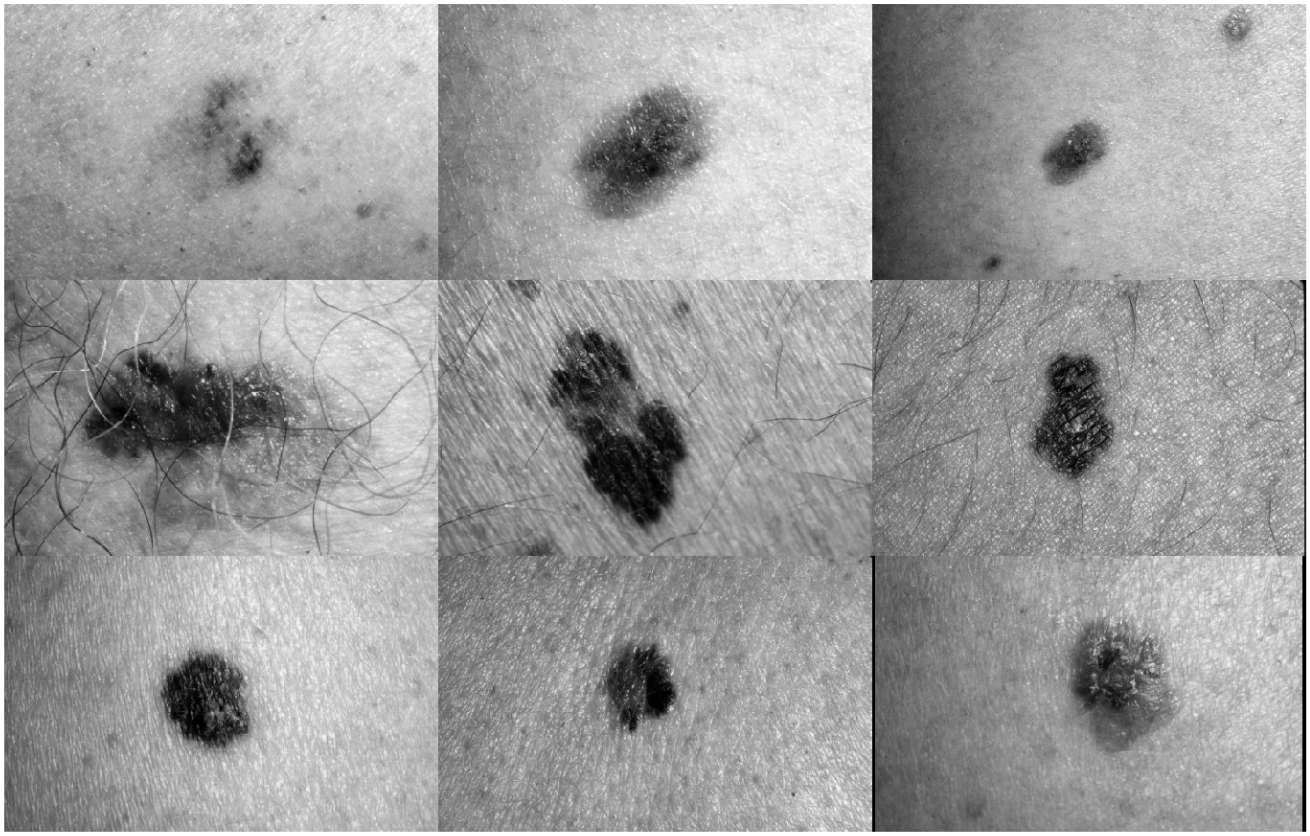
```
clc;
close all;
clear all
% Read the image and corresponding threshold value from .csv file for training and testing
trainingData = readtable("Train.csv");
X_Train = trainingData.Name;
testingData = readtable("Test.csv");
X_Test = testingData.Name;
```

```
% Threshold value for testing and training
Y_Train = trainingData.Value;
Y_Test = testingData.Value;
fn = X_Train{1};
size(imread(fn));
```

```
% Display 9 sample images from the database
imds = imageDatastore(X_Train(1:9));
montage(imds)
```



```
trainds = augmentedImageDatastore([224 224],trainingData);
testds = augmentedImageDatastore([224 224],testingData);
```

```
%DTP-Net Layers

layers = [
    imageInputLayer([224 224 1])
    convolution2dLayer(3,8,'Padding','same')
    convolution2dLayer(3,8,'Padding','same')
    batchNormalizationLayer
    reluLayer
    maxPooling2dLayer(2,'Stride',2)
    convolution2dLayer(3,16,'Padding','same')
    convolution2dLayer(3,16,'Padding','same')
    batchNormalizationLayer
    reluLayer
    maxPooling2dLayer(2,'Stride',2)
    convolution2dLayer(3,32,'Padding','same')
    convolution2dLayer(3,32,'Padding','same')
    batchNormalizationLayer
    reluLayer
    maxPooling2dLayer(2,'Stride',2)
    convolution2dLayer(3,64,'Padding','same')
    convolution2dLayer(3,64,'Padding','same')
    batchNormalizationLayer
    reluLayer
    maxPooling2dLayer(2,'Stride',2)
    convolution2dLayer(3,128,'Padding','same')
    convolution2dLayer(3,128,'Padding','same')
    batchNormalizationLayer
    reluLayer
    convolution2dLayer(3,256,'Padding','same')
    batchNormalizationLayer
    reluLayer
    dropoutLayer(0.2)
    fullyConnectedLayer(1)
    regressionLayer];
```

```
options = trainingOptions("sgdm","MaxEpochs",150,"InitialLearnRate",0.0001,'Shuffle','every-epo
    'MiniBatchSize',64)
```

```
options =
  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: 150
                   MiniBatchSize: 64
                         Verbose: 1
```

```
                VerboseFrequency: 50
                  ValidationData: []
             ValidationFrequency: 50
              ValidationPatience: Inf
                         Shuffle: 'every-epoch'
                  CheckpointPath: ''
             CheckpointFrequency: 1
          CheckpointFrequencyUnit: 'epoch'
             ExecutionEnvironment: 'auto'
                       WorkerLoad: []
                        OutputFcn: []
                            Plots: 'none'
                   SequenceLength: 'longest'
             SequencePaddingValue: 0
          SequencePaddingDirection: 'right'
              DispatchInBackground: 0
           ResetInputNormalization: 1
     BatchNormalizationStatistics: 'population'
                  OutputNetwork: 'last-iteration'
```

```
% options = trainingOptions("sgdm","MaxEpochs",500,"InitialLearnRate",0.0001, ...
%     'ValidationData',{validds,YValid},'ValidationFrequency',10, ...
%     'MiniBatchSize',8,'Plots','training-progress')


% miniBatchSize  = 128;
% validationFrequency = floor(numel(YTrain)/miniBatchSize);
% options = trainingOptions('sgdm', ...
%     'MiniBatchSize',miniBatchSize, ...
%     'MaxEpochs',30, ...
