Modified Efficient Network Architecture with Pretrained Parameters

Script for creating the layers for a deep learning network with the following properties:

```
Number of layers: 289
Number of connections: 362
Pretrained parameters file: D:\NITPY PhD\Contrast_EnH_Skin_Images\Source_Codes\New_Method\params_2021_09_18__2
```

Run the script to create the layers in the workspace variable `lgraph`.

To learn more, see Generate MATLAB Code From Deep Network Designer.

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Load the Pretrained Parameters

```
% Give correct path to load the pre-trained parameters.
params = load("D:\NITPY PhD\Contrast_EnH_Skin_Images\Source_Codes\New_Method_DL\params_2021_09_
```

Create Layer Graph

Create the layer graph variable to contain the network layers.

```
lgraph = layerGraph();
```

Add Layer Branches

Add the branches of the network to the layer graph. Each branch is a linear array of layers.

```
tempLayers = [
    imageInputLayer([224 224 1],"Name","imageinput","Normalization","zscore")
    convolution2dLayer([1 1],32,"Name","conv","Padding","same","Stride",[2 2])
    batchNormalizationLayer("Name","efficientnet-b0|model|stem|tpu_batch_normalization|FusedBat
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|stem|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|stem|MulLayer")
    groupedConvolution2dLayer([3 3],1,32,"Name","efficientnet-b0|model|blocks_0|depthwise_conv2
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_0|tpu_batch_normalization|Fuse
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_0|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_0|MulLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    globalAveragePooling2dLayer("Name","efficientnet-b0|model|blocks_0|se|GlobAvgPool")
```

```
    convolution2dLayer([1 1],8,"Name","Conv__301","Bias",params.Conv__301.Bias,"Weights",params
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_0|se|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_0|se|MulLayer")
    convolution2dLayer([1 1],32,"Name","Conv__304","Bias",params.Conv__304.Bias,"Weights",param
    sigmoidLayer("Name","efficientnet-b0|model|blocks_0|se|SigmoidLayer_1")];
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_0|se|MulLayer_1")
    convolution2dLayer([1 1],16,"Name","efficientnet-b0|model|blocks_0|conv2d|Conv2D","Bias",pa
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_0|tpu_batch_normalization_1|Fu
    convolution2dLayer([1 1],96,"Name","efficientnet-b0|model|blocks_1|conv2d|Conv2D","Bias",pa
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_1|tpu_batch_normalization|Fuse
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_1|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_1|MulLayer")
    groupedConvolution2dLayer([3 3],1,96,"Name","efficientnet-b0|model|blocks_1|depthwise_conv2
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_1|tpu_batch_normalization_1|Fu
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_1|SigmoidLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_1|MulLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    globalAveragePooling2dLayer("Name","efficientnet-b0|model|blocks_1|se|GlobAvgPool")
    convolution2dLayer([1 1],4,"Name","Conv__309","Bias",params.Conv__309.Bias,"Weights",params
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_1|se|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_1|se|MulLayer")
    convolution2dLayer([1 1],96,"Name","Conv__312","Bias",params.Conv__312.Bias,"Weights",param
    sigmoidLayer("Name","efficientnet-b0|model|blocks_1|se|SigmoidLayer_1")];
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
```

```
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_1|se|MulLayer_1")
    convolution2dLayer([1 1],24,"Name","efficientnet-b0|model|blocks_1|conv2d_1|Conv2D","Bias",
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_1|tpu_batch_normalization_2|Fu
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    convolution2dLayer([1 1],144,"Name","efficientnet-b0|model|blocks_2|conv2d|Conv2D","Bias",p
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_2|tpu_batch_normalization|Fuse
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_2|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_2|MulLayer")
    groupedConvolution2dLayer([3 3],1,144,"Name","efficientnet-b0|model|blocks_2|depthwise_conv
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_2|tpu_batch_normalization_1|Fu
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_2|SigmoidLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_2|MulLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    globalAveragePooling2dLayer("Name","efficientnet-b0|model|blocks_2|se|GlobAvgPool")
    convolution2dLayer([1 1],6,"Name","Conv__319","Bias",params.Conv__319.Bias,"Weights",params
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_2|se|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_2|se|MulLayer")
    convolution2dLayer([1 1],144,"Name","Conv__322","Bias",params.Conv__322.Bias,"Weights",para
    sigmoidLayer("Name","efficientnet-b0|model|blocks_2|se|SigmoidLayer_1")];
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_2|se|MulLayer_1")
    convolution2dLayer([1 1],24,"Name","efficientnet-b0|model|blocks_2|conv2d_1|Conv2D","Bias",
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_2|tpu_batch_normalization_2|Fu
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    additionLayer(2,"Name","efficientnet-b0|model|blocks_2|Add")
    convolution2dLayer([1 1],144,"Name","efficientnet-b0|model|blocks_3|conv2d|Conv2D","Bias",p
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_3|tpu_batch_normalization|Fuse
lgraph = addLayers(lgraph,tempLayers);
```

```
tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_3|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_3|MulLayer")
    groupedConvolution2dLayer([5 5],1,144,"Name","efficientnet-b0|model|blocks_3|depthwise_conv
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_3|tpu_batch_normalization_1|Fu
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_3|SigmoidLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_3|MulLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    globalAveragePooling2dLayer("Name","efficientnet-b0|model|blocks_3|se|GlobAvgPool")
    convolution2dLayer([1 1],6,"Name","Conv__327","Bias",params.Conv__327.Bias,"Weights",params
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_3|se|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_3|se|MulLayer")
    convolution2dLayer([1 1],144,"Name","Conv__330","Bias",params.Conv__330.Bias,"Weights",para
    sigmoidLayer("Name","efficientnet-b0|model|blocks_3|se|SigmoidLayer_1")];
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_3|se|MulLayer_1")
    convolution2dLayer([1 1],40,"Name","efficientnet-b0|model|blocks_3|conv2d_1|Conv2D","Bias",
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_3|tpu_batch_normalization_2|Fu
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    convolution2dLayer([1 1],240,"Name","efficientnet-b0|model|blocks_4|conv2d|Conv2D","Bias",p
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_4|tpu_batch_normalization|Fuse
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_4|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_4|MulLayer")
    groupedConvolution2dLayer([5 5],1,240,"Name","efficientnet-b0|model|blocks_4|depthwise_conv
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_4|tpu_batch_normalization_1|Fu
lgraph = addLayers(lgraph,tempLayers);
```

```
tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_4|SigmoidLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_4|MulLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    globalAveragePooling2dLayer("Name","efficientnet-b0|model|blocks_4|se|GlobAvgPool")
    convolution2dLayer([1 1],10,"Name","Conv__337","Bias",params.Conv__337.Bias,"Weights",paran
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_4|se|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_4|se|MulLayer")
    convolution2dLayer([1 1],240,"Name","Conv__340","Bias",params.Conv__340.Bias,"Weights",para
    sigmoidLayer("Name","efficientnet-b0|model|blocks_4|se|SigmoidLayer_1")];
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_4|se|MulLayer_1")
    convolution2dLayer([1 1],40,"Name","efficientnet-b0|model|blocks_4|conv2d_1|Conv2D","Bias",
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_4|tpu_batch_normalization_2|Fu
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    additionLayer(2,"Name","efficientnet-b0|model|blocks_4|Add")
    convolution2dLayer([1 1],240,"Name","efficientnet-b0|model|blocks_5|conv2d|Conv2D","Bias",p
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_5|tpu_batch_normalization|Fuse
