```
net = alexnet
```

```
net = 
  SeriesNetwork with properties:

         Layers: [25×1 nnet.cnn.layer.Layer]
     InputNames: {'data'}
    OutputNames: {'output'}
```

```
path =fullfile(pwd)
```

```
path = 
'C:\Users\HP\OneDrive\Desktop\mobiles'
```

```
filepath = [path,filesep,'images']
```

```
filepath = 
'C:\Users\HP\OneDrive\Desktop\mobiles\images'
```

```
imds = imageDatastore(filepath,'IncludeSubfolders',true,'LabelSource','foldernames')
```

```
imds = 
  ImageDatastore with properties:

                       Files: {
                              ' ...\Desktop\mobiles\images\Jio Feature phone\Jio_Feature_Phone (1).jpg';
                              ' ...\Desktop\mobiles\images\Jio Feature phone\Jio_Feature_Phone (10).jpg';
                              ' ...\Desktop\mobiles\images\Jio Feature phone\Jio_Feature_Phone (11).jpg'
                               ... and 996 more
                              }
                     Folders: {
                              'C:\Users\HP\OneDrive\Desktop\mobiles\images'
                              }
                      Labels: [Jio Feature phone; Jio Feature phone; Jio Feature phone ... and 996 more categorical]
    AlternateFileSystemRoots: {}
                    ReadSize: 1
      SupportedOutputFormats: ["png"    "jpg"    "jpeg"    "tif"    "tiff"]
         DefaultOutputFormat: "png"
                     ReadFcn: @readDatastoreImage
```

```
label_class = unique(imds.Labels)
```

```
label_class = 4×1 categorical
Jio Feature phone
LG Q6 phone
One Plus Nord phone
Oppo Mobile phone
```

```
n1 = length(label_class)
```

```
n1 = 4
```

```
randNum = randi(length(imds.Files))
```

```
randNum = 913
```

```
[imTemp,info] = readimage(imds,randNum)
```

```
imTemp = 3000×4000×3 uint8 array
imTemp(:,:,1) =

  Columns 1 through 1,666
```

```
      7       5       4      13      17      15       7       6      18       8      13      10       6      14      16      14      11      12      12
      6       6       5      11      14      16       8       5      19      11      11       8       9      16      14      14      13       7      12
     13      14      11      12      14      18      15      10      13      12      13       8       9      13      11      14      17       5      14
     13      14      10       9       9      16      16      11       6      10      15      11      10      16      15      14      17       5      10
      6       5       4       6       7      15      17      13       7       9      14      12      11      20      22      12      15       8       6
      ⋮

info = struct with fields:
    Filename: 'C:\Users\HP\OneDrive\Desktop\mobiles\images\Oppo Mobile phone\oppo_a11 (200).jpg'
    FileSize: 3520607
       Label: Oppo Mobile phone
```

```
imshow(imTemp)
title(string(info.Label),'Interpreter',"none")
```

Oppo Mobile phone

```
sizeRequirement = net.Layers(1).InputSize
```

```
sizeRequirement = 1×3
   227   227     3
```

```
inputSize = sizeRequirement(1:2)
```

```
inputSize = 1×2
   227   227
```

```
imds.ReadFcn = @(img) imresize(imread(img),inputSize)
```

```
imds = 
  ImageDatastore with properties:

                       Files: {
                              ' ...\Desktop\mobiles\images\Jio Feature phone\Jio_Feature_Phone (1).jpg';
                              ' ...\Desktop\mobiles\images\Jio Feature phone\Jio_Feature_Phone (10).jpg';
                              ' ...\Desktop\mobiles\images\Jio Feature phone\Jio_Feature_Phone (11).jpg'
                               ... and 996 more
                              }
                     Folders: {
                              'C:\Users\HP\OneDrive\Desktop\mobiles\images'
                              }
                      Labels: [Jio Feature phone; Jio Feature phone; Jio Feature phone ... and 996 more categorical]
    AlternateFileSystemRoots: {}
                    ReadSize: 1
      SupportedOutputFormats: ["png"    "jpg"    "jpeg"    "tif"    "tiff"]
         DefaultOutputFormat: "png"
                     ReadFcn: @(img)imresize(imread(img),inputSize)
```

```
[trainDS,testDS] = splitEachLabel(imds,0.8,'randomized')
```

```
trainDS = 
  ImageDatastore with properties:

                       Files: {
                              ' ...\Desktop\mobiles\images\Jio Feature phone\Jio_Feature_Phone (1).jpg';
                              ' ...\Desktop\mobiles\images\Jio Feature phone\Jio_Feature_Phone (10).jpg';
                              ' ...\Desktop\mobiles\images\Jio Feature phone\Jio_Feature_Phone (11).jpg'
                               ... and 796 more
                              }
                     Folders: {
                              'C:\Users\HP\OneDrive\Desktop\mobiles\images'
                              }
                      Labels: [Jio Feature phone; Jio Feature phone; Jio Feature phone ... and 796 more categorical]
    AlternateFileSystemRoots: {}
                    ReadSize: 1
