
IMAGE PROCESSING USING CNN CLASSIFIERS

Table of Contents

AUTHOR	1
Load and explore the data	1
Display images of datastore	1
Calculate the number of images in each category	2
Specify the image sizes	3
Dive the dataset into Training and Validation	3
Define the CNN architecture	3
Specify Training options	3
Train the network	3
Classify Validated Images	4
Calculate the Accuracy	4

AUTHOR

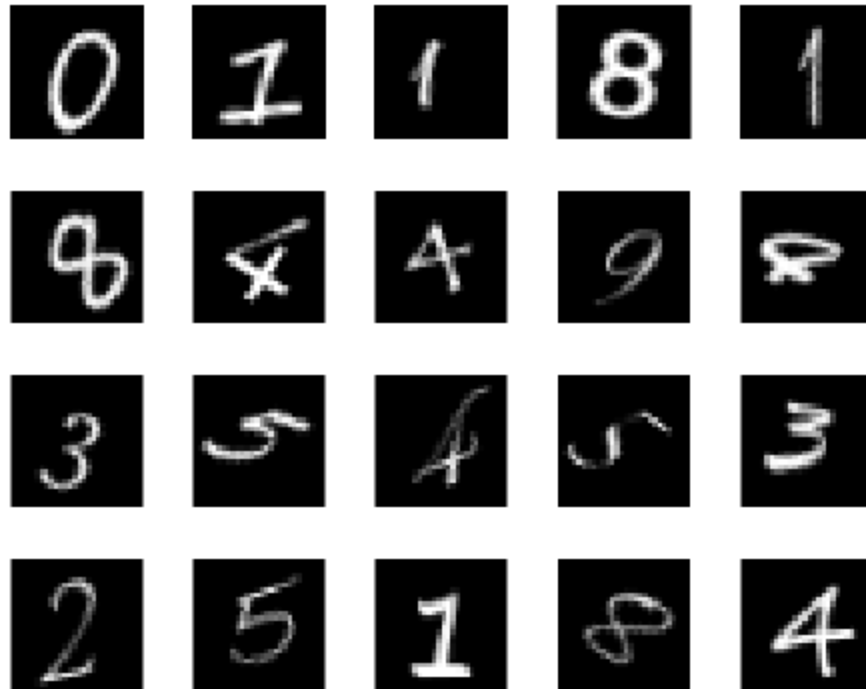
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Load and explore the data

```
digitDatasetPath = fullfile(matlabroot,'toolbox','nnet','nndemos', ...  
    'nndatasets','DigitDataset');  
imds = imageDatastore(digitDatasetPath, ...  
    'IncludeSubfolders',true,'LabelSource','foldernames');
```

Display images of datastore

```
figure(1),perm = randperm(10000,20);  
for i = 1:20  
    subplot(4,5,i);  
    imshow(imds.Files{perm(i)});  
end
```



Calculate the number of images in each category

```
labelCount = countEachLabel(imds)
```

```
labelCount =
```

```
10×2 table
```

<i>Label</i>	<i>Count</i>
0	1000
1	1000
2	1000
3	1000
4	1000
5	1000
6	1000
7	1000
8	1000
9	1000

Specify the image sizes

```
img = readimage(imds,1);  
size(img)
```

```
ans =  
  
    28    28
```

Dive the dataset into Training and Validation

```
numTrainFiles = 750;  
[imdsTrain,imdsValidation] =  
    splitEachLabel(imds,numTrainFiles,'randomize');
```

Define the CNN architecture

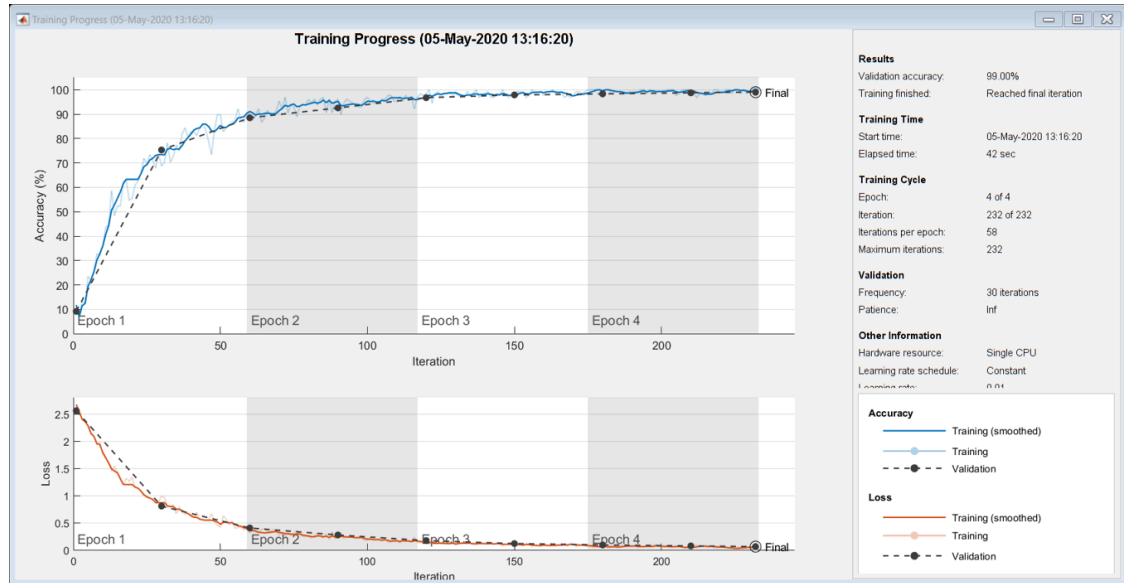
```
layers = [  
    imageInputLayer([28 28 1])  
    convolution2dLayer(3,8,'Padding','same')  
    batchNormalizationLayer  
    reluLayer  
    maxPooling2dLayer(2,'Stride',2)  
    convolution2dLayer(3,16,'Padding','same')  
    batchNormalizationLayer  
    reluLayer  
    maxPooling2dLayer(2,'Stride',2)  
    convolution2dLayer(3,32,'Padding','same')  
    batchNormalizationLayer  
    reluLayer  
    fullyConnectedLayer(10)  
    softmaxLayer  
    classificationLayer];
```

Specify Training options

```
options = trainingOptions('sgdm', ...  
    'InitialLearnRate',0.01, ...  
    'MaxEpochs',4, ...  
    'Shuffle','every-epoch', ...  
    'ValidationData',imdsValidation, ...  
    'ValidationFrequency',30, ...  
    'Verbose',false, ...  
    'Plots','training-progress');
```

Train the network

```
net = trainNetwork(imdsTrain,layers,options);
```



Classify Validated Images

```
YPred = classify(net,imdsValidation);  
YValidation = imdsValidation.Labels;
```

Calculate the Accuracy

```
accuracy = sum(YPred == YValidation)/numel(YValidation)
```

```
accuracy =
```

```
0.9900
```

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