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_5|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_5|MulLayer")
    groupedConvolution2dLayer([3 3],1,240,"Name","efficientnet-b0|model|blocks_5|depthwise_conv
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_5|tpu_batch_normalization_1|Fu
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_5|SigmoidLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_5|MulLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    globalAveragePooling2dLayer("Name","efficientnet-b0|model|blocks_5|se|GlobAvgPool")
    convolution2dLayer([1 1],10,"Name","Conv__345","Bias",params.Conv__345.Bias,"Weights",paran
```

```
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_5|se|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_5|se|MulLayer")
    convolution2dLayer([1 1],240,"Name","Conv__348","Bias",params.Conv__348.Bias,"Weights",para
    sigmoidLayer("Name","efficientnet-b0|model|blocks_5|se|SigmoidLayer_1")];
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_5|se|MulLayer_1")
    convolution2dLayer([1 1],80,"Name","efficientnet-b0|model|blocks_5|conv2d_1|Conv2D","Bias",
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_5|tpu_batch_normalization_2|Fu
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    convolution2dLayer([1 1],480,"Name","efficientnet-b0|model|blocks_6|conv2d|Conv2D","Bias",p
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_6|tpu_batch_normalization|Fuse
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_6|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_6|MulLayer")
    groupedConvolution2dLayer([3 3],1,480,"Name","efficientnet-b0|model|blocks_6|depthwise_conv
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_6|tpu_batch_normalization_1|Fu
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_6|SigmoidLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_6|MulLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    globalAveragePooling2dLayer("Name","efficientnet-b0|model|blocks_6|se|GlobAvgPool")
    convolution2dLayer([1 1],20,"Name","Conv__355","Bias",params.Conv__355.Bias,"Weights",paran
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_6|se|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_6|se|MulLayer")
    convolution2dLayer([1 1],480,"Name","Conv__358","Bias",params.Conv__358.Bias,"Weights",para
    sigmoidLayer("Name","efficientnet-b0|model|blocks_6|se|SigmoidLayer_1")];
lgraph = addLayers(lgraph,tempLayers);
```

```
tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_6|se|MulLayer_1")
    convolution2dLayer([1 1],80,"Name","efficientnet-b0|model|blocks_6|conv2d_1|Conv2D","Bias",
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_6|tpu_batch_normalization_2|Fu
lgraph = addLayers(lgraph,tempLayers);

tempLayers = additionLayer(2,"Name","efficientnet-b0|model|blocks_6|Add");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    convolution2dLayer([1 1],480,"Name","efficientnet-b0|model|blocks_7|conv2d|Conv2D","Bias",p
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_7|tpu_batch_normalization|Fuse
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_7|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_7|MulLayer")
    groupedConvolution2dLayer([3 3],1,480,"Name","efficientnet-b0|model|blocks_7|depthwise_conv
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_7|tpu_batch_normalization_1|Fu
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_7|SigmoidLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_7|MulLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    globalAveragePooling2dLayer("Name","efficientnet-b0|model|blocks_7|se|GlobAvgPool")
    convolution2dLayer([1 1],20,"Name","Conv__365","Bias",params.Conv__365.Bias,"Weights",param
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_7|se|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_7|se|MulLayer")
    convolution2dLayer([1 1],480,"Name","Conv__368","Bias",params.Conv__368.Bias,"Weights",para
    sigmoidLayer("Name","efficientnet-b0|model|blocks_7|se|SigmoidLayer_1")];
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_7|se|MulLayer_1")
    convolution2dLayer([1 1],80,"Name","efficientnet-b0|model|blocks_7|conv2d_1|Conv2D","Bias",
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_7|tpu_batch_normalization_2|Fu
lgraph = addLayers(lgraph,tempLayers);
```

```
tempLayers = [
    additionLayer(2,"Name","efficientnet-b0|model|blocks_7|Add")
    convolution2dLayer([1 1],480,"Name","efficientnet-b0|model|blocks_8|conv2d|Conv2D","Bias",p
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_8|tpu_batch_normalization|Fuse
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_8|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_8|MulLayer")
    groupedConvolution2dLayer([5 5],1,480,"Name","efficientnet-b0|model|blocks_8|depthwise_conv
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_8|tpu_batch_normalization_1|Fu
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_8|SigmoidLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_8|MulLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    globalAveragePooling2dLayer("Name","efficientnet-b0|model|blocks_8|se|GlobAvgPool")
    convolution2dLayer([1 1],20,"Name","Conv__373","Bias",params.Conv__373.Bias,"Weights",paran
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_8|se|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_8|se|MulLayer")
    convolution2dLayer([1 1],480,"Name","Conv__376","Bias",params.Conv__376.Bias,"Weights",para
    sigmoidLayer("Name","efficientnet-b0|model|blocks_8|se|SigmoidLayer_1")];
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_8|se|MulLayer_1")
    convolution2dLayer([1 1],112,"Name","efficientnet-b0|model|blocks_8|conv2d_1|Conv2D","Bias"
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_8|tpu_batch_normalization_2|Fu
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    convolution2dLayer([1 1],672,"Name","efficientnet-b0|model|blocks_9|conv2d|Conv2D","Bias",p
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_9|tpu_batch_normalization|Fuse
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_9|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
```

```
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_9|MulLayer")
    groupedConvolution2dLayer([5 5],1,672,"Name","efficientnet-b0|model|blocks_9|depthwise_conv
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_9|tpu_batch_normalization_1|Fu
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_9|SigmoidLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_9|MulLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    globalAveragePooling2dLayer("Name","efficientnet-b0|model|blocks_9|se|GlobAvgPool")
    convolution2dLayer([1 1],28,"Name","Conv__383","Bias",params.Conv__383.Bias,"Weights",param
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_9|se|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_9|se|MulLayer")
    convolution2dLayer([1 1],672,"Name","Conv__386","Bias",params.Conv__386.Bias,"Weights",para
    sigmoidLayer("Name","efficientnet-b0|model|blocks_9|se|SigmoidLayer_1")];
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_9|se|MulLayer_1")
    convolution2dLayer([1 1],112,"Name","efficientnet-b0|model|blocks_9|conv2d_1|Conv2D","Bias"
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_9|tpu_batch_normalization_2|Fu
lgraph = addLayers(lgraph,tempLayers);

tempLayers = additionLayer(2,"Name","efficientnet-b0|model|blocks_9|Add");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    convolution2dLayer([1 1],672,"Name","efficientnet-b0|model|blocks_10|conv2d|Conv2D","Bias",
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_10|tpu_batch_normalization|Fus
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_10|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_10|MulLayer")
    groupedConvolution2dLayer([5 5],1,672,"Name","efficientnet-b0|model|blocks_10|depthwise_con
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_10|tpu_batch_normalization_1|F
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_10|SigmoidLayer_1");
lgraph = addLayers(lgraph,tempLayers);
```

```
tempLayers = multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_10|MulLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    globalAveragePooling2dLayer("Name","efficientnet-b0|model|blocks_10|se|GlobAvgPool")
    convolution2dLayer([1 1],28,"Name","Conv__393","Bias",params.Conv__393.Bias,"Weights",paran
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_10|se|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_10|se|MulLayer")
    convolution2dLayer([1 1],672,"Name","Conv__396","Bias",params.Conv__396.Bias,"Weights",para
    sigmoidLayer("Name","efficientnet-b0|model|blocks_10|se|SigmoidLayer_1")];
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_10|se|MulLayer_1")