      SupportedOutputFormats: ["png"    "jpg"    "jpeg"    "tif"    "tiff"]
         DefaultOutputFormat: "png"
                     ReadFcn: @(img)imresize(imread(img),inputSize)
testDS = 
  ImageDatastore with properties:

                       Files: {
                              ' ...\Desktop\mobiles\images\Jio Feature phone\Jio_Feature_Phone (14).jpg';
                              ' ...\Desktop\mobiles\images\Jio Feature phone\Jio_Feature_Phone (19).jpg';
                              ' ...\Desktop\mobiles\images\Jio Feature phone\Jio_Feature_Phone (20).jpg'
                               ... and 197 more
                              }
                     Folders: {
                              'C:\Users\HP\OneDrive\Desktop\mobiles\images'
                              }
                      Labels: [Jio Feature phone; Jio Feature phone; Jio Feature phone ... and 197 more categorical]
    AlternateFileSystemRoots: {}
                    ReadSize: 1
      SupportedOutputFormats: ["png"    "jpg"    "jpeg"    "tif"    "tiff"]
         DefaultOutputFormat: "png"
                     ReadFcn: @(img)imresize(imread(img),inputSize)
```

```
numClasses = numel(unique(imds.Labels))
```

```
numClasses = 4
```

```
layers = net.Layers
```

```
layers = 
  25×1 Layer array with layers:

     1   'data'     Image Input                   227×227×3 images with 'zerocenter' normalization
     2   'conv1'    Convolution                   96 11×11×3 convolutions with stride [4  4] and padding [0  0  0  0
     3   'relu1'    ReLU                          ReLU
     4   'norm1'    Cross Channel Normalization   cross channel normalization with 5 channels per element
     5   'pool1'    Max Pooling                   3×3 max pooling with stride [2  2] and padding [0  0  0  0]
     6   'conv2'    Grouped Convolution           2 groups of 128 5×5×48 convolutions with stride [1  1] and padding
     7   'relu2'    ReLU                          ReLU
     8   'norm2'    Cross Channel Normalization   cross channel normalization with 5 channels per element
     9   'pool2'    Max Pooling                   3×3 max pooling with stride [2  2] and padding [0  0  0  0]
    10   'conv3'    Convolution                   384 3×3×256 convolutions with stride [1  1] and padding [1  1  1
    11   'relu3'    ReLU                          ReLU
    12   'conv4'    Grouped Convolution           2 groups of 192 3×3×192 convolutions with stride [1  1] and paddin
    13   'relu4'    ReLU                          ReLU
    14   'conv5'    Grouped Convolution           2 groups of 128 3×3×192 convolutions with stride [1  1] and paddin
    15   'relu5'    ReLU                          ReLU
    16   'pool5'    Max Pooling                   3×3 max pooling with stride [2  2] and padding [0  0  0  0]
    17   'fc6'      Fully Connected               4096 fully connected layer
    18   'relu6'    ReLU                          ReLU
    19   'drop6'    Dropout                       50% dropout
    20   'fc7'      Fully Connected               4096 fully connected layer
    21   'relu7'    ReLU                          ReLU
    22   'drop7'    Dropout                       50% dropout
    23   'fc8'      Fully Connected               1000 fully connected layer
    24   'prob'     Softmax                       softmax
    25   'output'   Classification Output         crossentropyex with 'tench' and 999 other classes
```

```
layers(23) = fullyConnectedLayer(4)
```

```
layers = 
  25×1 Layer array with layers:

     1   'data'     Image Input                   227×227×3 images with 'zerocenter' normalization
     2   'conv1'    Convolution                   96 11×11×3 convolutions with stride [4  4] and padding [0  0  0  0
     3   'relu1'    ReLU                          ReLU
     4   'norm1'    Cross Channel Normalization   cross channel normalization with 5 channels per element
     5   'pool1'    Max Pooling                   3×3 max pooling with stride [2  2] and padding [0  0  0  0]
     6   'conv2'    Grouped Convolution           2 groups of 128 5×5×48 convolutions with stride [1  1] and padding
     7   'relu2'    ReLU                          ReLU
     8   'norm2'    Cross Channel Normalization   cross channel normalization with 5 channels per element
     9   'pool2'    Max Pooling                   3×3 max pooling with stride [2  2] and padding [0  0  0  0]
    10   'conv3'    Convolution                   384 3×3×256 convolutions with stride [1  1] and padding [1  1  1
    11   'relu3'    ReLU                          ReLU
    12   'conv4'    Grouped Convolution           2 groups of 192 3×3×192 convolutions with stride [1  1] and paddin
    13   'relu4'    ReLU                          ReLU
    14   'conv5'    Grouped Convolution           2 groups of 128 3×3×192 convolutions with stride [1  1] and paddin
    15   'relu5'    ReLU                          ReLU
    16   'pool5'    Max Pooling                   3×3 max pooling with stride [2  2] and padding [0  0  0  0]
