Tai Duc Nguyen - ECEC 487 - 10/26/2019

Homework Part 0

a. What accuracy do you obtain?

Attempt 1: 98.80%

Attempt 2: 98.96%

Attempt 3: 99.00%

Attempt 4: 98.72%

Attempt 5: 98.92%

Compare the accuracy of your solution with the example solution. If they differ, explain why. If they are the same, explain why

The accuracies obtained from my solution is different from that of the example solution (98.72%). These small differences are due to the randomized initial weights and biases at each neuron. Although the sensitivity of the network can tolerate different initializations through the **Batch Normalization Layer**, the network's outputs are still subjected to its initial conditions.

Show the digits at the beginning of the demo is an excellent visualization to confirm the inputs are correct. What would be a good visualization to validate the classification results?

A good visualization to validate the classification results can be made from a collage of:

- For each digits (0...10)
    - Wrong classifications and their original images
    - One correct classification and its original image
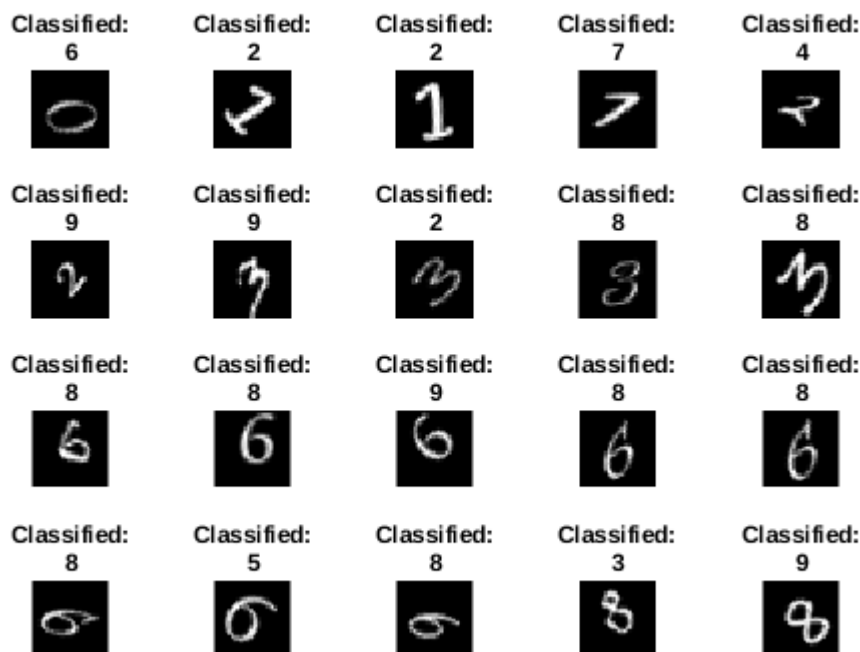
Extra credit: implement your visualization suggestion

```
WrongPred = YPred ~= YValidation;
WrongPredCatg = YPred(WrongPred);

WrongImg = find(WrongPred == 1);

figure;
sgtitle('20 Incorrect Classifications')
for i = 1:20
    subplot(4,5,i);
    imshow(imdsValidation.Files{WrongImg(i)});
    title(['Classified: ', WrongPredCatg(i)])
end
```
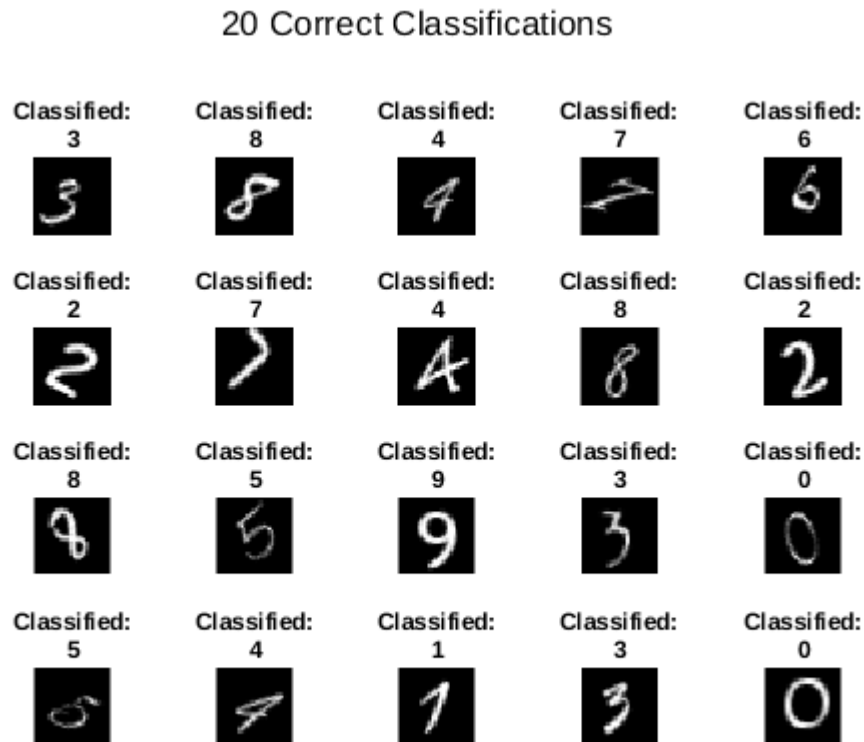

20 Incorrect Classifications

```
CorrectPred = YPred == YValidation;
CorrectPredCatg = YPred(CorrectPred);
idx=randperm(length(CorrectPredCatg));

CorrectImg = find(CorrectPred == 1);
```

```
figure;
sgtitle('20 Correct Classifications')
for i = 1:20
    subplot(4,5,i);
    imshow(imdsValidation.Files{CorrectImg(idx(i))});
    title(['Classified: ', CorrectPredCatg(idx(i))])
end
```


20 Correct Classifications

Homework Part 1 (Next Page)