    convolution2dLayer([1 1],112,"Name","efficientnet-b0|model|blocks_10|conv2d_1|Conv2D","Bias
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_10|tpu_batch_normalization_2|F
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    additionLayer(2,"Name","efficientnet-b0|model|blocks_10|Add")
    convolution2dLayer([1 1],672,"Name","efficientnet-b0|model|blocks_11|conv2d|Conv2D","Bias",
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_11|tpu_batch_normalization|Fus
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_11|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_11|MulLayer")
    groupedConvolution2dLayer([5 5],1,672,"Name","efficientnet-b0|model|blocks_11|depthwise_con
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_11|tpu_batch_normalization_1|F
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_11|SigmoidLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_11|MulLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    globalAveragePooling2dLayer("Name","efficientnet-b0|model|blocks_11|se|GlobAvgPool")
    convolution2dLayer([1 1],28,"Name","Conv__401","Bias",params.Conv__401.Bias,"Weights",paran
lgraph = addLayers(lgraph,tempLayers);
```

```
tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_11|se|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_11|se|MulLayer")
    convolution2dLayer([1 1],672,"Name","Conv__404","Bias",params.Conv__404.Bias,"Weights",para
    sigmoidLayer("Name","efficientnet-b0|model|blocks_11|se|SigmoidLayer_1")];
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_11|se|MulLayer_1")
    convolution2dLayer([1 1],192,"Name","efficientnet-b0|model|blocks_11|conv2d_1|Conv2D","Bias
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_11|tpu_batch_normalization_2|F
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    convolution2dLayer([1 1],1152,"Name","efficientnet-b0|model|blocks_12|conv2d|Conv2D","Bias"
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_12|tpu_batch_normalization|Fus
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_12|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_12|MulLayer")
    groupedConvolution2dLayer([5 5],1,1152,"Name","efficientnet-b0|model|blocks_12|depthwise_co
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_12|tpu_batch_normalization_1|F
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_12|SigmoidLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_12|MulLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    globalAveragePooling2dLayer("Name","efficientnet-b0|model|blocks_12|se|GlobAvgPool")
    convolution2dLayer([1 1],48,"Name","Conv__411","Bias",params.Conv__411.Bias,"Weights",paran
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_12|se|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_12|se|MulLayer")
    convolution2dLayer([1 1],1152,"Name","Conv__414","Bias",params.Conv__414.Bias,"Weights",par
    sigmoidLayer("Name","efficientnet-b0|model|blocks_12|se|SigmoidLayer_1")];
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
```

```
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_12|se|MulLayer_1")
    convolution2dLayer([1 1],192,"Name","efficientnet-b0|model|blocks_12|conv2d_1|Conv2D","Bias
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_12|tpu_batch_normalization_2|F
lgraph = addLayers(lgraph,tempLayers);

tempLayers = additionLayer(2,"Name","efficientnet-b0|model|blocks_12|Add");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    convolution2dLayer([1 1],1152,"Name","efficientnet-b0|model|blocks_13|conv2d|Conv2D","Bias"
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_13|tpu_batch_normalization|Fus
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_13|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_13|MulLayer")
    groupedConvolution2dLayer([5 5],1,1152,"Name","efficientnet-b0|model|blocks_13|depthwise_co
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_13|tpu_batch_normalization_1|F
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_13|SigmoidLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_13|MulLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    globalAveragePooling2dLayer("Name","efficientnet-b0|model|blocks_13|se|GlobAvgPool")
    convolution2dLayer([1 1],48,"Name","Conv__421","Bias",params.Conv__421.Bias,"Weights",param
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_13|se|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_13|se|MulLayer")
    convolution2dLayer([1 1],1152,"Name","Conv__424","Bias",params.Conv__424.Bias,"Weights",par
    sigmoidLayer("Name","efficientnet-b0|model|blocks_13|se|SigmoidLayer_1")];
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_13|se|MulLayer_1")
    convolution2dLayer([1 1],192,"Name","efficientnet-b0|model|blocks_13|conv2d_1|Conv2D","Bias
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_13|tpu_batch_normalization_2|F
lgraph = addLayers(lgraph,tempLayers);

tempLayers = additionLayer(2,"Name","efficientnet-b0|model|blocks_13|Add");
lgraph = addLayers(lgraph,tempLayers);
```

```
tempLayers = [
    convolution2dLayer([1 1],1152,"Name","efficientnet-b0|model|blocks_14|conv2d|Conv2D","Bias"
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_14|tpu_batch_normalization|Fus
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_14|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_14|MulLayer")
    groupedConvolution2dLayer([5 5],1,1152,"Name","efficientnet-b0|model|blocks_14|depthwise_co
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_14|tpu_batch_normalization_1|F
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_14|SigmoidLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_14|MulLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    globalAveragePooling2dLayer("Name","efficientnet-b0|model|blocks_14|se|GlobAvgPool")
    convolution2dLayer([1 1],48,"Name","Conv__431","Bias",params.Conv__431.Bias,"Weights",param
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_14|se|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_14|se|MulLayer")
    convolution2dLayer([1 1],1152,"Name","Conv__434","Bias",params.Conv__434.Bias,"Weights",par
    sigmoidLayer("Name","efficientnet-b0|model|blocks_14|se|SigmoidLayer_1")];
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_14|se|MulLayer_1")
    convolution2dLayer([1 1],192,"Name","efficientnet-b0|model|blocks_14|conv2d_1|Conv2D","Bias
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_14|tpu_batch_normalization_2|F
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    additionLayer(2,"Name","efficientnet-b0|model|blocks_14|Add")
    convolution2dLayer([1 1],1152,"Name","efficientnet-b0|model|blocks_15|conv2d|Conv2D","Bias"
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_15|tpu_batch_normalization|Fus
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_15|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);
```

```
tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_15|MulLayer")
    groupedConvolution2dLayer([3 3],1,1152,"Name","efficientnet-b0|model|blocks_15|depthwise_co
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_15|tpu_batch_normalization_1|F
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_15|SigmoidLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_15|MulLayer_1");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    globalAveragePooling2dLayer("Name","efficientnet-b0|model|blocks_15|se|GlobAvgPool")
    convolution2dLayer([1 1],48,"Name","Conv__439","Bias",params.Conv__439.Bias,"Weights",param
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|blocks_15|se|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_15|se|MulLayer")
    convolution2dLayer([1 1],1152,"Name","Conv__442","Bias",params.Conv__442.Bias,"Weights",par
    sigmoidLayer("Name","efficientnet-b0|model|blocks_15|se|SigmoidLayer_1")];
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|blocks_15|se|MulLayer_1")
    convolution2dLayer([1 1],320,"Name","efficientnet-b0|model|blocks_15|conv2d_1|Conv2D","Bias
    batchNormalizationLayer("Name","efficientnet-b0|model|blocks_15|tpu_batch_normalization_2|F
    convolution2dLayer([1 1],1280,"Name","efficientnet-b0|model|head|conv2d|Conv2D","Bias",para
    batchNormalizationLayer("Name","efficientnet-b0|model|head|tpu_batch_normalization|FusedBat
lgraph = addLayers(lgraph,tempLayers);

tempLayers = sigmoidLayer("Name","efficientnet-b0|model|head|SigmoidLayer");
lgraph = addLayers(lgraph,tempLayers);

tempLayers = [
    multiplicationLayer(2,"Name","efficientnet-b0|model|head|MulLayer")
    globalAveragePooling2dLayer("Name","efficientnet-b0|model|head|global_average_pooling2d|Glo
    fullyConnectedLayer(1,"Name","fc")
    regressionLayer("Name","regressionoutput")];
lgraph = addLayers(lgraph,tempLayers);

% clean up helper variable
clear tempLayers;
```