%     'InitialLearnRate',1e-3, ...
%     'LearnRateSchedule','piecewise', ...
%     'LearnRateDropFactor',0.1, ...
%     'LearnRateDropPeriod',20, ...
%     'Shuffle','every-epoch', ...
%     'ValidationData',{testds,YTrain}, ...
%     'ValidationFrequency',validationFrequency, ...
%     'Plots','training-progress', ...
%     'Verbose',false);
```

```
%Train the DTP-Net
ccnet = trainNetwork(trainds,layers,options)
```

```
Training on single GPU.
Initializing input data normalization.
|=========================================================================================|
|  Epoch  |  Iteration  |  Time Elapsed  |  Mini-batch  |  Mini-batch  |  Base Learning  |
|         |             |   (hh:mm:ss)   |     RMSE     |     Loss     |      Rate       |
|=========================================================================================|
|       1 |           1 |       00:00:25 |       120.00 |       7199.5 |      1.0000e-04 |
|       1 |          50 |       00:00:46 |        26.10 |        340.5 |      1.0000e-04 |
|       2 |         100 |       00:01:19 |        20.91 |        218.6 |      1.0000e-04 |
|       3 |         150 |       00:01:51 |        21.26 |        225.9 |      1.0000e-04 |
|       3 |         200 |       00:02:12 |        30.24 |        457.3 |      1.0000e-04 |
```

|  4 |  250 | 00:02:44 | 23.98 | 287.5 | 1.0000e-04 |
|---|---|---|---|---|---|
|  5 |  300 | 00:03:17 | 27.63 | 381.6 | 1.0000e-04 |
|  5 |  350 | 00:03:44 | 18.04 | 162.7 | 1.0000e-04 |
|  6 |  400 | 00:04:19 | 21.49 | 230.8 | 1.0000e-04 |
|  7 |  450 | 00:04:54 | 21.21 | 224.9 | 1.0000e-04 |
|  8 |  500 | 00:05:28 | 17.06 | 145.5 | 1.0000e-04 |
|  8 |  550 | 00:05:48 | 23.39 | 273.5 | 1.0000e-04 |
|  9 |  600 | 00:06:24 | 16.75 | 140.2 | 1.0000e-04 |
| 10 |  650 | 00:07:00 | 21.18 | 224.4 | 1.0000e-04 |
| 10 |  700 | 00:07:22 | 20.61 | 212.4 | 1.0000e-04 |
| 11 |  750 | 00:07:55 | 14.55 | 105.8 | 1.0000e-04 |
| 12 |  800 | 00:08:29 | 16.74 | 140.2 | 1.0000e-04 |
| 12 |  850 | 00:08:49 | 16.24 | 131.8 | 1.0000e-04 |
| 13 |  900 | 00:09:21 | 20.38 | 207.7 | 1.0000e-04 |
| 14 |  950 | 00:09:55 | 16.13 | 130.1 | 1.0000e-04 |
| 15 | 1000 | 00:10:27 | 18.19 | 165.4 | 1.0000e-04 |
| 15 | 1050 | 00:10:52 | 15.35 | 117.8 | 1.0000e-04 |
| 16 | 1100 | 00:11:26 | 15.07 | 113.6 | 1.0000e-04 |
| 17 | 1150 | 00:11:59 | 17.14 | 146.9 | 1.0000e-04 |
| 17 | 1200 | 00:12:21 | 19.83 | 196.6 | 1.0000e-04 |
| 18 | 1250 | 00:12:56 | 16.62 | 138.1 | 1.0000e-04 |
| 19 | 1300 | 00:13:29 | 16.54 | 136.8 | 1.0000e-04 |
| 20 | 1350 | 00:14:05 | 15.38 | 118.3 | 1.0000e-04 |
| 20 | 1400 | 00:14:26 | 15.06 | 113.4 | 1.0000e-04 |
| 21 | 1450 | 00:15:00 | 15.89 | 126.2 | 1.0000e-04 |
| 22 | 1500 | 00:15:34 | 13.46 |  90.5 | 1.0000e-04 |
| 22 | 1550 | 00:15:55 | 14.41 | 103.9 | 1.0000e-04 |
| 23 | 1600 | 00:16:30 | 20.08 | 201.7 | 1.0000e-04 |
| 24 | 1650 | 00:17:02 | 13.97 |  97.5 | 1.0000e-04 |
| 24 | 1700 | 00:17:22 | 14.05 |  98.8 | 1.0000e-04 |
| 25 | 1750 | 00:17:56 | 15.62 | 122.0 | 1.0000e-04 |
| 26 | 1800 | 00:18:29 | 19.85 | 197.1 | 1.0000e-04 |
| 27 | 1850 | 00:19:06 | 15.67 | 122.7 | 1.0000e-04 |
| 27 | 1900 | 00:19:26 | 14.37 | 103.3 | 1.0000e-04 |
