Is it Raining Cats or Dogs?

LESLIE JUENGST

SAMANTHA ROBERTS

Introduction

The ability to properly classify images of different species of animals is a complex and delicate problem. The refinement and satisfactory solution to a problem such as this has wide application in industries such as agriculture, health services and animal services.

One impactful example is classifying species of mosquitoes known to carry the Zika virus to identify high-risk areas with minimal cost.

Data Set:
- Cats and Dogs Breeds Classification Oxford Dataset
- Located at https://www.kaggle.com/zippyz/cats-and-dogs-breeds-classification-oxford-dataset
- Dog/Cat classification
- 7,393 images

Methodology

Framework: Caffe

Models: LeNet, AlexNet

Data Preprocessing
◦ Renamed Files
◦ Train/test split
◦ Create_lmdb.py
 ◦ 3 .mat files removed
 ◦ 6 corrupt files

Layers & Functions

Model	Batch Size	Convl Layer #	Fully Connect Layer #	Dropout Layers	Loss Function	Output Function
LeNet	64	2	2	0	Stoch Grad Desc	Softmax
LeNet Version 1	1	3	3	2	AdamSolver	Cross Entropy
LeNet Version 2	1	2	2	0	AdamSolver	Softmax
AlexNet	64	5	3	2	Stoch Grad Desc	Softmax

Parameters

Model	Test Iteration	Test Interval	Learning Rate	Momentum	Weight Decay	Gamma
LeNet	100	500	0.01	0.9	0.0005	0.001
LeNet(upd) /AlexNet	50	100	0.001	0.5	0.0001	0.1

Results

Testing Steps
- Run 1: LeNet Baseline
- Run 2: LeNet Version 1
- Run 3: LeNet Version 3
- Run 4: AlexNet

Best Model: LeNet Version 2

Max Accuracy: 1.00%

Loss Value: 0.105658

Learning Rate: 0.000919131

Layers & Functions

Model	Batch Size	Convl Layer #	Fully Connect Layer #	Dropout	Loss Function
LeNet (2)	1	2	2	0	AdamSolver

Parameters

Test Iteration	Test Interval	Learning Rate	Momentum	Weight Decay	Gamma
50	100	0.001	0.5	0.0001	0.1

*Overfitting was addressed by adding the dropout layers, lowering the batch and iteration sizes, and utilizing Softmax.

