Midterm Assignment

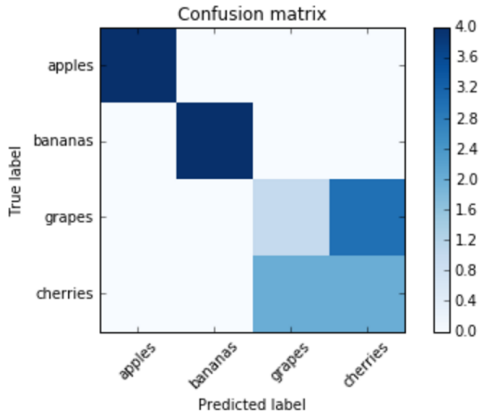
T81-559: Applications of Deep Neural Networks, Washington University September 30, 2016

The midterm exam will be submitted through the university Blackboard system. There is a space to enter the text from each of the 5 questions. You should need around 5-6 sentences to answer each question. Use more if you need. Make sure to submit your answers before the due date that is indicated in Blackboard. Make sure to support your answer, there are many correct answers.

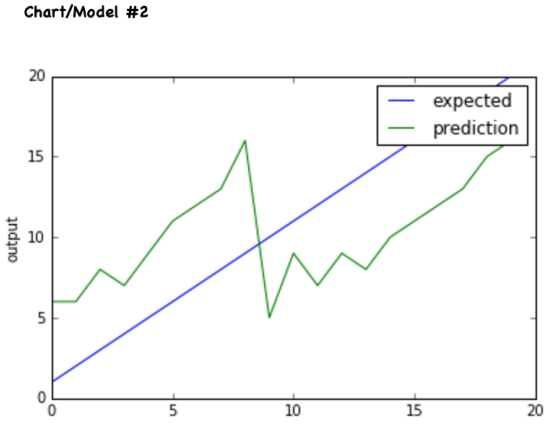
Question 1

Consider the following two charts (chart 1 and chart 2) that were generated from two different models and datasets. What do these charts tell you? Was the underlying model likely regression or classification for each? How might you numerically measure each of the two models (would you use RMSE or accuracy)?

Chart/Model #1



Chart/Model #2



Question 2

How might you encode each of the following values, what function would you use? Would it be different if you were trying to use the value as input (x) or as the prediction (y).

- Age
- Favorite Color
- Length
- Gender

What problems might you encounter encoding a value like zip code (as input)? How would you address these problems?

Question 3

How would your decision to use validation/holdout or k-fold cross validation affect your ability to obtain out-of-sample predictions from the neural network? Why are out of sample predictions important? What os overfitting, and how do you prevent it?

Question 4

What is the effect of using too large of a learning rate? What is the effect of too small? What role does momentum play in backpropagation? How does ADAM relate to learning rate and momentum?

Question 5

Give an example of a classification problem that you might use a neural network for. Give an example of a regression problem you might use a neural network for. For both, describe how you would evaluate the neural network.