ASSIGNMENT 2 — PRACTICAL PART
CONVOLUTIONAL NEURAL NETWORKS

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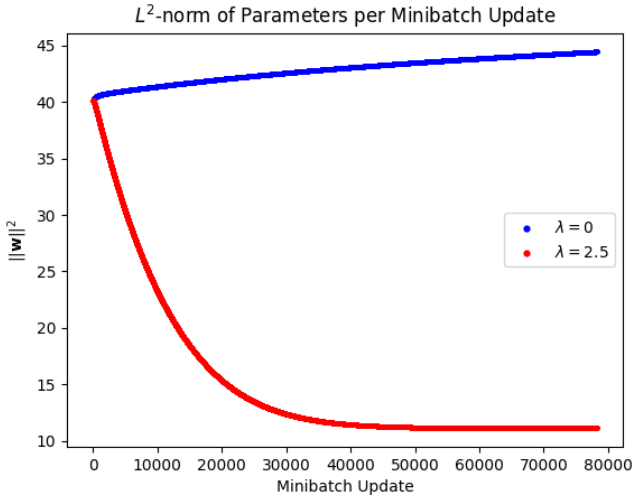
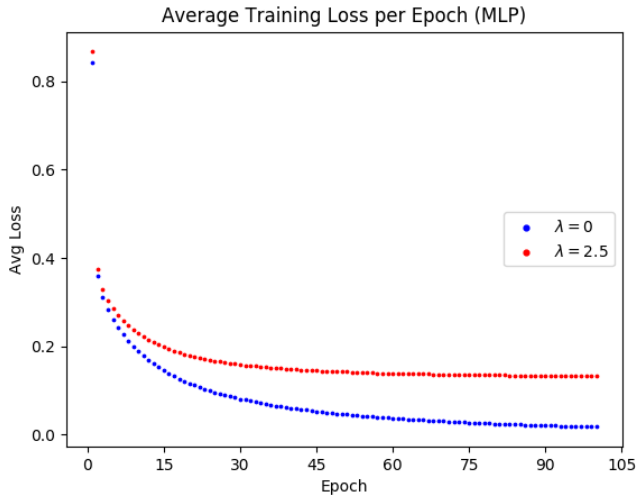
1 REGULARIZATION

(a) *Early stopping and weight decay.* We plot the L^2-norm of all parameters $\mathbf{w}$ at each minibatch update for 100 epochs. To adapt the loss for minibatch SGD, we rescaled the regularization coefficient as $\lambda \leftarrow \lambda b/|\mathbf{X}|$, where b is the batch size and $\mathbf{X}$ is the entire training set. We also plot the average loss on the training set for both schemes.





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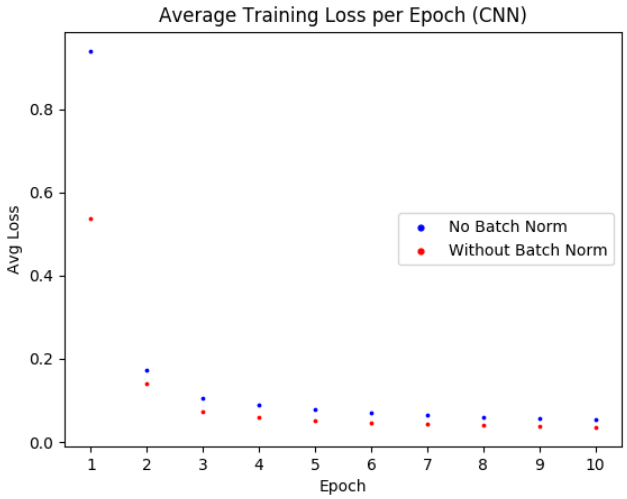
(b) *Dropout.*

(c) *Convolutional networks.* We plot the error at the end of each epoch for the model.



2 DOGS VS. CATS CLASSIFICATION

We have resized the images to $3 \times 64 \times 64$ pixels using the Python script provided and separated the dataset into training/valid/test sets as follows. The index ranges apply to both dogs and cats, making each subsets' class distributions equal.

Index range	[0, 7 499]	[7 500, 9 999]	[10 000, 12 499]
Dataset	TRAIN	VALID	TEST
Size	15 000	5 000	5 000

Table 1: Splitting the Dogs vs. Cats dataset.

(a) *Architecture.*

(b) *Performance on test set.*

(c) *Visualization and possible improvements.*