| 28 | 1950 | 00:20:00 | 18.43 | 169.8 | 1.0000e-04 |
| 29 | 2000 | 00:20:35 | 15.87 | 125.9 | 1.0000e-04 |
| 29 | 2050 | 00:20:56 | 13.35 |  89.2 | 1.0000e-04 |
| 30 | 2100 | 00:21:26 | 13.20 |  87.2 | 1.0000e-04 |
| 31 | 2150 | 00:21:57 | 15.07 | 113.5 | 1.0000e-04 |
| 31 | 2200 | 00:22:18 | 14.78 | 109.3 | 1.0000e-04 |
| 32 | 2250 | 00:22:53 | 19.06 | 181.6 | 1.0000e-04 |
| 33 | 2300 | 00:23:20 | 18.95 | 179.6 | 1.0000e-04 |
| 34 | 2350 | 00:23:45 | 12.14 |  73.6 | 1.0000e-04 |
| 34 | 2400 | 00:24:00 | 20.26 | 205.2 | 1.0000e-04 |
| 35 | 2450 | 00:24:22 | 14.61 | 106.7 | 1.0000e-04 |
| 36 | 2500 | 00:24:44 | 14.72 | 108.4 | 1.0000e-04 |
| 36 | 2550 | 00:25:00 | 15.78 | 124.6 | 1.0000e-04 |
| 37 | 2600 | 00:25:21 | 17.79 | 158.2 | 1.0000e-04 |
| 38 | 2650 | 00:25:43 | 12.36 |  76.3 | 1.0000e-04 |
| 39 | 2700 | 00:26:04 | 12.68 |  80.4 | 1.0000e-04 |
| 39 | 2750 | 00:26:19 | 15.07 | 113.5 | 1.0000e-04 |
| 40 | 2800 | 00:26:42 | 15.49 | 120.0 | 1.0000e-04 |
| 41 | 2850 | 00:27:04 | 15.21 | 115.6 | 1.0000e-04 |
| 41 | 2900 | 00:27:19 | 12.82 |  82.2 | 1.0000e-04 |
| 42 | 2950 | 00:27:40 | 14.44 | 104.2 | 1.0000e-04 |
| 43 | 3000 | 00:28:02 | 11.99 |  71.8 | 1.0000e-04 |
| 43 | 3050 | 00:28:18 | 11.99 |  71.9 | 1.0000e-04 |
| 44 | 3100 | 00:28:40 | 11.24 |  63.2 | 1.0000e-04 |
| 45 | 3150 | 00:29:01 | 12.75 |  81.3 | 1.0000e-04 |
| 46 | 3200 | 00:29:23 | 12.54 |  78.7 | 1.0000e-04 |
| 46 | 3250 | 00:29:38 | 10.38 |  53.9 | 1.0000e-04 |
| 47 | 3300 | 00:30:00 | 13.23 |  87.5 | 1.0000e-04 |
| 48 | 3350 | 00:30:22 | 16.12 | 130.0 | 1.0000e-04 |
| 48 | 3400 | 00:30:37 | 15.04 | 113.1 | 1.0000e-04 |

|      49 |        3450 |       00:30:58 |        15.60 |        121.7 |      1.0000e-04 |
|      50 |        3500 |       00:31:19 |        14.23 |        101.2 |      1.0000e-04 |
|      50 |        3550 |       00:31:35 |        16.99 |        144.3 |      1.0000e-04 |
|      51 |        3600 |       00:31:56 |        13.63 |         92.8 |      1.0000e-04 |
|      52 |        3650 |       00:32:18 |        14.12 |         99.7 |      1.0000e-04 |
|      53 |        3700 |       00:32:39 |        12.64 |         79.9 |      1.0000e-04 |
|      53 |        3750 |       00:32:55 |        16.50 |        136.1 |      1.0000e-04 |
|      54 |        3800 |       00:33:17 |        17.13 |        146.7 |      1.0000e-04 |
|      55 |        3850 |       00:33:39 |        16.60 |        137.7 |      1.0000e-04 |
|      55 |        3900 |       00:33:54 |        10.02 |         50.2 |      1.0000e-04 |
|      56 |        3950 |       00:34:15 |        13.24 |         87.6 |      1.0000e-04 |
|      57 |        4000 |       00:34:38 |        12.79 |         81.8 |      1.0000e-04 |
|      58 |        4050 |       00:34:59 |        13.14 |         86.3 |      1.0000e-04 |
|      58 |        4100 |       00:35:15 |        13.73 |         94.3 |      1.0000e-04 |
|      59 |        4150 |       00:35:37 |        10.30 |         53.0 |      1.0000e-04 |
|      60 |        4200 |       00:35:58 |         9.66 |         46.7 |      1.0000e-04 |
|      60 |        4250 |       00:36:14 |        13.90 |         96.6 |      1.0000e-04 |