Results
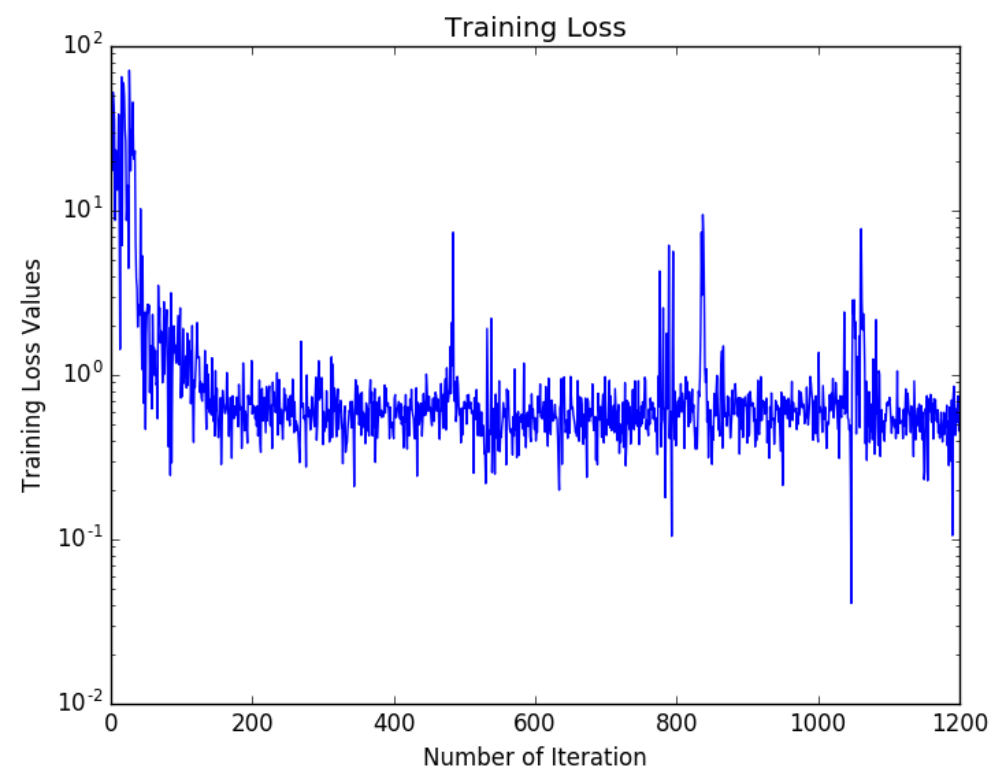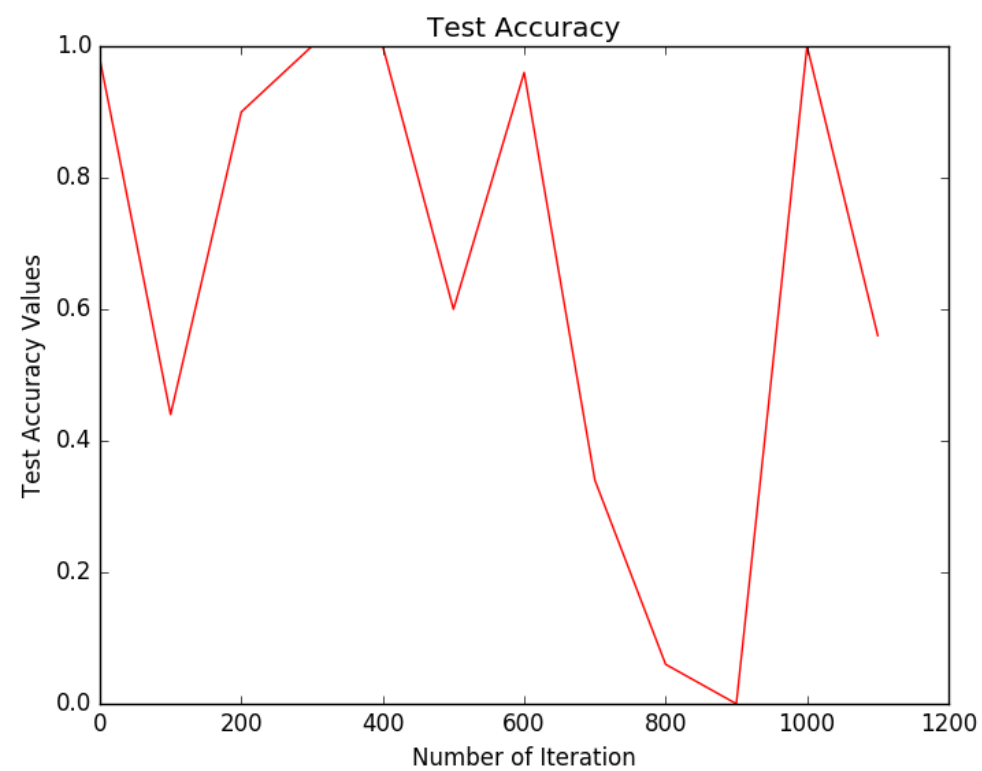
Conclusion

Lessons Learned:

Proper documentation is important!

Proper sample sizes!

Recommendations for Future Research:

Focus on the feature maps located within the hidden convolutional layers to determine ability to classify subspecies of dogs and cats. This would require a larger data set so additional data collection or oversampling techniques would be necessary.

Questions?