Project 0: Classification by Deep Learning

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October 11, 2017

Task 1: Train full LeNet, plot training/testing error

Download the CIFAR-10 Dataset, and train a LeNet on it. Plot the training error and the validation error against the training epoch (Figure 1).

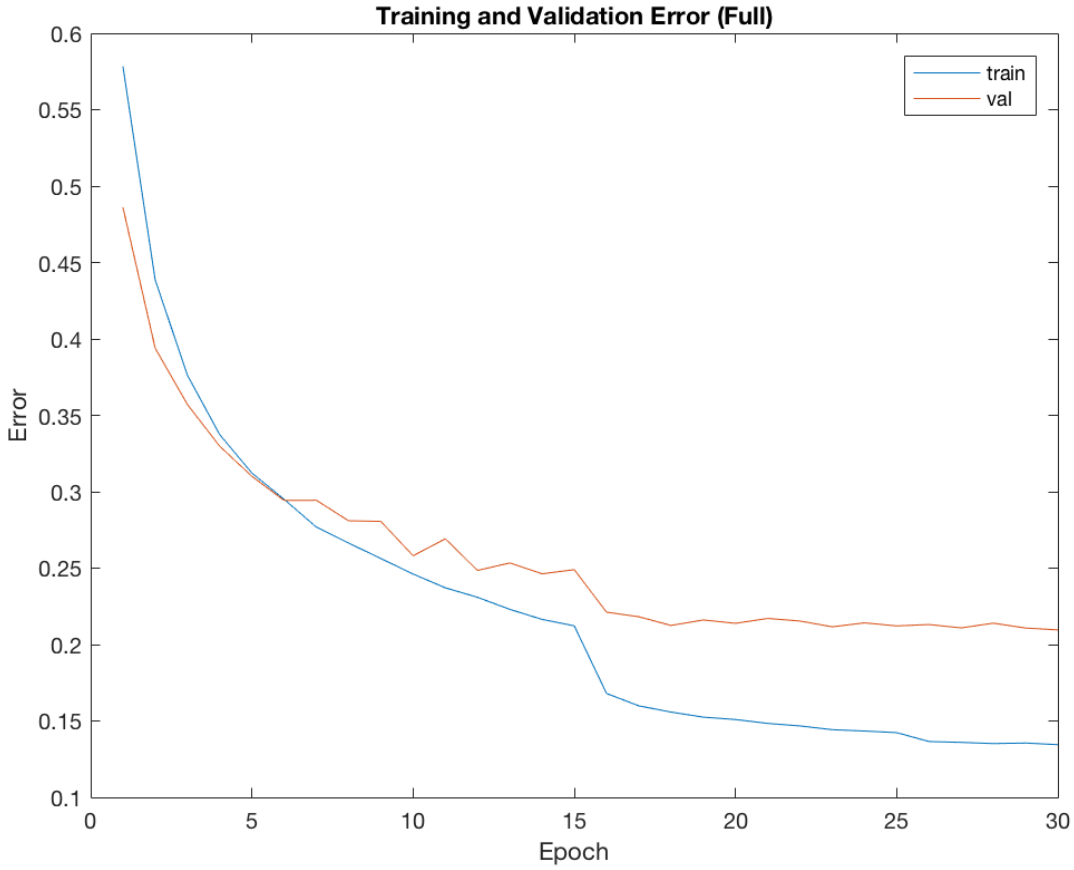

Figure 1: Training and validation errors for full training.

Task 2: Remove blocks

Keep Block5, and train a modified LeNet with only: i) Block1; ii) Block1 and Block2; iii) Block1, Block2 and Block3 respectively. Record the final training and validation errors (Table 1).

LeNet Structure	Full	i)	ii)	iii)
Training Error	0.1344800	0.7318000	0.4462000	0.3275800
Validation Error	0.2096000	0.7353200	0.4583000	0.3282000

Table 1: Training and validation errors for different LeNet structures.

From Table 1, we observe that as the number of hidden layers (blocks) of LeNet increases, both training and validation errors decrease.

Task 3: Visualize filter response

For each image, visualize the filter response maps of 32 filters in the first layer of LeNet.