Connect Layer Branches

Connect all the branches of the network to create the network graph.

```
lgraph = connectLayers(lgraph,"efficientnet-b0|model|stem|tpu_batch_normalization|FusedBatchNor
lgraph = connectLayers(lgraph,"efficientnet-b0|model|stem|tpu_batch_normalization|FusedBatchNor
lgraph = connectLayers(lgraph,"efficientnet-b0|model|stem|SigmoidLayer","efficientnet-b0|model
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_0|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_0|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_0|SigmoidLayer","efficientnet-b0|mo
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_0|MulLayer","efficientnet-b0|model
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_0|MulLayer","efficientnet-b0|model
lgraph = connectLayers(lgraph,"Conv__301","efficientnet-b0|model|blocks_0|se|SigmoidLayer");
lgraph = connectLayers(lgraph,"Conv__301","efficientnet-b0|model|blocks_0|se|MulLayer/in1");
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_0|se|SigmoidLayer","efficientnet-b0
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_0|se|SigmoidLayer_1","efficientnet-
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_1|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_1|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_1|SigmoidLayer","efficientnet-b0|mo
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_1|tpu_batch_normalization_1|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_1|tpu_batch_normalization_1|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_1|SigmoidLayer_1","efficientnet-b0|
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_1|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_1|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"Conv__309","efficientnet-b0|model|blocks_1|se|SigmoidLayer");
lgraph = connectLayers(lgraph,"Conv__309","efficientnet-b0|model|blocks_1|se|MulLayer/in1");
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_1|se|SigmoidLayer","efficientnet-b0
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_1|se|SigmoidLayer_1","efficientnet-
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_1|tpu_batch_normalization_2|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_1|tpu_batch_normalization_2|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_2|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_2|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_2|SigmoidLayer","efficientnet-b0|mo
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_2|tpu_batch_normalization_1|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_2|tpu_batch_normalization_1|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_2|SigmoidLayer_1","efficientnet-b0|
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_2|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_2|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"Conv__319","efficientnet-b0|model|blocks_2|se|SigmoidLayer");
lgraph = connectLayers(lgraph,"Conv__319","efficientnet-b0|model|blocks_2|se|MulLayer/in1");
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_2|se|SigmoidLayer","efficientnet-b0
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_2|se|SigmoidLayer_1","efficientnet-
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_2|tpu_batch_normalization_2|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_3|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_3|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_3|SigmoidLayer","efficientnet-b0|mo
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_3|tpu_batch_normalization_1|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_3|tpu_batch_normalization_1|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_3|SigmoidLayer_1","efficientnet-b0|
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_3|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_3|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"Conv__327","efficientnet-b0|model|blocks_3|se|SigmoidLayer");
lgraph = connectLayers(lgraph,"Conv__327","efficientnet-b0|model|blocks_3|se|MulLayer/in1");
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_3|se|SigmoidLayer","efficientnet-b0
```

```
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_3|se|SigmoidLayer_1","efficientnet-
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_3|tpu_batch_normalization_2|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_3|tpu_batch_normalization_2|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_4|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_4|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_4|SigmoidLayer","efficientnet-b0|mo
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_4|tpu_batch_normalization_1|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_4|tpu_batch_normalization_1|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_4|SigmoidLayer_1","efficientnet-b0|
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_4|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_4|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"Conv__337","efficientnet-b0|model|blocks_4|se|SigmoidLayer");
lgraph = connectLayers(lgraph,"Conv__337","efficientnet-b0|model|blocks_4|se|MulLayer/in1");
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_4|se|SigmoidLayer","efficientnet-b0
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_4|se|SigmoidLayer_1","efficientnet-
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_4|tpu_batch_normalization_2|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_5|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_5|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_5|SigmoidLayer","efficientnet-b0|mo
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_5|tpu_batch_normalization_1|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_5|tpu_batch_normalization_1|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_5|SigmoidLayer_1","efficientnet-b0|
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_5|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_5|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"Conv__345","efficientnet-b0|model|blocks_5|se|SigmoidLayer");
lgraph = connectLayers(lgraph,"Conv__345","efficientnet-b0|model|blocks_5|se|MulLayer/in1");
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_5|se|SigmoidLayer","efficientnet-b0
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_5|se|SigmoidLayer_1","efficientnet-
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_5|tpu_batch_normalization_2|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_5|tpu_batch_normalization_2|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_6|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_6|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_6|SigmoidLayer","efficientnet-b0|mo
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_6|tpu_batch_normalization_1|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_6|tpu_batch_normalization_1|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_6|SigmoidLayer_1","efficientnet-b0|
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_6|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_6|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"Conv__355","efficientnet-b0|model|blocks_6|se|SigmoidLayer");
lgraph = connectLayers(lgraph,"Conv__355","efficientnet-b0|model|blocks_6|se|MulLayer/in1");
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_6|se|SigmoidLayer","efficientnet-b0
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_6|se|SigmoidLayer_1","efficientnet-
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_6|tpu_batch_normalization_2|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_6|Add","efficientnet-b0|model|block
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_6|Add","efficientnet-b0|model|block
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_7|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_7|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_7|SigmoidLayer","efficientnet-b0|mo
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_7|tpu_batch_normalization_1|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_7|tpu_batch_normalization_1|FusedBa
```