    17   'fc6'      Fully Connected               4096 fully connected layer
    18   'relu6'    ReLU                          ReLU
    19   'drop6'    Dropout                       50% dropout
    20   'fc7'      Fully Connected               4096 fully connected layer
    21   'relu7'    ReLU                          ReLU
    22   'drop7'    Dropout                       50% dropout
    23   ''         Fully Connected               4 fully connected layer
    24   'prob'     Softmax                       softmax
    25   'output'   Classification Output         crossentropyex with 'tench' and 999 other classes
```

```
layers(25) = classificationLayer
```

```
layers = 
  25×1 Layer array with layers:

     1   'data'    Image Input                   227×227×3 images with 'zerocenter' normalization
     2   'conv1'   Convolution                   96 11×11×3 convolutions with stride [4  4] and padding [0  0  0  0]
     3   'relu1'   ReLU                          ReLU
     4   'norm1'   Cross Channel Normalization   cross channel normalization with 5 channels per element
     5   'pool1'   Max Pooling                   3×3 max pooling with stride [2  2] and padding [0  0  0  0]
     6   'conv2'   Grouped Convolution           2 groups of 128 5×5×48 convolutions with stride [1  1] and padding
     7   'relu2'   ReLU                          ReLU
     8   'norm2'   Cross Channel Normalization   cross channel normalization with 5 channels per element
     9   'pool2'   Max Pooling                   3×3 max pooling with stride [2  2] and padding [0  0  0  0]
    10   'conv3'   Convolution                   384 3×3×256 convolutions with stride [1  1] and padding [1  1  1  1
    11   'relu3'   ReLU                          ReLU
    12   'conv4'   Grouped Convolution           2 groups of 192 3×3×192 convolutions with stride [1  1] and padding
    13   'relu4'   ReLU                          ReLU
    14   'conv5'   Grouped Convolution           2 groups of 128 3×3×192 convolutions with stride [1  1] and padding
    15   'relu5'   ReLU                          ReLU
    16   'pool5'   Max Pooling                   3×3 max pooling with stride [2  2] and padding [0  0  0  0]
    17   'fc6'     Fully Connected               4096 fully connected layer
    18   'relu6'   ReLU                          ReLU
    19   'drop6'   Dropout                       50% dropout
    20   'fc7'     Fully Connected               4096 fully connected layer
    21   'relu7'   ReLU                          ReLU
    22   'drop7'   Dropout                       50% dropout
    23   ''        Fully Connected               4 fully connected layer
    24   'prob'    Softmax                       softmax
    25   ''        Classification Output         crossentropyex
```

```
newlayers = layers
```

```
newlayers = 
  25×1 Layer array with layers:

     1   'data'    Image Input                   227×227×3 images with 'zerocenter' normalization
     2   'conv1'   Convolution                   96 11×11×3 convolutions with stride [4  4] and padding [0  0  0  0]
     3   'relu1'   ReLU                          ReLU
     4   'norm1'   Cross Channel Normalization   cross channel normalization with 5 channels per element
     5   'pool1'   Max Pooling                   3×3 max pooling with stride [2  2] and padding [0  0  0  0]
     6   'conv2'   Grouped Convolution           2 groups of 128 5×5×48 convolutions with stride [1  1] and padding
     7   'relu2'   ReLU                          ReLU
     8   'norm2'   Cross Channel Normalization   cross channel normalization with 5 channels per element
     9   'pool2'   Max Pooling                   3×3 max pooling with stride [2  2] and padding [0  0  0  0]
    10   'conv3'   Convolution                   384 3×3×256 convolutions with stride [1  1] and padding [1  1  1  1
    11   'relu3'   ReLU                          ReLU
    12   'conv4'   Grouped Convolution           2 groups of 192 3×3×192 convolutions with stride [1  1] and padding
    13   'relu4'   ReLU                          ReLU
    14   'conv5'   Grouped Convolution           2 groups of 128 3×3×192 convolutions with stride [1  1] and padding
    15   'relu5'   ReLU                          ReLU
    16   'pool5'   Max Pooling                   3×3 max pooling with stride [2  2] and padding [0  0  0  0]
    17   'fc6'     Fully Connected               4096 fully connected layer
    18   'relu6'   ReLU                          ReLU
    19   'drop6'   Dropout                       50% dropout
    20   'fc7'     Fully Connected               4096 fully connected layer
    21   'relu7'   ReLU                          ReLU
    22   'drop7'   Dropout                       50% dropout
    23   ''        Fully Connected               4 fully connected layer
    24   'prob'    Softmax                       softmax
    25   ''        Classification Output         crossentropyex
```

```
opts = trainingOptions("sgdm",...