|      61 |        4300 |       00:36:35 |        15.09 |        113.8 |      1.0000e-04 |
|      62 |        4350 |       00:36:57 |        14.81 |        109.7 |      1.0000e-04 |
|      62 |        4400 |       00:37:12 |        15.76 |        124.2 |      1.0000e-04 |
|      63 |        4450 |       00:37:33 |        10.67 |         56.9 |      1.0000e-04 |
|      64 |        4500 |       00:37:55 |        11.69 |         68.3 |      1.0000e-04 |
|      65 |        4550 |       00:38:16 |        12.01 |         72.1 |      1.0000e-04 |
|      65 |        4600 |       00:38:31 |         8.12 |         33.0 |      1.0000e-04 |
|      66 |        4650 |       00:38:52 |         9.89 |         48.9 |      1.0000e-04 |
|      67 |        4700 |       00:39:14 |        14.33 |        102.6 |      1.0000e-04 |
|      67 |        4750 |       00:39:29 |         8.81 |         38.8 |      1.0000e-04 |
|      68 |        4800 |       00:39:51 |        11.60 |         67.3 |      1.0000e-04 |
|      69 |        4850 |       00:40:12 |        14.44 |        104.3 |      1.0000e-04 |
|      70 |        4900 |       00:40:33 |         9.13 |         41.7 |      1.0000e-04 |
|      70 |        4950 |       00:40:48 |        10.83 |         58.7 |      1.0000e-04 |
|      71 |        5000 |       00:41:09 |         7.94 |         31.5 |      1.0000e-04 |
|      72 |        5050 |       00:41:30 |        10.37 |         53.8 |      1.0000e-04 |
|      72 |        5100 |       00:41:46 |         8.83 |         39.0 |      1.0000e-04 |
|      73 |        5150 |       00:42:07 |        15.56 |        121.0 |      1.0000e-04 |
|      74 |        5200 |       00:42:28 |        10.83 |         58.6 |      1.0000e-04 |
|      74 |        5250 |       00:42:43 |        12.35 |         76.3 |      1.0000e-04 |
|      75 |        5300 |       00:43:07 |         9.94 |         49.4 |      1.0000e-04 |
|      76 |        5350 |       00:43:30 |         8.48 |         36.0 |      1.0000e-04 |
|      77 |        5400 |       00:43:53 |         9.51 |         45.3 |      1.0000e-04 |
|      77 |        5450 |       00:44:09 |        15.43 |        119.0 |      1.0000e-04 |
|      78 |        5500 |       00:44:30 |        10.21 |         52.1 |      1.0000e-04 |
|      79 |        5550 |       00:44:52 |        11.61 |         67.4 |      1.0000e-04 |
|      79 |        5600 |       00:45:07 |         8.71 |         38.0 |      1.0000e-04 |
|      80 |        5650 |       00:45:28 |         8.39 |         35.2 |      1.0000e-04 |
|      81 |        5700 |       00:45:50 |         8.49 |         36.1 |      1.0000e-04 |
|      81 |        5750 |       00:46:06 |        11.51 |         66.2 |      1.0000e-04 |
|      82 |        5800 |       00:46:27 |         9.96 |         49.6 |      1.0000e-04 |
|      83 |        5850 |       00:46:48 |        12.15 |         73.8 |      1.0000e-04 |
|      84 |        5900 |       00:47:09 |        12.59 |         79.3 |      1.0000e-04 |
|      84 |        5950 |       00:47:24 |         9.86 |         48.6 |      1.0000e-04 |
|      85 |        6000 |       00:47:52 |        10.37 |         53.8 |      1.0000e-04 |