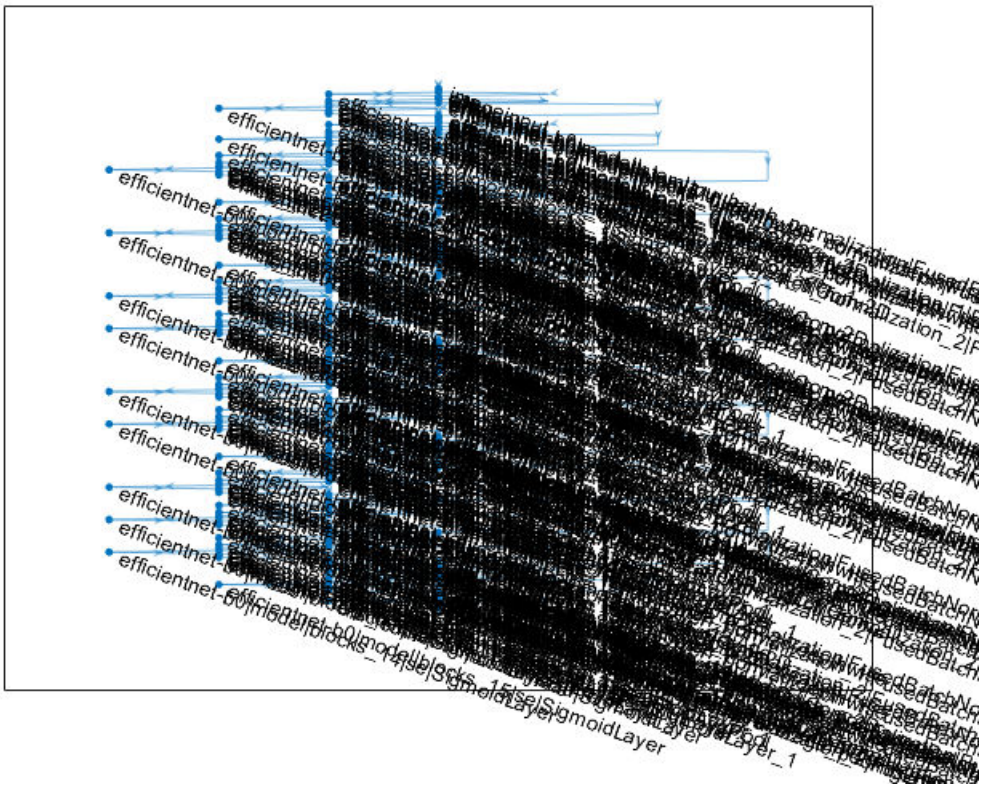
```
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_7|SigmoidLayer_1","efficientnet-b0
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_7|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_7|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"Conv__365","efficientnet-b0|model|blocks_7|se|SigmoidLayer");
lgraph = connectLayers(lgraph,"Conv__365","efficientnet-b0|model|blocks_7|se|MulLayer/in1");
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_7|se|SigmoidLayer","efficientnet-b0
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_7|se|SigmoidLayer_1","efficientnet-
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_7|tpu_batch_normalization_2|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_8|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_8|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_8|SigmoidLayer","efficientnet-b0|mo
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_8|tpu_batch_normalization_1|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_8|tpu_batch_normalization_1|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_8|SigmoidLayer_1","efficientnet-b0
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_8|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_8|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"Conv__373","efficientnet-b0|model|blocks_8|se|SigmoidLayer");
lgraph = connectLayers(lgraph,"Conv__373","efficientnet-b0|model|blocks_8|se|MulLayer/in1");
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_8|se|SigmoidLayer","efficientnet-b0
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_8|se|SigmoidLayer_1","efficientnet-
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_8|tpu_batch_normalization_2|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_8|tpu_batch_normalization_2|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_9|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_9|tpu_batch_normalization|FusedBatc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_9|SigmoidLayer","efficientnet-b0|mo
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_9|tpu_batch_normalization_1|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_9|tpu_batch_normalization_1|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_9|SigmoidLayer_1","efficientnet-b0
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_9|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_9|MulLayer_1","efficientnet-b0|mode
lgraph = connectLayers(lgraph,"Conv__383","efficientnet-b0|model|blocks_9|se|SigmoidLayer");
lgraph = connectLayers(lgraph,"Conv__383","efficientnet-b0|model|blocks_9|se|MulLayer/in1");
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_9|se|SigmoidLayer","efficientnet-b0
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_9|se|SigmoidLayer_1","efficientnet-
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_9|tpu_batch_normalization_2|FusedBa
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_9|Add","efficientnet-b0|model|block
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_9|Add","efficientnet-b0|model|block
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_10|tpu_batch_normalization|FusedBat
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_10|tpu_batch_normalization|FusedBat
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_10|SigmoidLayer","efficientnet-b0|m
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_10|tpu_batch_normalization_1|FusedB
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_10|tpu_batch_normalization_1|FusedB
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_10|SigmoidLayer_1","efficientnet-b0
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_10|MulLayer_1","efficientnet-b0|moc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_10|MulLayer_1","efficientnet-b0|moc
lgraph = connectLayers(lgraph,"Conv__393","efficientnet-b0|model|blocks_10|se|SigmoidLayer");
lgraph = connectLayers(lgraph,"Conv__393","efficientnet-b0|model|blocks_10|se|MulLayer/in1");
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_10|se|SigmoidLayer","efficientnet-b
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_10|se|SigmoidLayer_1","efficientnet
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_10|tpu_batch_normalization_2|FusedB
```

```
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_11|tpu_batch_normalization|FusedBat
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_11|tpu_batch_normalization|FusedBat
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_11|SigmoidLayer","efficientnet-b0|m
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_11|tpu_batch_normalization_1|FusedB
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_11|tpu_batch_normalization_1|FusedB
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_11|SigmoidLayer_1","efficientnet-b0
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_11|MulLayer_1","efficientnet-b0|mod
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_11|MulLayer_1","efficientnet-b0|mod
lgraph = connectLayers(lgraph,"Conv__401","efficientnet-b0|model|blocks_11|se|SigmoidLayer");
lgraph = connectLayers(lgraph,"Conv__401","efficientnet-b0|model|blocks_11|se|MulLayer/in1");
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_11|se|SigmoidLayer","efficientnet-b
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_11|se|SigmoidLayer_1","efficientnet
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_11|tpu_batch_normalization_2|FusedB
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_11|tpu_batch_normalization_2|FusedB
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_12|tpu_batch_normalization|FusedBat
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_12|tpu_batch_normalization|FusedBat
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_12|SigmoidLayer","efficientnet-b0|m
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_12|tpu_batch_normalization_1|FusedB
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_12|tpu_batch_normalization_1|FusedB
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_12|SigmoidLayer_1","efficientnet-b0
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_12|MulLayer_1","efficientnet-b0|mod
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_12|MulLayer_1","efficientnet-b0|mod
lgraph = connectLayers(lgraph,"Conv__411","efficientnet-b0|model|blocks_12|se|SigmoidLayer");
lgraph = connectLayers(lgraph,"Conv__411","efficientnet-b0|model|blocks_12|se|MulLayer/in1");
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_12|se|SigmoidLayer","efficientnet-b
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_12|se|SigmoidLayer_1","efficientnet
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_12|tpu_batch_normalization_2|FusedB
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_12|Add","efficientnet-b0|model|bloc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_12|Add","efficientnet-b0|model|bloc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_13|tpu_batch_normalization|FusedBat
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_13|tpu_batch_normalization|FusedBat
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_13|SigmoidLayer","efficientnet-b0|m
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_13|tpu_batch_normalization_1|FusedB
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_13|tpu_batch_normalization_1|FusedB
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_13|SigmoidLayer_1","efficientnet-b0
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_13|MulLayer_1","efficientnet-b0|mod
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_13|MulLayer_1","efficientnet-b0|mod
lgraph = connectLayers(lgraph,"Conv__421","efficientnet-b0|model|blocks_13|se|SigmoidLayer");
lgraph = connectLayers(lgraph,"Conv__421","efficientnet-b0|model|blocks_13|se|MulLayer/in1");
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_13|se|SigmoidLayer","efficientnet-b
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_13|se|SigmoidLayer_1","efficientnet
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_13|tpu_batch_normalization_2|FusedB
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_13|Add","efficientnet-b0|model|bloc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_13|Add","efficientnet-b0|model|bloc
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_14|tpu_batch_normalization|FusedBat
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_14|tpu_batch_normalization|FusedBat
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_14|SigmoidLayer","efficientnet-b0|m
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_14|tpu_batch_normalization_1|FusedB
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_14|tpu_batch_normalization_1|FusedB
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_14|SigmoidLayer_1","efficientnet-b0
```

```
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_14|MulLayer_1","efficientnet-b0|mod
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_14|MulLayer_1","efficientnet-b0|mod
lgraph = connectLayers(lgraph,"Conv__431","efficientnet-b0|model|blocks_14|se|SigmoidLayer");
lgraph = connectLayers(lgraph,"Conv__431","efficientnet-b0|model|blocks_14|se|MulLayer/in1");
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_14|se|SigmoidLayer","efficientnet-b
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_14|se|SigmoidLayer_1","efficientnet
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_14|tpu_batch_normalization_2|FusedB
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_15|tpu_batch_normalization|FusedBat
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_15|tpu_batch_normalization|FusedBat
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_15|SigmoidLayer","efficientnet-b0|m
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_15|tpu_batch_normalization_1|FusedB
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_15|tpu_batch_normalization_1|FusedB
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_15|SigmoidLayer_1","efficientnet-b0
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_15|MulLayer_1","efficientnet-b0|mod
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_15|MulLayer_1","efficientnet-b0|mod
lgraph = connectLayers(lgraph,"Conv__439","efficientnet-b0|model|blocks_15|se|SigmoidLayer");
lgraph = connectLayers(lgraph,"Conv__439","efficientnet-b0|model|blocks_15|se|MulLayer/in1");
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_15|se|SigmoidLayer","efficientnet-b
lgraph = connectLayers(lgraph,"efficientnet-b0|model|blocks_15|se|SigmoidLayer_1","efficientnet
lgraph = connectLayers(lgraph,"efficientnet-b0|model|head|tpu_batch_normalization|FusedBatchNor
lgraph = connectLayers(lgraph,"efficientnet-b0|model|head|tpu_batch_normalization|FusedBatchNor
lgraph = connectLayers(lgraph,"efficientnet-b0|model|head|SigmoidLayer","efficientnet-b0|model|
```