Image 1: 

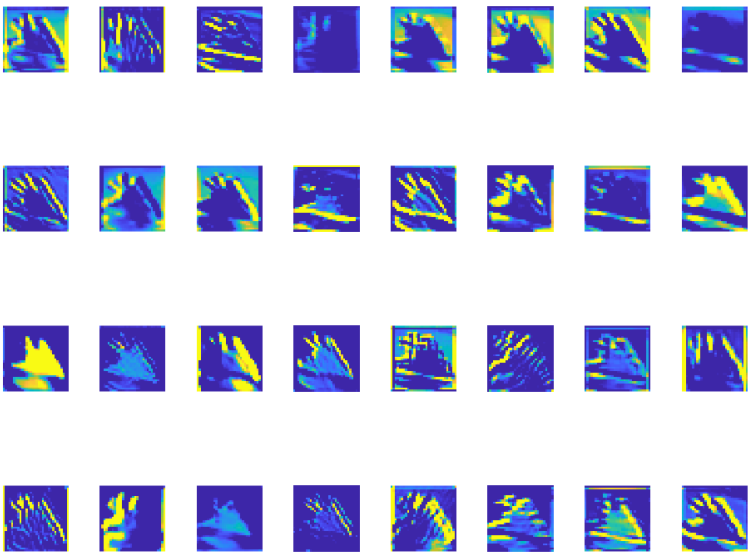

Image 2: 

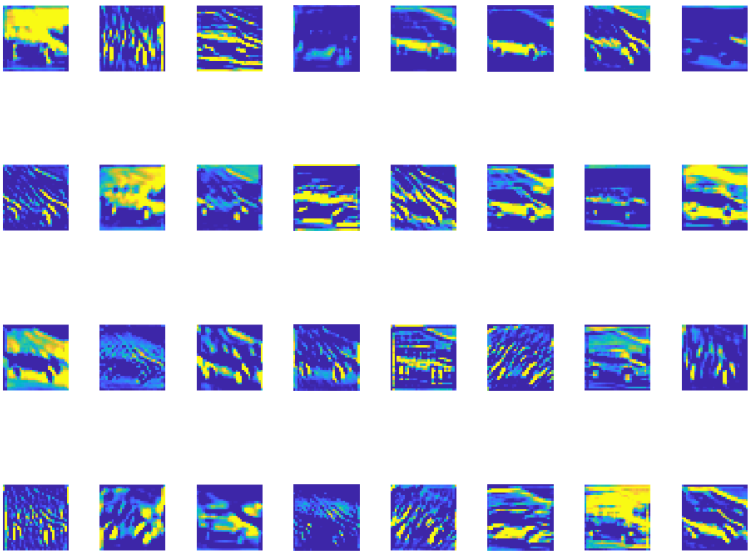

Image 3: 

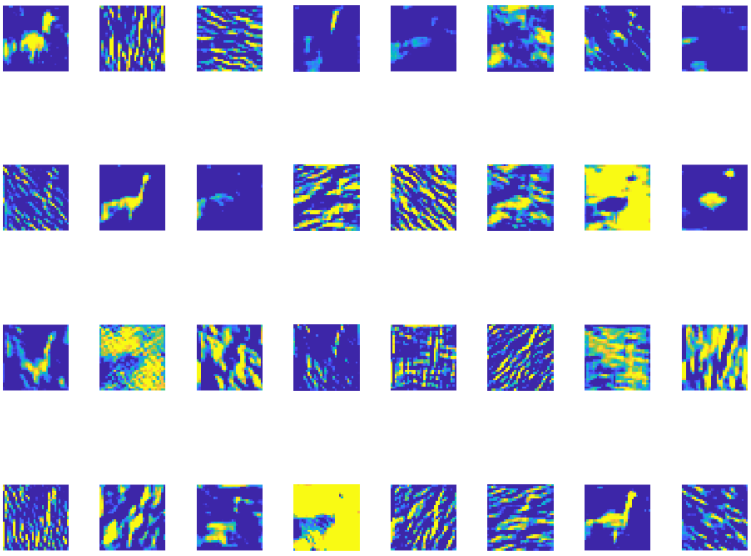

Image 4: 