    'InitialLearnRate',0.0001,...
    "MaxEpochs",10,...
    "MiniBatchSize",15 ,...
    'Shuffle','every-epoch', ...
    'ValidationData',testDS, ...
    'ValidationFrequency',30, ...
    'Plots','training-progress')
```

```
opts = 
  TrainingOptionsSGDM with properties:

                    Momentum: 0.9000
            InitialLearnRate: 1.0000e-04
           LearnRateSchedule: 'none'
         LearnRateDropFactor: 0.1000
         LearnRateDropPeriod: 10
            L2Regularization: 1.0000e-04
     GradientThresholdMethod: 'l2norm'
           GradientThreshold: Inf
                   MaxEpochs: 10
               MiniBatchSize: 15
                     Verbose: 1
            VerboseFrequency: 50
              ValidationData: [1×1 matlab.io.datastore.ImageDatastore]
         ValidationFrequency: 30
          ValidationPatience: Inf
                     Shuffle: 'every-epoch'
              CheckpointPath: ''
        ExecutionEnvironment: 'auto'
                  WorkerLoad: []
                   OutputFcn: []
                       Plots: 'training-progress'
              SequenceLength: 'longest'
        SequencePaddingValue: 0
    SequencePaddingDirection: 'right'
        DispatchInBackground: 0
     ResetInputNormalization: 1
```

```
myNet = trainNetwork(trainDS,newlayers,opts)
```

```
Training on single GPU.
Initializing input data normalization.
|==============================================================================================================
|  Epoch  |  Iteration  |  Time Elapsed  |  Mini-batch  |  Validation  |  Mini-batch  |  Validation  |  Base Learnin
|         |             |   (hh:mm:ss)   |   Accuracy   |   Accuracy   |     Loss     |     Loss     |      Rate
|==============================================================================================================
|       1 |           1 |       00:01:53 |       40.00% |       31.50% |       2.0212 |       1.6607 |      1.0000e-
|       1 |          30 |       00:07:20 |       93.33% |       97.00% |       0.0712 |       0.0708 |      1.0000e-
|       1 |          50 |       00:10:06 |      100.00% |              |       0.0449 |              |      1.0000e-
|       2 |          60 |       00:12:59 |      100.00% |      100.00% |       0.0150 |       0.0048 |      1.0000e-
|       2 |          90 |       00:18:44 |      100.00% |      100.00% |       0.0096 |       0.0025 |      1.0000e-
|       2 |         100 |       00:20:06 |      100.00% |              |       0.0010 |              |      1.0000e-
|       3 |         120 |       00:24:18 |      100.00% |      100.00% |       0.0012 |       0.0019 |      1.0000e-
|       3 |         150 |       00:29:58 |      100.00% |      100.00% |       0.0017 |       0.0007 |      1.0000e-
|       4 |         180 |       00:35:22 |      100.00% |      100.00% |       0.0010 |       0.0005 |      1.0000e-
|       4 |         200 |       00:37:46 |      100.00% |              |       0.0009 |              |      1.0000e-
|       4 |         210 |       00:40:23 |      100.00% |      100.00% |       0.0015 |       0.0003 |      1.0000e-
|       5 |         240 |       00:45:25 |      100.00% |      100.00% |       0.0019 |       0.0002 |      1.0000e-
|       5 |         250 |       00:46:40 |      100.00% |              |       0.0002 |              |      1.0000e-
|       6 |         270 |       00:50:36 |      100.00% |      100.00% |       0.0022 |       0.0002 |      1.0000e-
|       6 |         300 |       00:55:36 |      100.00% |      100.00% |       0.0020 |       0.0002 |      1.0000e-
|       7 |         330 |       01:00:35 |      100.00% |      100.00% |       0.0090 |       0.0001 |      1.0000e-
|       7 |         350 |       01:03:02 |      100.00% |              |       0.0028 |              |      1.0000e-
|       7 |         360 |       01:05:38 |      100.00% |      100.00% |   4.6025e-05 |       0.0001 |      1.0000e-
|       8 |         390 |       01:10:34 |      100.00% |      100.00% |       0.0135 |       0.0001 |      1.0000e-
|       8 |         400 |       01:11:45 |      100.00% |              |   5.1939e-05 |              |      1.0000e-
|       8 |         420 |       01:15:34 |      100.00% |      100.00% |       0.0040 |   8.9920e-05 |      1.0000e-
|       9 |         450 |       01:20:30 |      100.00% |      100.00% |       0.0002 |   8.6468e-05 |      1.0000e-
|      10 |         480 |       01:25:28 |      100.00% |      100.00% |       0.0006 |   7.5160e-05 |      1.0000e-
|      10 |         500 |       01:27:49 |      100.00% |              |   8.4807e-05 |              |      1.0000e-
|      10 |         510 |       01:30:32 |      100.00% |      100.00% |       0.0026 |   6.3139e-05 |      1.0000e-
|      10 |         530 |       01:34:21 |      100.00% |      100.00% |       0.0022 |   6.5795e-05 |      1.0000e-
|===========================================================================================================
myNet = 
  SeriesNetwork with properties:

         Layers: [25×1 nnet.cnn.layer.Layer]
     InputNames: {'data'}
    OutputNames: {'classoutput'}
```

```
predictedLabels = classify(myNet,testDS)