Plot Layers

```
plot(lgraph);
```



Prediction Data

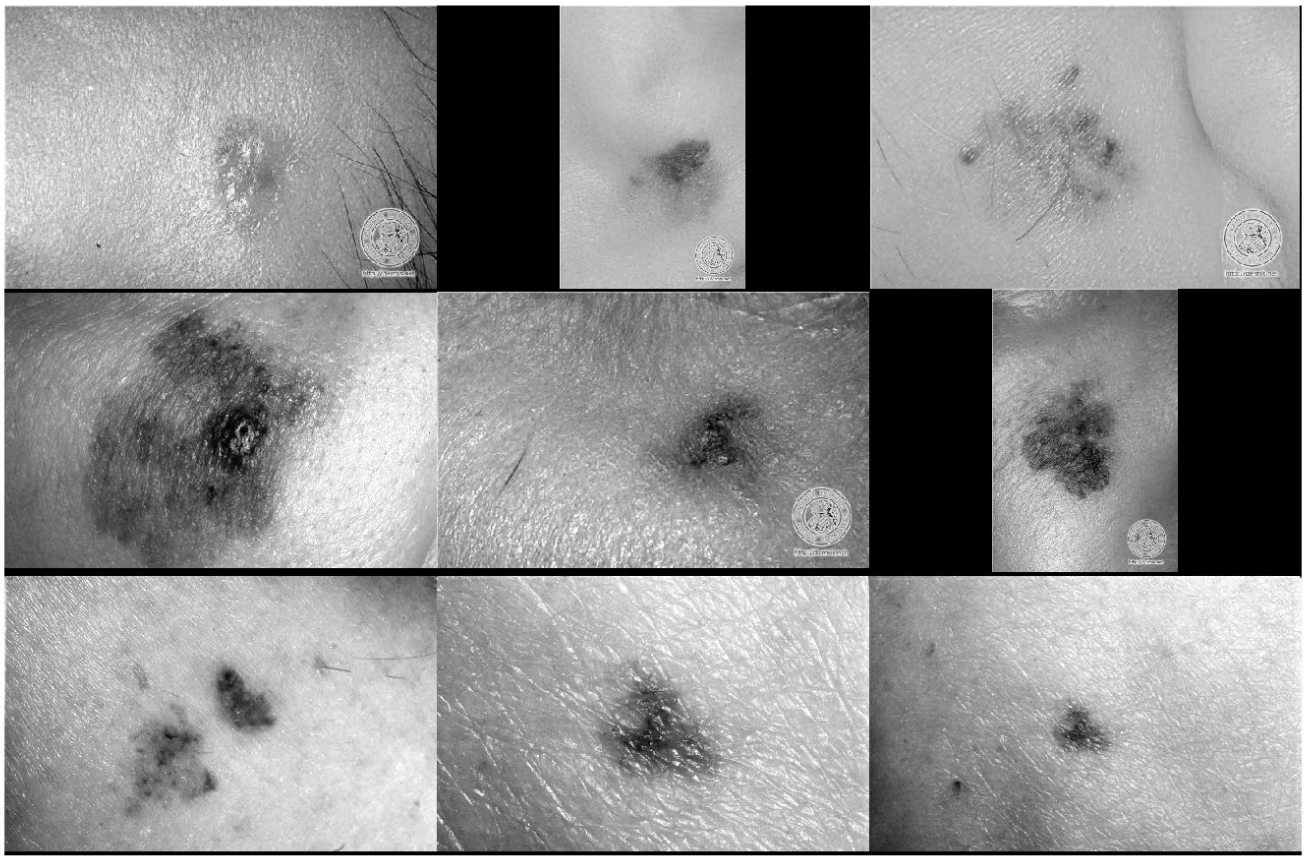
```
% Read the image and the corresponding Value(V) component from the csv file.
trainingData = readtable("Train_Aug.csv");
X_Train = trainingData.Name;

testingData = readtable("Test.csv");
```

```
Y_Train = trainingData.Value;

Y_Test = testingData.Value;
fn = X_Train{1};
size(imread(fn));
%imshow(imread(fn));
```

```
imds = imageDatastore(X_Train(1:9));
montage(imds)
```



```
trainds = augmentedImageDatastore([224 224],trainingData)
```

```
trainds =
```

```
  augmentedImageDatastore with properties:

         NumObservations: 2665
           MiniBatchSize: 1
       DataAugmentation: 'none'
     ColorPreprocessing: 'none'
             OutputSize: [224 224]
         OutputSizeMode: 'resize'
    DispatchInBackground: 0
```

```
%validds = augmentedImageDatastore([224 224],validData);
testds = augmentedImageDatastore([224 224],testingData)
```

```
testds =
  augmentedImageDatastore with properties:

         NumObservations: 48
           MiniBatchSize: 1
       DataAugmentation: 'none'
     ColorPreprocessing: 'none'
             OutputSize: [224 224]
         OutputSizeMode: 'resize'
    DispatchInBackground: 0
```

```
%Training options
options = trainingOptions("sgdm","MaxEpochs",15,"InitialLearnRate",0.001,'Shuffle','every-epoch
    'MiniBatchSize',16)
```

```
options =
  TrainingOptionsSGDM with properties:

                      Momentum: 0.9000
                 InitialLearnRate: 1.0000e-03
                LearnRateSchedule: 'none'
              LearnRateDropFactor: 0.1000
              LearnRateDropPeriod: 10
                 L2Regularization: 1.0000e-04
          GradientThresholdMethod: 'l2norm'
                GradientThreshold: Inf
                        MaxEpochs: 15
                    MiniBatchSize: 16
                          Verbose: 1
                  VerboseFrequency: 50
                    ValidationData: []
               ValidationFrequency: 50
                ValidationPatience: Inf
                          Shuffle: 'every-epoch'
                   CheckpointPath: ''
             ExecutionEnvironment: 'auto'
                      WorkerLoad: []
                       OutputFcn: []
                           Plots: 'none'
                  SequenceLength: 'longest'
             SequencePaddingValue: 0
          SequencePaddingDirection: 'right'
              DispatchInBackground: 0
           ResetInputNormalization: 1
    BatchNormalizationStatistics: 'population'
```

```
effnet = trainNetwork(trainds,lgraph,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 |       00:00:10 |         0.69 |          0.2 |          0.0010 |
|       1 |          50 |       00:01:29 |         0.37 |      7.0e-02 |          0.0010 |
|       1 |         100 |       00:02:46 |         0.28 |      3.8e-02 |          0.0010 |
|       1 |         150 |       00:04:04 |         0.25 |      3.2e-02 |          0.0010 |
|       2 |         200 |       00:05:37 |         0.28 |      3.9e-02 |          0.0010 |
|       2 |         250 |       00:06:54 |         0.22 |      2.4e-02 |          0.0010 |
|       2 |         300 |       00:08:13 |         0.18 |      1.7e-02 |          0.0010 |
|       3 |         350 |       00:09:33 |         0.21 |      2.2e-02 |          0.0010 |
|       3 |         400 |       00:10:52 |         0.16 |      1.2e-02 |          0.0010 |
|       3 |         450 |       00:12:09 |         0.15 |      1.1e-02 |          0.0010 |
|       4 |         500 |       00:13:30 |         0.30 |      4.4e-02 |          0.0010 |
|       4 |         550 |       00:14:47 |         0.18 |      1.6e-02 |          0.0010 |
|       4 |         600 |       00:16:04 |         0.19 |      1.8e-02 |          0.0010 |
|       4 |         650 |       00:17:31 |         0.16 |      1.2e-02 |          0.0010 |
|       5 |         700 |       00:18:53 |         0.16 |      1.3e-02 |          0.0010 |
|       5 |         750 |       00:20:12 |         0.11 |      6.5e-03 |          0.0010 |
