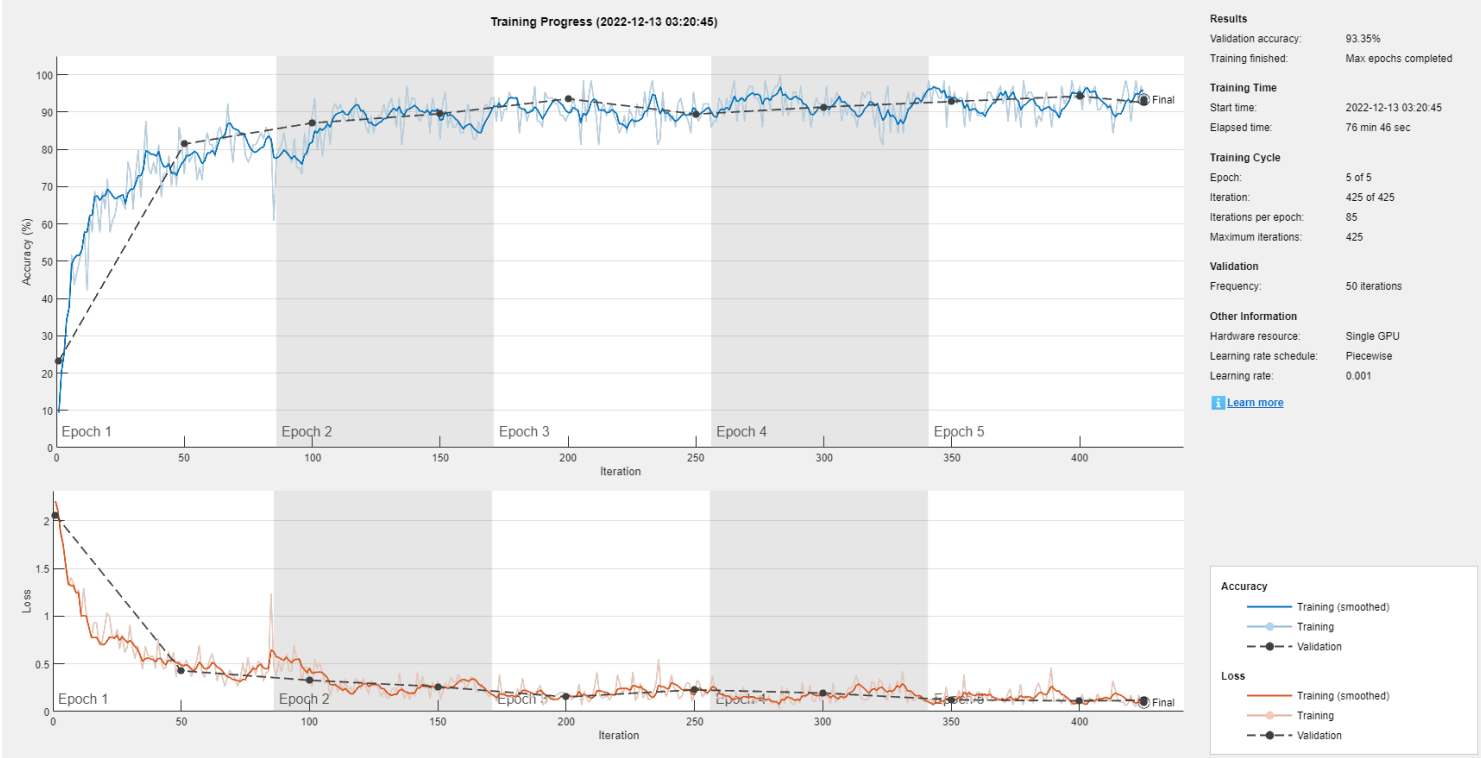
```
clc; clear
cd 'G:\Jiaxu Flashdrive Backup\code';
addpath 'G:\Jiaxu Flashdrive Backup\code\functions'
```

```
net = load("efficientnetV2S_untrained.mat");
network = net.efficientnetv2s;
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',5, ...
    '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);
```