```

```
predictedLabels = 200×1 categorical
Jio Feature phone
Jio Feature phone
Jio Feature phone
Jio Feature phone
Jio Feature phone
Jio Feature phone
Jio Feature phone
Jio Feature phone
Jio Feature phone
Jio Feature phone
     ⋮
```

```
accuracy = mean(predictedLabels == testDS.Labels)
```

```
accuracy = 1
```

```
accuracy1 = sum(predictedLabels == testDS.Labels) / numel(predictedLabels)
```

```
accuracy1 = 1
```

```
randNum = randi(length(testDS.Files))
```

```
randNum = 163
```

```
imOriginal = readimage(testDS,randNum)
```

```
imOriginal = 227×227×3 uint8 array
imOriginal(:,:,1) =

   172   173   173   175   174   175   177   180   180   179   179   180   180   181   182   183   184   185   184
   174   176   176   176   176   177   180   181   181   180   181   180   181   183   184   183   183   184   184
   176   177   178   177   177   179   181   181   182   182   181   182   182   183   185   184   186   186   187
   177   179   179   179   179   182   182   184   185   185   185   183   184   184   185   185   186   187   185
   178   180   179   179   182   183   183   183   185   186   186   184   183   185   185   188   188   188   187
   180   181   180   181   183   185   185   184   185   186   186   186   186   185   185   187   189   190   189
   179   180   181   182   183   185   186   186   186   186   187   187   187   188   190   189   190   190   189
   181   182   183   183   185   187   188   188   186   187   187   188   188   190   192   191   190   190   191
   180   182   184   183   185   187   189   189   189   189   189   188   190   190   191   193   192   193   194
```

```
    180     182     182     183     185     187     187     188     188     189     189     188     189     190     191     191     192     194     194
    182     183     184     185     185     186     187     189     189     190     191     189     189     190     191     190     191     194     194
    182     185     187     186     186     186     188     189     190     190     190     190     191     193     192     192     194     194     195
    183     186     188     186     185     187     190     191     192     191     192     193     194     194     194     194     194     195     196
    183     186     187     188     187     189     190     193     195     193     192     194     195     195     194     195     196     196     195
    183     187     188     190     189     190     189     191     193     193     193     192     195     194     194     196     195     194     196
    185     187     190     190     190     191     191     189     192     193     192     192     193     195     194     196     195     195     196
    186     187     189     190     190     192     192     191     193     194     194     196     196     195     195     196     195     196     197
    188     188     191     191     190     192     192     193     193     193     194     197     197     195     197     196     197     197     197
    189     189     191     192     192     192     194     194     196     195     196     195     193     196     197     197     198     198     198
    189     190     190     193     193     194     195     195     195     197     196     195     196     197     197     199     198     198     199
    190     191     190     193     196     195     195     195     197     199     197     197     197     197     199     198     198     199     197
    189     191     190     190     194     196     196     196     196     197     197     196     197     197     199     198     199     199     198
    190     192     193     193     195     196     196     196     197     198     199     196     196     197     198     198     197     199     199
    191     192     192     193     196     194     195     195     198     197     198     197     197     198     200     202     200     200     202
    191     192     193     194     196     195     197     198     200     200     199     199     200     200     200     202     201     202     201
    193     194     195     196     197     197     197     195     199     200     201     200     199     199     200     201     201     202     202
    194     195     196     196     198     198     197     197     199     199     200     200     200     200     201     203     202     201     202
    194     195     198     197     199     200     199     199     199     200     200     202     202     202     201     203     204     203     203
    194     196     197     197     199     199     197     199     198     201     201     201     202     203     204     203     205     204     204
    195     196     196     199     201     200     199     200     200     202     200     202     202     204     203     202     202     204     205
    195     198     196     199     200     199     199     198     199     201     203     203     202     205     203     201     204     206     205
    195     198     198     200     200     198     199     198     200     203     205     203     203     204     202     204     205     206     205