|       5 |         800 |       00:21:28 |         0.16 |      1.3e-02 |          0.0010 |
|       6 |         850 |       00:22:46 |         0.12 |      7.7e-03 |          0.0010 |
|       6 |         900 |       00:24:03 |         0.16 |      1.2e-02 |          0.0010 |
|       6 |         950 |       00:25:19 |         0.12 |      7.8e-03 |          0.0010 |
|       7 |        1000 |       00:26:37 |         0.15 |      1.1e-02 |          0.0010 |
|       7 |        1050 |       00:27:55 |         0.19 |      1.7e-02 |          0.0010 |
|       7 |        1100 |       00:29:11 |         0.16 |      1.3e-02 |          0.0010 |
|       7 |        1150 |       00:30:31 |         0.13 |      8.8e-03 |          0.0010 |
|       8 |        1200 |       00:31:52 |         0.18 |      1.6e-02 |          0.0010 |
|       8 |        1250 |       00:33:14 |         0.16 |      1.4e-02 |          0.0010 |
|       8 |        1300 |       00:34:31 |         0.12 |      7.4e-03 |          0.0010 |
|       9 |        1350 |       00:35:50 |         0.16 |      1.2e-02 |          0.0010 |
|       9 |        1400 |       00:37:09 |         0.14 |      9.8e-03 |          0.0010 |
|       9 |        1450 |       00:38:26 |         0.12 |      7.7e-03 |          0.0010 |
|      10 |        1500 |       00:39:45 |         0.10 |      5.1e-03 |          0.0010 |
|      10 |        1550 |       00:41:01 |         0.13 |      8.7e-03 |          0.0010 |
|      10 |        1600 |       00:42:18 |         0.15 |      1.2e-02 |          0.0010 |
|      10 |        1650 |       00:43:35 |         0.14 |      1.0e-02 |          0.0010 |
|      11 |        1700 |       00:44:59 |         0.14 |      9.4e-03 |          0.0010 |
|      11 |        1750 |       00:47:40 |         0.14 |      1.0e-02 |          0.0010 |
|      11 |        1800 |       00:50:22 |         0.14 |      9.7e-03 |          0.0010 |
|      12 |        1850 |       00:53:07 |         0.13 |      8.1e-03 |          0.0010 |
|      12 |        1900 |       00:55:49 |         0.17 |      1.5e-02 |          0.0010 |
|      12 |        1950 |       00:58:30 |         0.14 |      9.2e-03 |          0.0010 |
|      13 |        2000 |       01:01:16 |         0.15 |      1.2e-02 |          0.0010 |
|      13 |        2050 |       01:03:57 |         0.15 |      1.1e-02 |          0.0010 |
|      13 |        2100 |       01:06:28 |         0.12 |      7.7e-03 |          0.0010 |
|      13 |        2150 |       01:09:53 |         0.21 |      2.2e-02 |          0.0010 |
|      14 |        2200 |       01:12:34 |         0.15 |      1.1e-02 |          0.0010 |
|      14 |        2250 |       01:15:15 |         0.10 |      5.3e-03 |          0.0010 |
|      14 |        2300 |       01:17:57 |         0.05 |      1.5e-03 |          0.0010 |
|      15 |        2350 |       01:20:38 |         0.13 |      8.1e-03 |          0.0010 |
|      15 |        2400 |       01:23:17 |         0.11 |      5.8e-03 |          0.0010 |
|      15 |        2450 |       01:25:57 |         0.12 |      7.6e-03 |          0.0010 |
|      15 |        2490 |       01:28:04 |         0.11 |      6.3e-03 |          0.0010 |
|=========================================================================================|
effnet =
  DAGNetwork with properties:

         Layers: [289×1 nnet.cnn.layer.Layer]
```

```
    Connections: [362×2 table]
     InputNames: {'imageinput'}
    OutputNames: {'regressionoutput'}
```

```
% Evaluation of the performance matrices for the trained model
Train_Predicted = abs(predict(effnet,trainds))
```

```
Train_Predicted = 2665×1 single column vector
    0.0061
    0.6812
    0.6902
    0.3719
    0.3904
    0.2431
    0.2778
    0.4624
    0.4446
    0.1907
     ⋮
```

```
Test_Predicted = abs(predict(effnet,testds));

Train_predictionError = Y_Train - Train_Predicted;
Test_predictionError = Y_Test - Test_Predicted;
```

```
Train_Pred_mae = errperf(Y_Train,Train_Predicted,'mae')
```

```
Train_Pred_mae = single

    0.0651
```

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

```
Train_Pred_mse = single

    0.0068
```

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

```
Train_Pred_rmse = single

    0.0826
```

```

Test_Pred_mae = errperf(Y_Test,Test_Predicted,'mae')
```

```
Test_Pred_mae = single

    0.0609
```

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

```
Test_Pred_mse = single

    0.0061
```

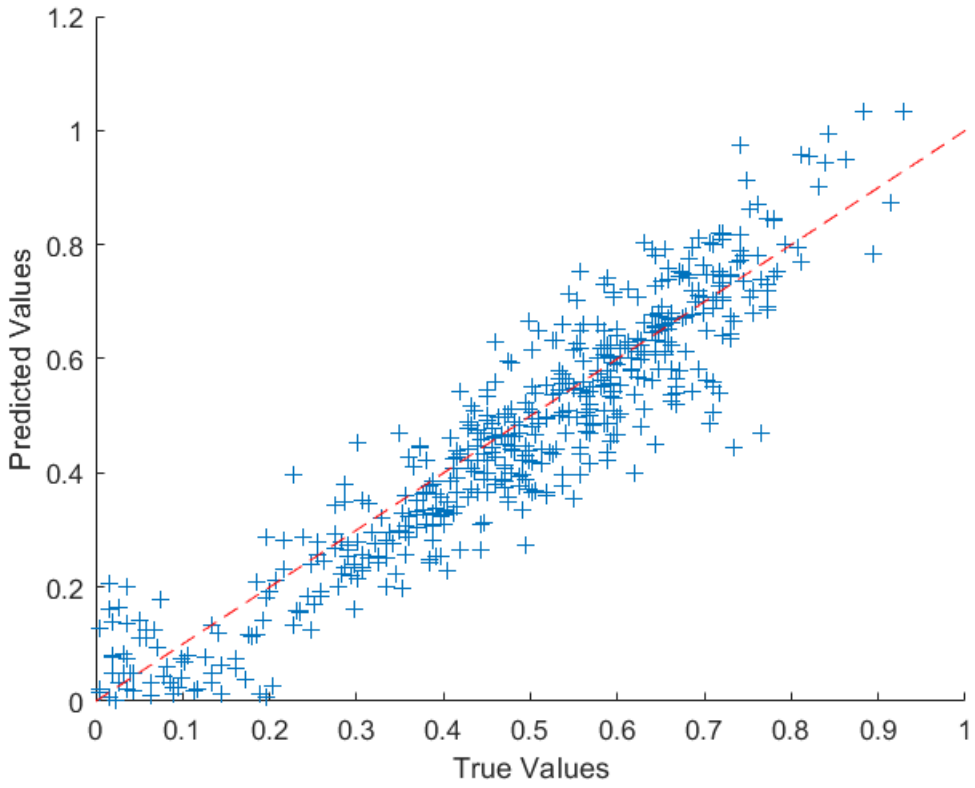
```
Test_Pred_rmse = errperf(Y_Test,Test_Predicted,'rmse')
```

```
Test_Pred_rmse = single

    0.0781
```

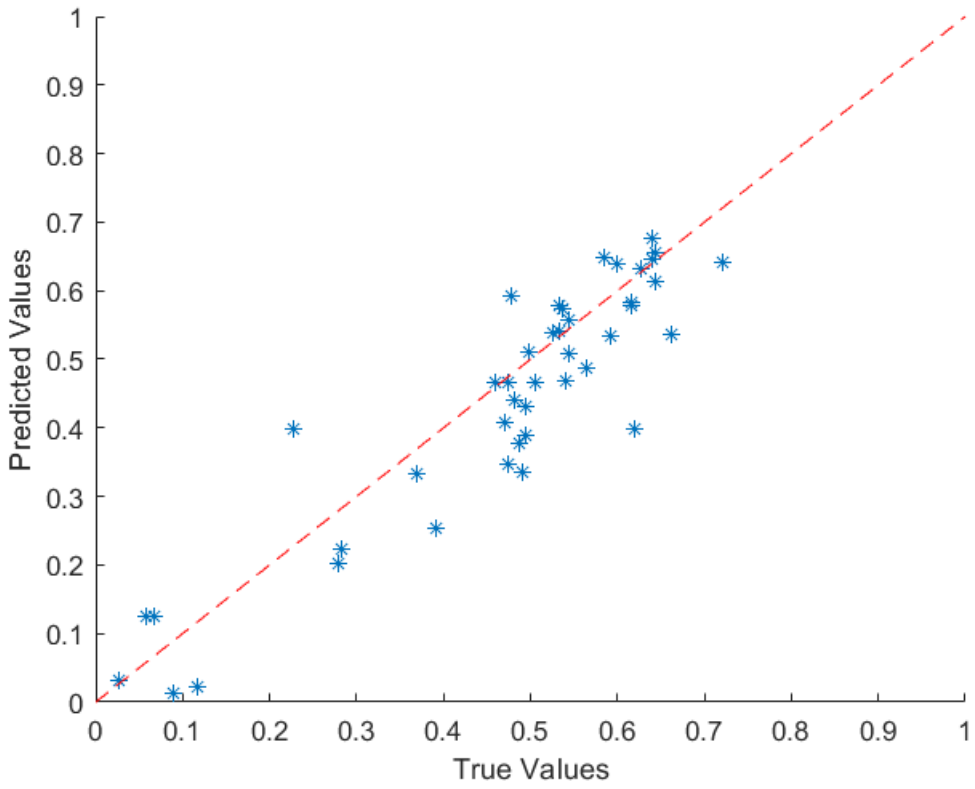
```
figure
scatter(Y_Train,Train_Predicted,'+')
xlabel("True Values")
ylabel("Predicted Values")

hold on
plot([0 1], [0 1],'r--')
```




```
figure
scatter(Y_Test,Test_Predicted,'*')
xlabel("True Values")
ylabel("Predicted Values")

hold on
plot([0 1], [0 1],'r--')
```




```
save('Int_effnet_sgdm_224X224_Repeatdata_12_11_21.mat')
```