Sensitivity analysis of LeNet5 architecture on MNIST

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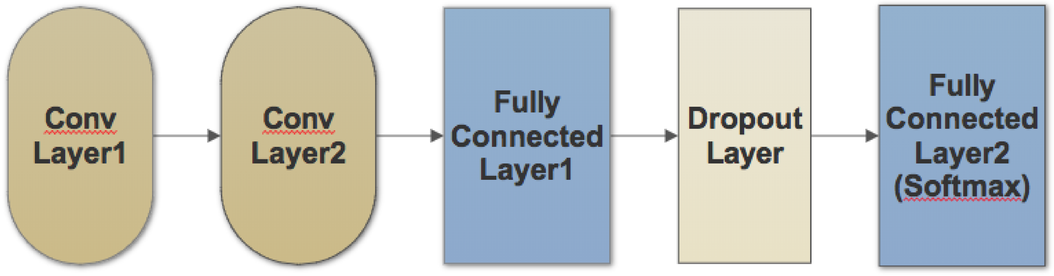
Research Questions

- How does partial occlusion affect classification performance? Over all test set? Per class?
- For single class/image, what location of the patch is more important?
- What kind of pattern do we expect for the location of patches?

Methodology

- Structure of our Network



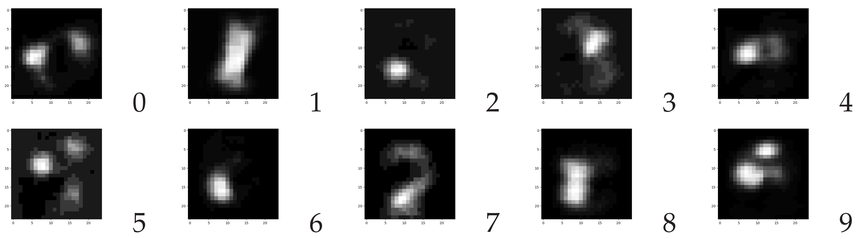
- Train the network with the original images
- Assess the performance over all images with patches
- Assess the performance of each digit class

A little look ahead

- We will try to finish the following and add the result in our project report
- Train the network with images with patch, and then compare the performance with our current network

Results

- The heat map shows the most important location regarding each class
- If the bright area is blocked by patch, the accuracy will be significantly lower



Interpretation

- As the size of the patch increase, the performance drops
- At some certain location, the patch misleads the network and result in misclassification, and the location varies for different class
- Initial expectation of the heat map is that the bright area gives a fairly similar shape with the digit
- Result shows slightly different than initial guess, it turns out that the important bright area is not the whole digit shape, but partial
- The non-symmetric shape of the heatmap is reasonable

A Little Game – Human Brain vs Network