    196     199     201     200     201     201     200     199     203     206     205     205     205     205     206     206     206     207     206
    195     199     200     200     202     201     201     201     203     205     205     204     205     205     206     206     206     206     206
    195     199     202     202     202     202     203     201     202     203     205     205     203     205     205     206     208     207     207
    196     199     201     203     201     204     204     203     204     205     205     206     206     206     205     205     208     208     208
    197     199     200     202     202     204     204     205     204     205     207     206     205     206     207     206     207     210     211
    198     200     202     203     203     204     206     206     203     203     206     207     205     207     209     208     208     210     210
    197     200     201     202     202     204     206     207     206     205     207     206     207     208     209     209     210     211     210
    197     201     203     203     202     203     206     205     206     206     209     207     205     207     208     209     211     211     210
    200     203     204     203     201     202     205     207     208     207     208     207     208     209     207     209     211     210     211
    201     203     202     203     203     204     207     208     209     210     209     209     209     208     206     207     210     211     211
    201     202     204     205     206     205     208     209     206     208     209     208     207     207     207     208     211     213     212
    202     202     205     204     206     206     206     208     208     208     210     211     213     212     210     212     212     212     211
      ⋮
```

```
imResized = imresize(imOriginal,inputSize)
```

```
imResized = 227×227×3 uint8 array
imResized(:,:,1) =

    172     173     173     175     174     175     177     180     180     179     179     180     180     181     182     183     184     185     184
    174     176     176     176     176     177     180     181     181     180     181     180     181     183     184     183     183     184     184
    176     177     178     177     177     179     181     181     182     182     181     182     182     183     185     184     186     186     187
    177     179     179     179     179     182     182     184     185     185     185     183     184     184     185     185     186     187     185
    178     180     179     179     182     183     183     183     185     186     186     184     183     185     185     188     188     188     187
    180     181     180     181     183     185     185     184     185     186     186     186     186     185     185     187     189     190     189
    179     180     181     182     183     185     186     186     186     186     187     187     187     188     190     189     190     190     189
    181     182     183     183     185     187     188     188     186     187     187     188     188     190     192     191     190     190     191
    180     182     184     183     185     187     189     189     189     189     189     188     190     190     191     193     192     193     194
    180     182     182     183     185     187     187     188     188     189     189     188     189     190     191     191     192     194     194
    182     183     184     185     185     186     187     189     189     190     191     189     189     190     191     190     191     194     194
    182     185     187     186     186     186     188     189     190     190     190     190     191     193     192     192     194     194     195
    183     186     188     186     185     187     190     191     192     191     192     193     194     194     194     194     194     195     196
    183     186     187     188     187     189     190     193     195     193     192     194     195     195     194     195     196     196     195
    183     187     188     190     189     190     189     191     193     193     193     192     195     194     194     196     195     194     196
    185     187     190     190     190     191     191     189     192     193     192     192     193     195     194     196     195     195     196
    186     187     189     190     190     192     192     191     193     194     194     196     196     195     195     196     195     196     197
    188     188     191     191     190     192     192     193     193     193     194     197     197     195     197     196     197     197     197
    189     189     191     192     192     192     194     194     196     195     196     195     193     196     197     197     198     198     198
    189     190     190     193     193     194     195     195     195     197     196     195     196     197     197     199     198     198     199
    190     191     190     193     196     195     195     195     197     199     197     197     197     197     199     198     198     199     197