|      86 |        6050 |       00:48:15 |         9.75 |         47.5 |      1.0000e-04 |
|      86 |        6100 |       00:48:31 |        13.21 |         87.3 |      1.0000e-04 |
|      87 |        6150 |       00:48:52 |         9.28 |         43.1 |      1.0000e-04 |
|      88 |        6200 |       00:49:14 |        11.13 |         62.0 |      1.0000e-04 |
|      89 |        6250 |       00:49:36 |         8.10 |         32.8 |      1.0000e-04 |
|      89 |        6300 |       00:49:51 |        14.92 |        111.3 |      1.0000e-04 |
|      90 |        6350 |       00:50:12 |         9.60 |         46.1 |      1.0000e-04 |
|      91 |        6400 |       00:50:34 |        10.46 |         54.7 |      1.0000e-04 |
|      91 |        6450 |       00:50:51 |        12.38 |         76.6 |      1.0000e-04 |
|      92 |        6500 |       00:51:14 |         7.07 |         25.0 |      1.0000e-04 |
|      93 |        6550 |       00:51:37 |         6.39 |         20.4 |      1.0000e-04 |
|      93 |        6600 |       00:51:53 |         8.16 |         33.3 |      1.0000e-04 |

|  94 |  6650 | 00:52:15 | 11.49 |  66.0 | 1.0000e-04 |
|  95 |  6700 | 00:52:36 | 11.40 |  65.0 | 1.0000e-04 |
|  96 |  6750 | 00:52:58 |  7.83 |  30.6 | 1.0000e-04 |
|  96 |  6800 | 00:53:14 |  7.70 |  29.6 | 1.0000e-04 |
|  97 |  6850 | 00:53:35 |  8.71 |  38.0 | 1.0000e-04 |
|  98 |  6900 | 00:53:57 |  8.29 |  34.4 | 1.0000e-04 |
|  98 |  6950 | 00:54:12 | 10.66 |  56.8 | 1.0000e-04 |
|  99 |  7000 | 00:54:33 |  8.49 |  36.0 | 1.0000e-04 |
| 100 |  7050 | 00:54:54 | 10.57 |  55.9 | 1.0000e-04 |
| 100 |  7100 | 00:55:09 |  6.89 |  23.7 | 1.0000e-04 |
| 101 |  7150 | 00:55:30 |  8.74 |  38.2 | 1.0000e-04 |
| 102 |  7200 | 00:55:51 |  8.96 |  40.2 | 1.0000e-04 |
| 103 |  7250 | 00:56:12 |  8.97 |  40.3 | 1.0000e-04 |
| 103 |  7300 | 00:56:27 | 10.09 |  50.9 | 1.0000e-04 |
| 104 |  7350 | 00:56:48 |  9.61 |  46.2 | 1.0000e-04 |
| 105 |  7400 | 00:57:10 |  7.44 |  27.7 | 1.0000e-04 |
| 105 |  7450 | 00:57:25 | 10.12 |  51.2 | 1.0000e-04 |
| 106 |  7500 | 00:57:47 | 12.70 |  80.7 | 1.0000e-04 |
| 107 |  7550 | 00:58:09 |  9.48 |  45.0 | 1.0000e-04 |
| 108 |  7600 | 00:58:30 |  7.87 |  31.0 | 1.0000e-04 |
| 108 |  7650 | 00:58:46 |  7.43 |  27.6 | 1.0000e-04 |
| 109 |  7700 | 00:59:07 |  8.78 |  38.5 | 1.0000e-04 |
| 110 |  7750 | 00:59:28 |  9.41 |  44.3 | 1.0000e-04 |
| 110 |  7800 | 00:59:44 |  9.62 |  46.3 | 1.0000e-04 |
| 111 |  7850 | 01:00:05 |  7.97 |  31.8 | 1.0000e-04 |
| 112 |  7900 | 01:00:26 | 10.08 |  50.8 | 1.0000e-04 |
| 112 |  7950 | 01:00:41 |  8.36 |  35.0 | 1.0000e-04 |
| 113 |  8000 | 01:01:02 |  8.17 |  33.4 | 1.0000e-04 |
| 114 |  8050 | 01:01:22 |  8.43 |  35.6 | 1.0000e-04 |
| 115 |  8100 | 01:01:43 |  6.94 |  24.1 | 1.0000e-04 |
| 115 |  8150 | 01:01:58 |  8.61 |  37.1 | 1.0000e-04 |
| 116 |  8200 | 01:02:24 |  8.17 |  33.4 | 1.0000e-04 |
| 117 |  8250 | 01:02:45 |  8.32 |  34.7 | 1.0000e-04 |
| 117 |  8300 | 01:03:00 |  9.05 |  41.0 | 1.0000e-04 |
| 118 |  8350 | 01:03:21 |  8.19 |  33.5 | 1.0000e-04 |
| 119 |  8400 | 01:03:42 |  6.66 |  22.2 | 1.0000e-04 |
| 120 |  8450 | 01:04:03 |  6.72 |  22.6 | 1.0000e-04 |