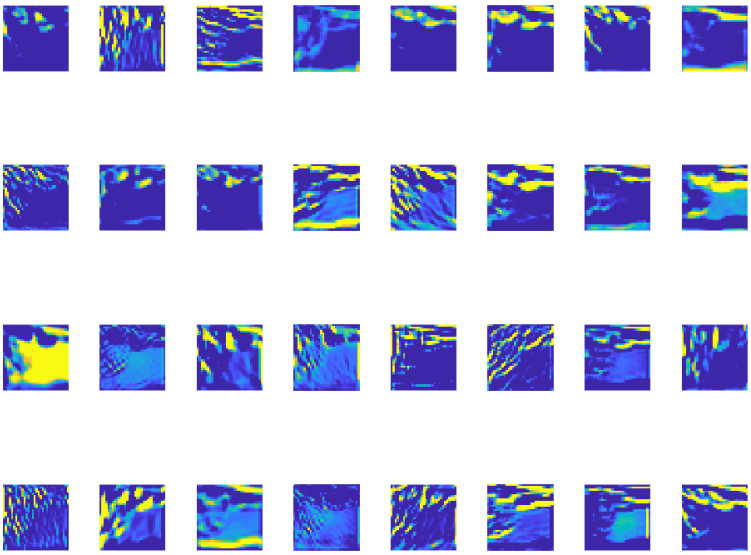

Image 5: 

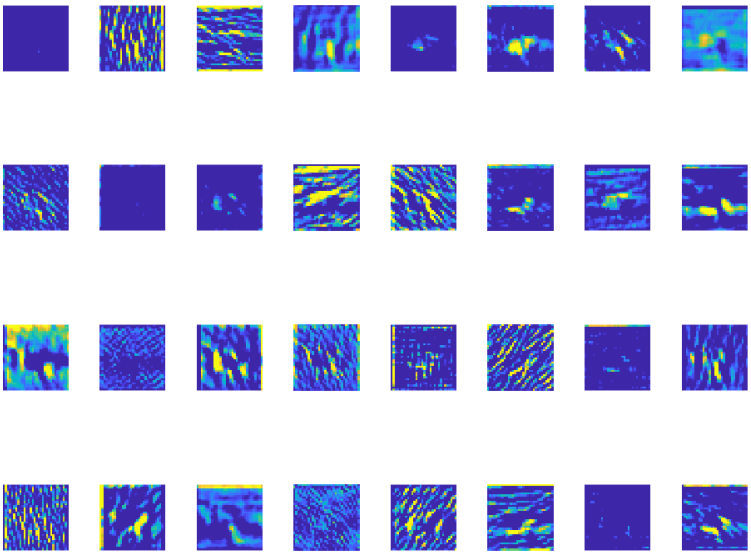

Image 6: 

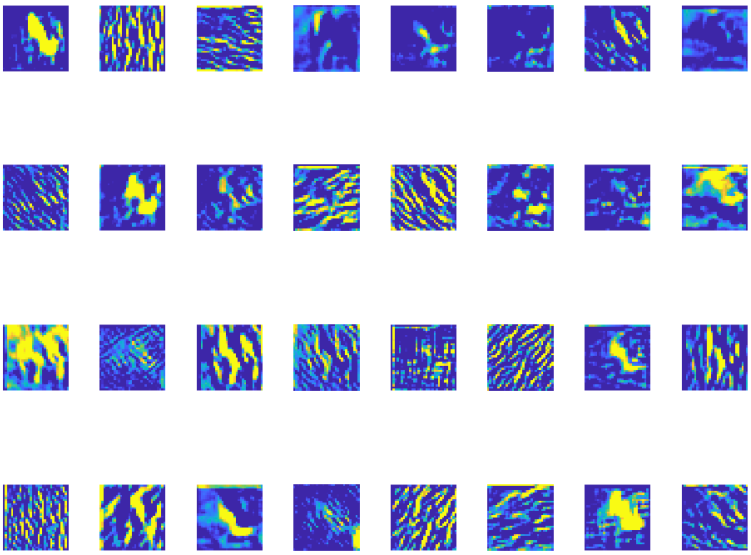

Image 7: 