    189     191     190     190     194     196     196     196     196     197     197     196     197     197     199     198     199     199     198
```

```
   190   192   193   193   195   196   196   196   197   198   199   196   196   197   198   198   197   199   199
   191   192   192   193   196   194   195   195   198   197   198   197   197   198   200   202   200   200   202
   191   192   193   194   196   195   197   198   200   200   199   199   200   200   200   202   201   202   201
   193   194   195   196   197   197   197   195   199   200   201   200   199   199   200   201   201   202   202
   194   195   196   196   198   198   197   197   199   199   200   200   200   200   201   203   202   201   202
   194   195   198   197   199   200   199   199   199   200   200   202   202   202   201   203   204   203   203
   194   196   197   197   199   199   197   199   198   201   201   201   202   203   204   203   205   204   204
   195   196   196   199   201   200   199   200   200   202   200   202   202   204   203   202   202   204   205
   195   198   196   199   200   199   199   198   199   201   203   203   202   205   203   201   204   206   205
   195   198   198   200   200   198   199   198   200   203   205   203   203   204   202   204   205   206   205
   196   199   201   200   201   201   200   199   203   206   205   205   205   205   206   206   206   207   206
   195   199   200   200   202   201   201   201   203   205   205   204   205   205   206   206   206   206   206
   195   199   202   202   202   202   203   201   202   203   205   205   203   205   205   206   208   207   207
   196   199   201   203   201   204   204   203   204   205   205   206   206   206   205   205   208   208   208
   197   199   200   202   202   204   204   205   204   205   207   206   205   206   207   206   207   210   211
   198   200   202   203   203   204   206   206   203   203   206   207   205   207   209   208   208   210   210
   197   200   201   202   202   204   206   207   206   205   207   206   207   208   209   209   210   211   210
   197   201   203   203   202   203   206   205   206   206   209   207   205   207   208   209   211   211   210
   200   203   204   203   201   202   205   207   208   207   208   207   208   209   207   209   211   210   211
   201   203   202   203   203   204   207   208   209   210   209   209   209   208   206   207   210   211   211
   201   202   204   205   206   205   208   209   206   208   209   208   207   207   207   208   211   213   212
   202   202   205   204   206   206   206   208   208   208   210   211   213   212   210   212   212   212   211
     ⋮
```

```
actualLabel = testDS.Labels(randNum)
```

```
actualLabel = categorical
     Oppo Mobile phone
```

```
predicted = classify(myNet,imResized)
```

```
predicted = categorical
     Oppo Mobile phone
```

```
imshow(imOriginal)
title(['PREDICTED:'  char(predicted) 'ACTUAL:' char(actualLabel)],'Interpreter','none')
```

ICTED:Oppo Mobile phoneACTUAL:Oppo Mobile p

```
URL = 'https://images.indianexpress.com/2020/07/OnePlus-Nord-back-759.jpg?w=759'
```

```
URL = 
'https://images.indianexpress.com/2020/07/OnePlus-Nord-back-759.jpg?w=759'
```

```
filename = 'oneplus.jpg'
```

```
filename = 
'oneplus.jpg'
```

```
websave(filename,URL)
```

```
ans = 
'C:\Users\HP\OneDrive\Desktop\mobiles\oneplus.jpg'
```

```
im = imread(filename)
```

```
im = 422×759×3 uint8 array
im(:,:,1) =

    70    70    70    70    70    70    70    70    69    67    66    67    70    71    70    68    73    73    73
   129   129   129   129   129   129   129   129   129   127   126   127   130   131   130   128   132   132   132
   135   135   135   135   135   135   135   135   135   133   132   133   136   137   136   134   137   137   137
   132   132   132   132   132   132   132   132   132   131   129   131   133   134   133   132   133   133   133
   143   143   143   143   143   143   143   143   144   142   141   142   145   146   145   143   144   144   144
   139   139   139   139   139   139   139   139   140   138   137   138   141   142   141   139   140   140   140
   142   142   142   142   142   142   142   142   143   142   141   142   144   145   144   143   145   145   145
   146   146   146   146   146   146   146   146   147   145   144   146   148   149   148   146   149   149   149
   146   147   148   149   150   150   149   149   150   150   150   150   150   150   150   150   151   151   152
   149   149   151   152   152   152   151   151   151   151   151   151   151   151   151   151   153   153   152
   151   152   153   154   155   155   154   154   152   152   152   152   152   152   152   152   156   155   153
   153   154   155   156   157   156   156   156   155   155   155   155   155   155   155   155   160   158   155
   154   155   156   157   157   157   157   156   157   157   157   157   157   157   157   157   162   160   158
     ⋮
```

```
im = imresize(im,inputSize)
```

```
im = 227×227×3 uint8 array
im(:,:,1) =

    95    95    94    93    95    98    98    98    98    98    97    97    99    98    95    94    96    97   100
