6 |         450 |       00:17:20 |       92.19% |       94.35% |       0.1278 |       0.0938 |          0.0
|       6 |         500 |       00:19:15 |       92.19% |       94.08% |       0.1004 |       0.0838 |          0.0
|       7 |         550 |       00:21:12 |       95.31% |       94.08% |       0.0763 |       0.1015 |          0.0
|       8 |         600 |       00:23:11 |       98.44% |       93.99% |       0.0872 |       0.1013 |          0.0
|       8 |         650 |       00:25:09 |       98.44% |       92.62% |       0.0621 |       0.1331 |          0.0
|       9 |         700 |       00:27:06 |       90.62% |       92.71% |       0.2236 |       0.1567 |          0.0
|       9 |         750 |       00:29:03 |       96.88% |       91.80% |       0.0853 |       0.2084 |          0.0
|      10 |         800 |       00:31:00 |       90.62% |       91.99% |       0.1446 |       0.1467 |          0.0
|=========================================================================================================================
Training finished: Met validation criterion.
```




```
testpreds = classify(ef_test_1,testing_imds);
nnz(testpreds == testing_imds.Labels)/numel(testpreds)
```

```
ans = 0.9313
```

```
confusionchart(testing_imds.Labels,testpreds);
```


True Class
0um
1um
2um
3um
4um
5um
6um
7um
8um
141
11
66
86
6
146
152
3
149
152
152
152
6
144
2
0um
1um
2um
3um
4um
5um
6um
7um
8um
Predicted Class