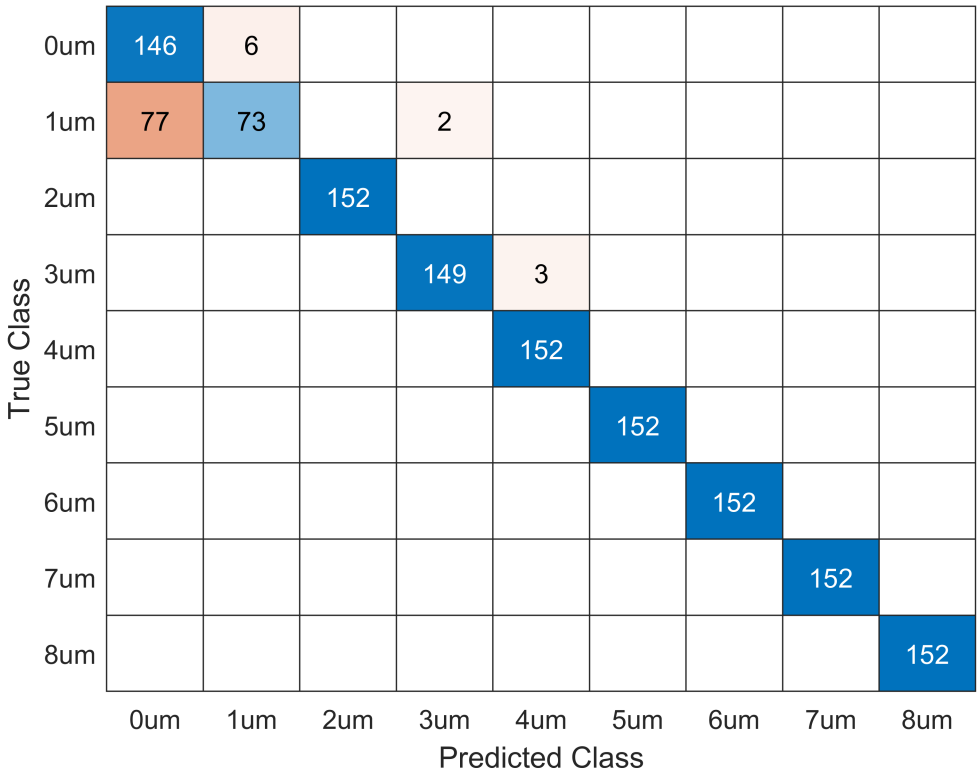
```
Initializing input data normalization.
|=========================================================================================================================
|  Epoch  |  Iteration  |  Time Elapsed  |  Mini-batch  |  Validation  |  Mini-batch  |  Validation  |  Base Learni
|         |             |   (hh:mm:ss)   |   Accuracy   |   Accuracy   |     Loss     |     Loss     |      Rate
|=========================================================================================================================
|       1 |           1 |       00:00:34 |        9.38% |       23.32% |       2.2047 |       2.0602 |          0.0
|       1 |          50 |       00:09:57 |       73.44% |       81.42% |       0.5021 |       0.4278 |          0.0
|       2 |         100 |       00:18:50 |       89.06% |       87.07% |       0.3343 |       0.3281 |          0.0
|       2 |         150 |       00:28:05 |       82.81% |       89.53% |       0.3179 |       0.2610 |          0.0
|       3 |         200 |       00:36:31 |       89.06% |       93.53% |       0.1591 |       0.1537 |          0.0
|       3 |         250 |       00:45:22 |       90.62% |       89.44% |       0.1919 |       0.2279 |          0.0
|       4 |         300 |       00:54:11 |       89.06% |       91.35% |       0.1760 |       0.1939 |          0.0
|       5 |         350 |       01:02:55 |       92.19% |       92.81% |       0.1123 |       0.1235 |          0.0
|       5 |         400 |       01:11:47 |       96.88% |       94.26% |       0.1019 |       0.1122 |          0.0
|       5 |         425 |       01:16:40 |       93.75% |       92.53% |       0.1159 |       0.1178 |          0.0
|=========================================================================================================================
Training finished: Max epochs completed.
```




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

```
ans = 0.9357
```

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


0um
1um
2um
3um
4um
5um
6um
7um
8um
True Class
146
6
77
73
2
152
149
3
152
152
152
152
0um
1um
2um
3um
4um
5um
6um
7um
8um
Predicted Class