   136   136   135   135   137   138   138   138   138   138   137   138   138   136   137   140   137   137   140
   140   140   140   140   142   141   141   141   141   141   141   141   141   140   142   143   140   142   143
   142   142   142   143   144   145   145   145   145   145   146   146   144   145   147   145   145   147   147
   147   149   149   149   150   151   150   151   151   151   152   152   151   152   152   149   151   152   153
   151   154   153   152   153   153   152   154   155   155   155   156   155   155   154   153   156   155   155
   155   157   156   156   157   157   157   160   159   159   159   159   159   159   157   159   161   161   158
   158   160   160   160   160   162   163   164   164   164   163   163   164   164   162   165   164   165   162
   163   165   165   164   163   166   167   167   168   167   165   164   165   166   167   169   166   168   165
   168   170   170   169   167   169   170   169   171   170   167   163   166   166   172   171   169   172   170
   173   174   173   172   171   171   173   173   173   173   169   170   172   167   175   171   174   176   175
   176   175   176   177   175   173   175   177   176   176   176   176   177   174   178   173   177   177   179
   177   175   177   180   176   178   179   179   177   177   181   179   178   179   179   176   178   178   180
   180   179   180   179   175   179   181   181   180   182   184   182   181   182   180   181   182   182   182
   181   181   182   179   179   183   183   182   182   183   185   184   186   183   182   184   186   182   182
   184   184   184   181   184   185   185   183   183   185   188   189   188   185   184   185   186   183   184
   186   186   186   184   185   185   184   184   185   186   190   191   189   188   188   188   187   183   188
   186   186   186   185   187   186   183   183   185   186   186   189   187   189   190   190   184   183   190
   186   187   186   186   187   182   183   181   182   188   188   189   185   190   190   190   187   187   190
   187   188   186   186   187   186   186   179   186   188   191   190   189   190   189   190   192   192   191
   188   185   187   186   189   188   186   183   190   189   190   188   190   188   190   190   193   193   192
   188   186   189   187   189   188   185   189   190   192   189   188   190   189   191   189   193   193   190
   188   189   190   190   189   189   188   189   190   191   190   190   189   191   191   188   191   191   186
   189   190   189   190   190   189   189   189   190   191   191   191   188   192   185   190   191   191   189
   190   188   190   191   191   189   190   190   190   191   192   192   190   190   183   192   193   193   195
   190   187   191   191   191   189   191   191   190   191   192   192   192   191   193   193   192   192   195
   189   187   192   192   192   191   191   192   192   192   192   192   192   192   191   192   193   191   197
   190   190   191   192   192   191   191   192   189   190   189   190   192   192   191   192   187   192   197
   190   190   191   192   192   191   191   192   183   193   189   190   192   192   191   192   188   195   194
   189   187   192   192   192   191   191   190   186   194   192   192   192   192   191   192   193   193   194
   189   188   190   191   191   191   193   191   191   192   192   192   192   193   192   193   194   193   194
   188   188   189   189   189   194   192   190   190   189   192   192   192   192   192   192   194   192   194
   189   188   188   187   188   195   192   192   186   190   192   192   193   191   190   192   195   191   193
   193   188   190   188   191   193   193   192   187   192   192   192   192   190   187   195   193   189   193
   191   190   191   190   192   190   193   191   191   190   193   194   194   187   187   195   193   190   193
   189   191   190   190   190   191   192   190   191   188   192   194   194   186   191   194   192   191   193
   190   190   188   190   190   191   191   190   192   189   192   194   192   187   194   193   190   192   192
   191   190   188   189   187   190   190   191   189   191   193   194   190   190   196   191   190   194   192
   191   190   190   189   187   190   188   193   187   193   191   192   190   193   194   190   192   196   192
   189   189   190   189   189   189   190   192   188   192   189   194   190   195   194   190   195   195   194
   190   190   191   186   186   185   192   187   191   189   192   193   190   195   190   192   194   194   191
   191   191   190   187   185   186   192   187   191   188   192   190   193   192   189   194   195   194   184
   191   191   188   188   185   191   190   190   189   186   189   191   194   192   192   194   195   186   186
   191   190   189   187   189   191   187   191   192   191   191   193   193   192   192   192   194   183   191
     ⋮
```

```
label = classify(myNet,im)
```

```
label = categorical
     One Plus Nord phone
```

```
imshow(im)
title(['PREDICTED:' char(label)],'Interpreter','none')
```