CS294-082: Experimental Design for Machine Learning on Multimedia Data
Fall 2019

Homework 5
To be discussed: October 11th, 2019

1) More on MEC
a) What is the Memory Equivalent Capacity of a neuron with static weights?
b) With a) in mind, check the 4 rules on calculating the Memory Equivalent Capacity for neural networks to calculate the contribution of a convolutional layer to the overall capacity. Use the example of max pooling.
c) Instead of a single decision neuron, argmax() is often used as a decision function. How does this change the MEC? (still assume binary classification)

2) Expectations. Assume you have a hard disk with 1TB memory capacity. A friend wants to give you data that she says takes 1.7TB of space on her hard disk.
a) Would you trust your hard disk to store her data given you have a compression algorithm at hand that typically compresses data 2:1?
b) What could you do to practically to estimate that the data would fit (without actually starting the copying & compression of the entire hard disk)?
c) Outline an algorithm that would minimize the time and maximize the prediction quality of the expectation estimation from b) (hint: see ML Experimental Design Theory Cheat Sheet)

3) Form groups and email the project proposals by end of day October 11th, 2019. The proposal does not have to be final. Don't hesitate to ask questions anytime.