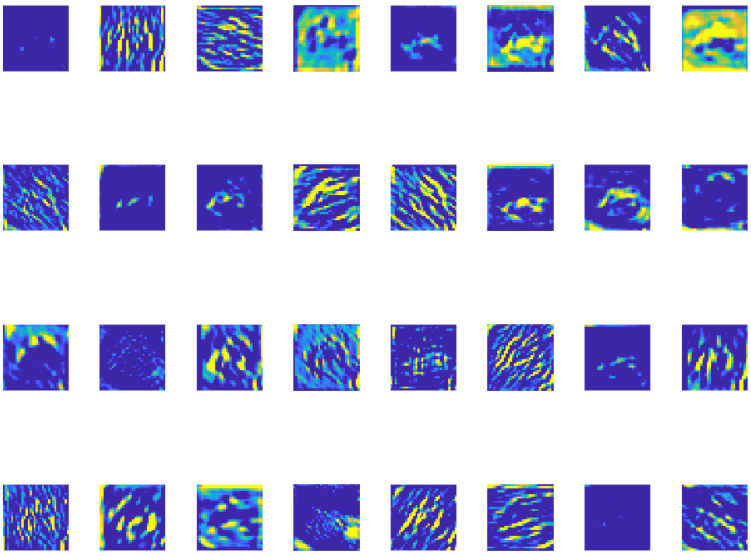

Image 8: 

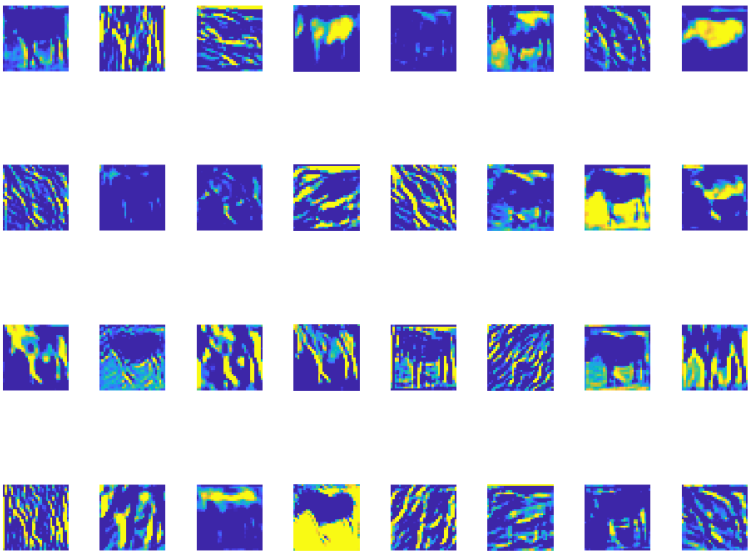

Image 9: 

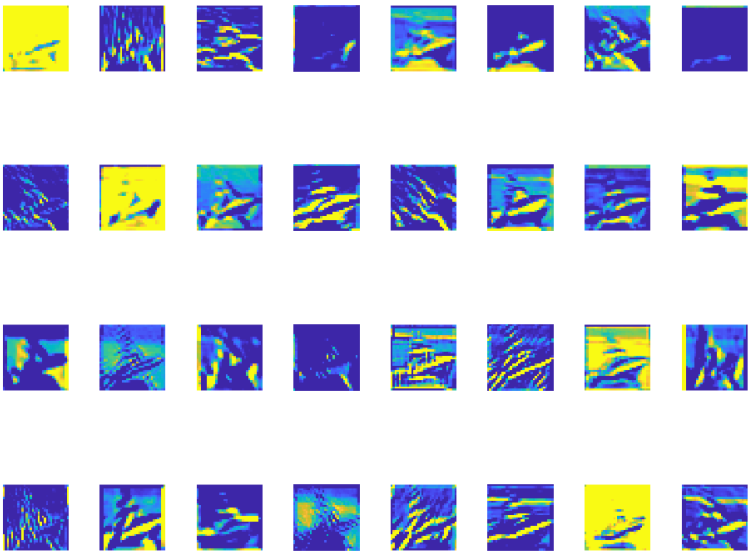

Image 10: