Create Deep Learning Network Architecture with Pretrained Parameters

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

```
Number of layers: 43
Number of connections: 42
Pretrained parameters file: /MATLAB Drive/params_2020_11_22__22_06_14.mat
```

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

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

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Load the Pretrained Parameters

```
params = load("/home/basia/Documents/Filtry/params_2020_11_22__22_06_14.mat");
```

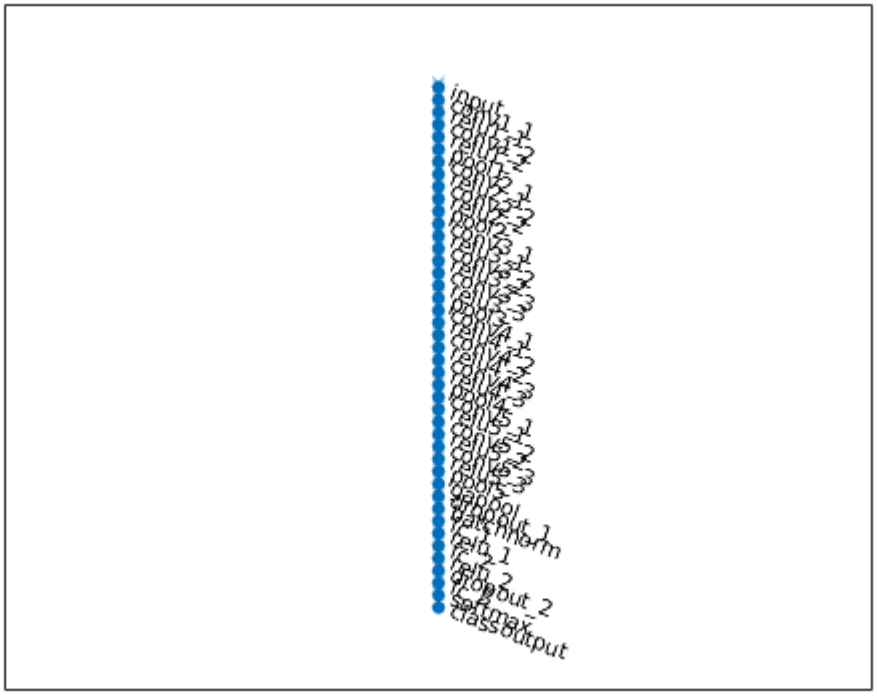
Create Array of Layers

```
layers = [
    imageInputLayer([224 224 3],"Name","input","Mean",params.input.Mean)
    convolution2dLayer([3 3],64,"Name","conv1_1","Padding",[1 1 1 1],"WeightL2Factor",0
    reluLayer("Name","relu1_1")
    convolution2dLayer([3 3],64,"Name","conv1_2","Padding",[1 1 1 1],"WeightL2Factor",0
    reluLayer("Name","relu1_2")
    maxPooling2dLayer([2 2],"Name","pool1","Stride",[2 2])
    convolution2dLayer([3 3],128,"Name","conv2_1","Padding",[1 1 1 1],"WeightL2Factor",
    reluLayer("Name","relu2_1")
    convolution2dLayer([3 3],128,"Name","conv2_2","Padding",[1 1 1 1],"WeightL2Factor",
    reluLayer("Name","re" + ...
    "lu2_2")
    maxPooling2dLayer([2 2],"Name","pool2","Stride",[2 2])
    convolution2dLayer([3 3],256,"Name","conv3_1","Padding",[1 1 1 1],"WeightL2Factor",
    reluLayer("Name","relu3_1")
    convolution2dLayer([3 3],256,"Name","conv3_2","Padding",[1 1 1 1],"WeightL2Factor",
    reluLayer("Name","relu3_2")
    convolution2dLayer([3 3],256,"Name","conv3_3","Padding",[1 1 1 1],"WeightL2Factor",
    reluLayer("Name","relu3_3")
    maxPooling2dLayer([2 2],"Name","pool3","Stride",[2 2])
    convolution2dLayer([3 3],512,"Name","conv4_1","Padding",[1 1 1 1],"WeightL2Factor",
    reluLayer("Name","relu4_1")
    convolution2dLayer([3 3],512,"Name","conv4_2","Padding",[1 1 1 1],"WeightL2Factor",
    reluLayer("Name","relu4_2")
    convolution2dLayer([3 3],512,"Name","conv4_3","Padding",[1 1 1 1],"WeightL2Factor",
    reluLayer("Name","relu4_3")
    maxPooling2dLayer([2 2],"Name","pool4","Stride",[2 2])
    convolution2dLayer([3 3],512,"Name","conv5_1","Padding",[1 1 1 1],"WeightL2Factor",
    reluLayer("Name","relu5_1")
    convolution2dLayer([3 3],512,"Name","conv5_2","Padding",[1 1 1 1],"WeightL2Factor",
    reluLayer("Name","relu5_2")
    convolution2dLayer([3 3],512,"Name","conv5_3","Padding",[1 1 1 1],"WeightL2Factor",
```

```
    reluLayer("Name","relu5_3")
    maxPooling2dLayer([2 2],"Name","pool5","Stride",[2 2])
    globalAveragePooling2dLayer("Name","gapool")
    dropoutLayer(0.2,"Name","dropout_1")
    batchNormalizationLayer("Name","batchnorm")
    fullyConnectedLayer(4096,"Name","fc_1")
    reluLayer("Name","relu_1")
    fullyConnectedLayer(4096,"Name","fc_2")
    reluLayer("Name","relu_2")
    dropoutLayer(0.2,"Name","dropout_2")
    fullyConnectedLayer(6,"Name","fc_3")
    softmaxLayer("Name","softmax")
    classificationLayer("Name","classoutput")];
```