| 120 |  8500 | 01:04:23 |  7.27 |  26.5 | 1.0000e-04 |
| 121 |  8550 | 01:04:44 |  8.52 |  36.3 | 1.0000e-04 |
| 122 |  8600 | 01:05:05 |  4.62 |  10.7 | 1.0000e-04 |
| 122 |  8650 | 01:05:20 |  5.39 |  14.5 | 1.0000e-04 |
| 123 |  8700 | 01:05:41 |  8.48 |  36.0 | 1.0000e-04 |
| 124 |  8750 | 01:06:01 |  9.24 |  42.6 | 1.0000e-04 |
| 124 |  8800 | 01:06:17 |  6.57 |  21.6 | 1.0000e-04 |
| 125 |  8850 | 01:06:37 |  7.65 |  29.2 | 1.0000e-04 |
| 126 |  8900 | 01:06:58 |  5.75 |  16.5 | 1.0000e-04 |
| 127 |  8950 | 01:07:19 |  6.76 |  22.9 | 1.0000e-04 |
| 127 |  9000 | 01:07:34 |  6.57 |  21.6 | 1.0000e-04 |
| 128 |  9050 | 01:07:55 | 10.22 |  52.2 | 1.0000e-04 |
| 129 |  9100 | 01:08:16 |  6.95 |  24.2 | 1.0000e-04 |
| 129 |  9150 | 01:08:31 |  5.84 |  17.1 | 1.0000e-04 |
| 130 |  9200 | 01:08:52 |  7.00 |  24.5 | 1.0000e-04 |
| 131 |  9250 | 01:09:12 |  6.69 |  22.4 | 1.0000e-04 |
| 131 |  9300 | 01:09:28 |  7.96 |  31.7 | 1.0000e-04 |
| 132 |  9350 | 01:09:48 |  7.62 |  29.1 | 1.0000e-04 |
| 133 |  9400 | 01:10:09 | 12.98 |  84.3 | 1.0000e-04 |
| 134 |  9450 | 01:10:30 |  6.36 |  20.2 | 1.0000e-04 |
| 134 |  9500 | 01:10:45 |  7.92 |  31.3 | 1.0000e-04 |
| 135 |  9550 | 01:11:05 |  6.86 |  23.5 | 1.0000e-04 |
| 136 |  9600 | 01:11:26 |  6.18 |  19.1 | 1.0000e-04 |
| 136 |  9650 | 01:11:41 |  6.27 |  19.7 | 1.0000e-04 |
| 137 |  9700 | 01:12:02 |  5.62 |  15.8 | 1.0000e-04 |
| 138 |  9750 | 01:12:23 |  5.71 |  16.3 | 1.0000e-04 |
| 139 |  9800 | 01:12:44 |  7.27 |  26.4 | 1.0000e-04 |

```
|     139 |        9850 |       01:12:59 |         8.49 |         36.1 |      1.0000e-04 |
|     140 |        9900 |       01:13:20 |         6.30 |         19.9 |      1.0000e-04 |
|     141 |        9950 |       01:13:41 |         8.12 |         33.0 |      1.0000e-04 |
|     141 |       10000 |       01:13:56 |         5.66 |         16.0 |      1.0000e-04 |
|     142 |       10050 |       01:14:16 |         4.88 |         11.9 |      1.0000e-04 |
|     143 |       10100 |       01:14:37 |         6.01 |         18.1 |      1.0000e-04 |
|     143 |       10150 |       01:14:52 |         7.31 |         26.7 |      1.0000e-04 |
|     144 |       10200 |       01:15:13 |         5.69 |         16.2 |      1.0000e-04 |
|     145 |       10250 |       01:15:34 |         9.71 |         47.1 |      1.0000e-04 |
|     146 |       10300 |       01:15:54 |         5.62 |         15.8 |      1.0000e-04 |
|     146 |       10350 |       01:16:09 |         7.43 |         27.6 |      1.0000e-04 |
|     147 |       10400 |       01:16:30 |         4.81 |         11.6 |      1.0000e-04 |
|     148 |       10450 |       01:16:51 |         9.50 |         45.1 |      1.0000e-04 |
|     148 |       10500 |       01:17:06 |        11.22 |         62.9 |      1.0000e-04 |
|     149 |       10550 |       01:17:27 |         6.55 |         21.4 |      1.0000e-04 |
|     150 |       10600 |       01:17:48 |         9.70 |         47.0 |      1.0000e-04 |
|     150 |       10650 |       01:18:03 |         9.32 |         43.5 |      1.0000e-04 |
|=========================================================================================|
Training finished: Max epochs completed.
