Cs543 hw 4 report

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1. Give the best classification accuracy achieved with your network at the top of the report. It should match the accuracy achieved by your best submission to the Kaggle competition.

My Score: **0.48480**

2. As in the past MPs, discuss your development process and any interesting implementation choices. Describe your network architecture. For each layer, list the layer functions, their parameters, input dimensions and output dimensions. Follow the same format as for the MNIST sample network below. [Image]

Ideally, you should justify the choices in your network architecture (i.e., show the performance with vs. without a given layer), but we realize that it may not be computationally feasible to test your variations, so just report any experiments you were able to do and try your best to motivate your architecture.

I read this paper whose network achieve about 75% accuracy on CIFAR-100. In its term, it used DeepCNiN(5, 300) to get this result. However, that's too computationally expensive for my laptop. So I experimented around and finally use DeepCNet(4, 120), which has fewer layers and a lot fewer filters. It took me about 12 hours and the result is about 48%.

Layer	Type	Name	Input	Filter	Pad	Stride	Output

1	conv	1*k C3	32x32x3	3x3x3x120	8	1	46x46x120
2	relu		46x46x120	Max(0, x)	0		46x46x120
3	maxpool	MP2	46x46x120	2x2	0	2	23x23x120
4	conv	2*k C2	23x23x120	2x2x120x240	0	1	22x22x240
5	relu		22x22x240	Max(0, x)	0		22x22x240
6	maxpool	MP2	22x22x240	2x2	0	2	11x11x240
7	conv	3*k C2	11x11x240	2x2x240x360	0	1	10x10x360
8	relu		10x10x360	Max(0, x)	0		10x10x360
9	maxpool	MP2	10x10x360	2x2	0	2	5x5x360
10	conv	4*k C2	5x5x360	2x2x360x480	0	1	4x4x480
11	relu		4x4x480	Max(0, x)	0		4x4x480
12	maxpool	MP2	4x4x480	2x2	0	2	2x2x480
13	conv	100 C2	2x2x480	2x2x480x100	0	1	1x1x100
14	relu		1x1x100	Max(0, x)	0		1x1x100
15	softmaxloss		1x1x100		0		1x100

3. For the following hyper-parameters, report the values that you used, and discuss how changing these parameters impacts running time and accuracy.