Plot Layer

```
plot(layerGraph(layers));
```



Import Data

```
data = imageDatastore('/home/basia/Documents/Filtry/titan/', ...
    'IncludeSubfolders', true, ...
    'LabelSource', 'foldernames');
imageSize = layers(1).InputSize;
%data.ReadFcn = @(data)imresize(imread(data),imageSize);
[trainingSet, testSet] = splitEachLabel(data, 0.2);
```

```
auimdsTrain = augmentedImageDatastore(imageSize,trainingSet,'ColorPreprocessing','gray2
auimdsTest = augmentedImageDatastore(imageSize,testSet,'ColorPreprocessing','gray2rgb')

auimdsTrain.preview()
```

ans = 8×2 table

	input	response
1	224×224×3 ...	AML
2	224×224×3 ...	AML
3	224×224×3 ...	AML
4	224×224×3 ...	AML
5	224×224×3 ...	AML
6	224×224×3 ...	AML
7	224×224×3 ...	AML
8	224×224×3 ...	AML

Training Options

```
options = trainingOptions('rmsprop', "MaxEpochs",10, 'MiniBatchSize', 32, "Plots","trai
```

Train

```
tumornet = trainNetwork(auimdsTrain, layers, options);
```

```
Training on single GPU.
Initializing input data normalization.
|=========================================================================================================
|  Epoch  |  Iteration  |  Time Elapsed  |  Mini-batch  |  Validation  |  Mini-batch  |  Validation  |  Ba
|         |             |   (hh:mm:ss)   |   Accuracy   |   Accuracy   |     Loss     |     Loss     |
|=========================================================================================================
|       1 |           1 |       00:00:14 |        6.25% |       51.93% |       1.9409 |       7.2600 |
|       1 |          10 |       00:00:52 |       43.75% |       53.44% |       1.4737 |       1.4507 |
|       2 |          20 |       00:01:33 |       46.88% |       51.63% |       1.5931 |       1.3076 |
|       3 |          30 |       00:02:14 |       43.75% |       51.85% |       1.3263 |       1.3112 |
|       4 |          40 |       00:02:55 |       46.88% |       51.63% |       1.2692 |       1.4397 |
|       5 |          50 |       00:03:36 |       53.12% |       51.55% |       1.2751 |       2.3018 |
|       6 |          60 |       00:04:19 |       53.12% |       51.93% |       1.3269 |       1.3951 |
|       7 |          70 |       00:05:00 |       50.00% |       51.93% |       1.2849 |       1.3923 |
|       8 |          80 |       00:05:39 |       43.75% |       51.93% |       1.3671 |       1.4694 |
|       9 |          90 |       00:06:09 |       50.00% |       51.93% |       1.2438 |       1.2982 |
|      10 |         100 |       00:06:50 |       50.00% |       52.61% |       1.2802 |       1.3621 |
|=========================================================================================================
```