ccnet =
  SeriesNetwork with properties:

         Layers: [31×1 nnet.cnn.layer.Layer]
     InputNames: {'imageinput'}
    OutputNames: {'regressionoutput'}
```

```
% Prediction of Threshold value using the trained DTP-Net
Train_Predicted = predict(ccnet,trainds);
Test_Predicted = predict(ccnet,testds);

% Error estimation
Train_predictionError = Y_Train - Train_Predicted;
Test_predictionError = Y_Test - Test_Predicted;
```

```
% Evalaution for training data
Train_Pred_mae = errperf(Y_Train,Train_Predicted,'mae')
```

```
Train_Pred_mae = single

    5.1116
```

```
Train_Pred_mse = errperf(Y_Train,Train_Predicted,'mse')
```

```
Train_Pred_mse = single

    40.5576
```

```
Train_Pred_rmse = errperf(Y_Train,Train_Predicted,'rmse')
```

```
Train_Pred_rmse = single

    6.3685
```

```
%Train_Pred_mare = errperf(Y_Train,Train_Predicted,'mare')
%Train_Pred_msre = errperf(Y_Train,Train_Predicted,'msre')
%Train_Pred_rmsre = errperf(Y_Train,Train_Predicted,'rmsre')
%Train_Pred_mape = errperf(Y_Train,Train_Predicted,'mape')
```

```
%Train_Pred_mspe = errperf(Y_Train,Train_Predicted,'mspe')
%Train_Pred_rmspe = errperf(Y_Train,Train_Predicted,'rmspe')