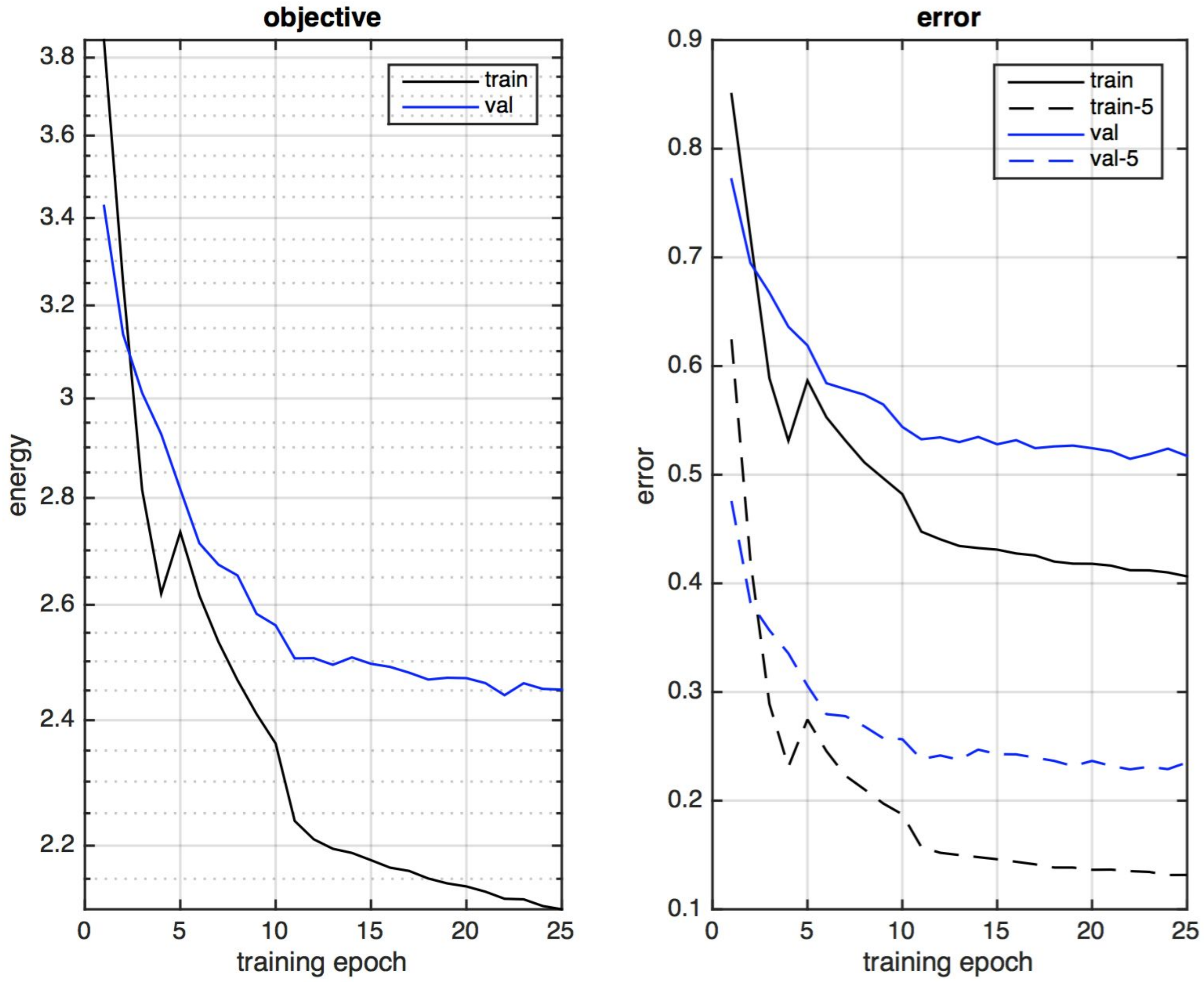
- mini-batch size (smaller vs. larger)

- learning rate (initial value? decay?)
- Iterations

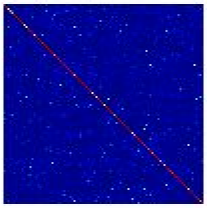
I just used the default parameters for all these.

4. Plot your training/validation error vs training iteration/epoch. Here is an example plot for MNIST: [image]

The lines for training and validation set apart far from each other after a few epochs. Clearly, my network has some serious overfitting problem.



5. Show the confusion matrix for your network (see examples above). Discuss which classes are the most confused with each other and why.



I wrote a script to output the most significant mistakes.

From a human's viewpoint, many mistakes are quite reasonable, such as bicycles mistaken as motorcycles, boys mistaken as girls, and dolphins mistaken as sharks.

Some mistakes are a lot less likely made by humans, but they at least naturally belong to a larger category. For example, bears are mistaken as chimpanzees. And spiders are mistaken as cockroaches.

Here are the 27 most confused classses:

- Some bear's are mistaken as chimpanzee's.
- Some bicycle's are mistaken as motorcycle's.
- Some boy's are mistaken as girl's.
- Some bus's are mistaken as pickup_truck's.
- Some bus's are mistaken as streetcar's.
- Some camel's are mistaken as cattle's.
- Some cloud's are mistaken as sea's.
- Some dolphin's are mistaken as shark's.
- Some dolphin's are mistaken as whale's.
- Some house's are mistaken as castle's.

- Some lamp's are mistaken as cup's.
- Some man's are mistaken as boy's.
- Some man's are mistaken as woman's.
- Some maple_tree's are mistaken as oak_tree's.
- Some maple_tree's are mistaken as willow_tree's.
- Some plain's are mistaken as sea's.
- Some poppy's are mistaken as rose's.
- Some rose's are mistaken as tulip's.
- Some shark's are mistaken as ray's.
- Some spider's are mistaken as cockroach's.
- Some streetcar's are mistaken as bus's.
- Some train's are mistaken as streetcar's.
- Some tulip's are mistaken as orchid's.
- Some tulip's are mistaken as poppy's.
- Some tulip's are mistaken as rose's.
- Some wolf's are mistaken as possum's.
- Some woman's are mistaken as girl's.