```

```
% Evalaution for test data
Test_Pred_mae = errperf(Y_Test,Test_Predicted,'mae')
```

```
Test_Pred_mae = single

    6.2166
```

```
Test_Pred_mse = errperf(Y_Test,Test_Predicted,'mse')
```

```
Test_Pred_mse = single

    48.8017
```

```
Test_Pred_rmse = errperf(Y_Test,Test_Predicted,'rmse')
```

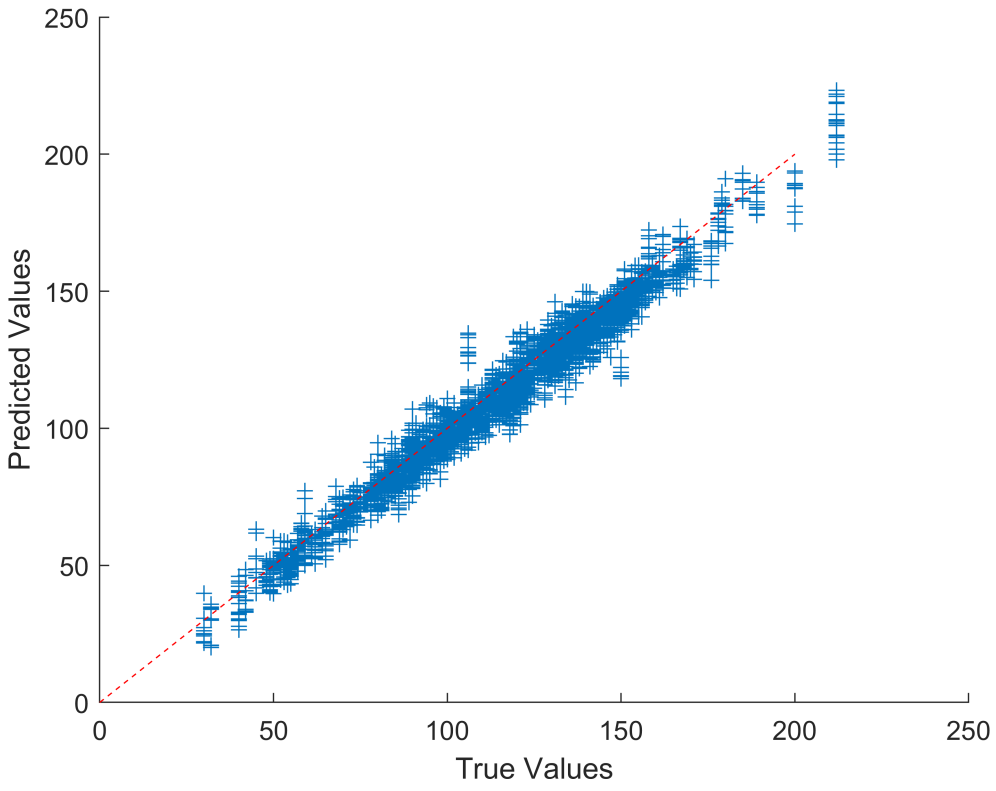
```
Test_Pred_rmse = single

    6.9858
```

```
% Test_Pred_mare = errperf(Y_Test,Test_Predicted,'mare')
% Test_Pred_msre = errperf(Y_Test,Test_Predicted,'msre')
% Test_Pred_rmsre = errperf(Y_Test,Test_Predicted,'rmsre')
% Test_Pred_mape = errperf(Y_Test,Test_Predicted,'mape')
% Testn_Pred_mspe = errperf(Y_Test,Test_Predicted,'mspe')
% Test_Pred_rmspe = errperf(Y_Test,Test_Predicted,'rmspe')
```

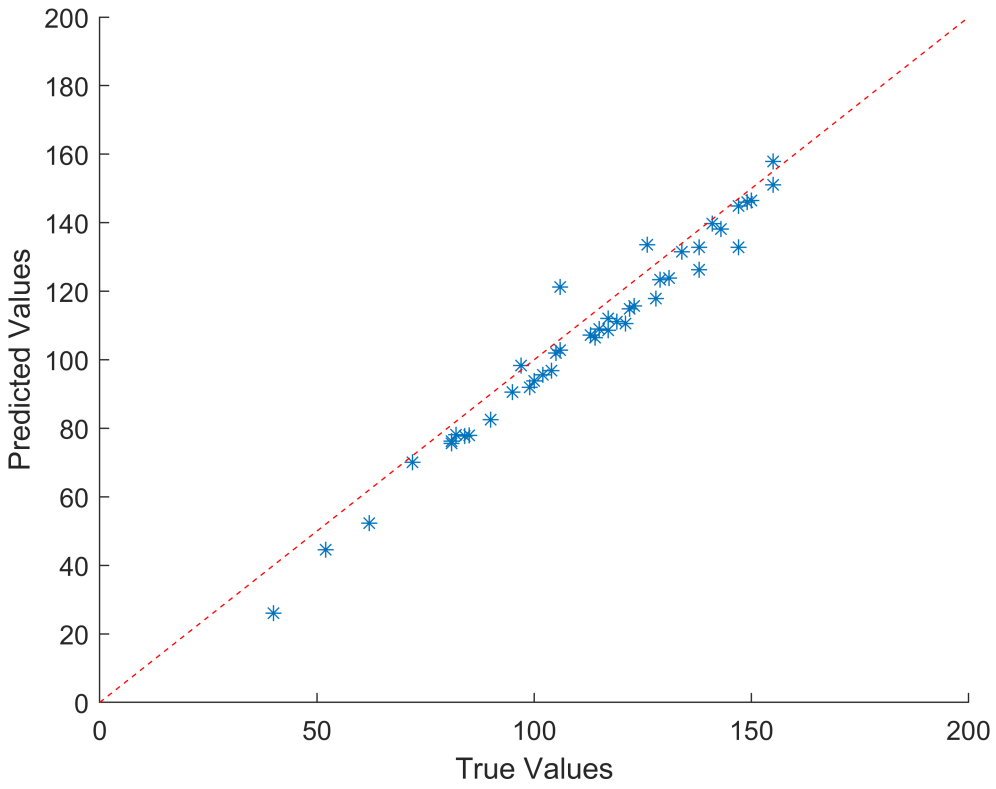
```
% Scatter plot for training phase
figure
scatter(Y_Train,Train_Predicted,'+')
xlabel("True Values")
ylabel("Predicted Values")

hold on
plot([0 200], [0 200],'r--')
```




```
% Scatter plot for testing phase
figure
scatter(Y_Test,Test_Predicted,'*')
xlabel("True Values")
ylabel("Predicted Values")

hold on
plot([0 200], [0 200],'r--')
```




```
%ccnet.Layers
```