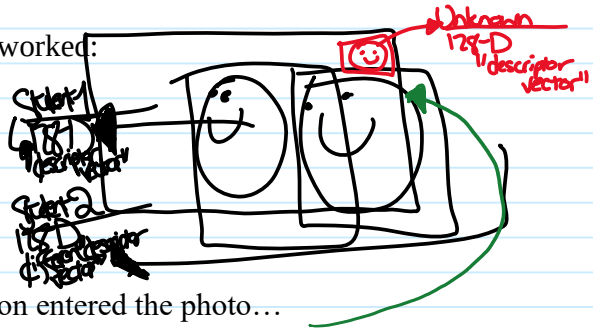
Week 2 Introduction

Monday, July 15, 2019 10:22 AM

Introduction: Demoed the Alexa program that recognized students based on photo:

Overview of how the program worked:



Suppose a third unknown person entered the photo…

Now take time to clone the repository and also install noggin using: *pip install mygrad noggin*

Overview for the Week

1. Machine Learning
   a. Definition
   b. "Problem Classes"
   c. Applications
2. Supervised Learning
   a. Gradient-based learning
3. Calculus
   a. What is $\frac{dl}{dw}$ (derivative)
   b. What is a gradient?
4. Auto-Differentiation Libraries
   a. Note (do not need to actually know calculus for this course as we use auto differentiation libraries that computes derivates for us)
   b. Some Examples: TensorFlow, PyTorch, MxNet, and the tool we will be using that was built for this course: MyGrad
5. Linear Algebra
   a. Quick cover of linear algebra to understand necessary mathematics for differentiation
6. What sort of mathematical functions are "good at learning"?
   a. Universal Function Approximator
   b. Let's suppose we have a function in the form: f(w,v,x), we will find "w" and "v" in a way that can help f(x) model whatever function we want
      i. Examples f(x) = sin(x) or f(x) = e^x
      ii. Think of the "w" and "v" as parameters for the function "f"
7. Neural Networks
   a. Dense neural networks
   b. 1- Dimensional Data
   c. 2- Dimensional Data
   d. ~3072 Dimensional Data
      i. The reasoning for 3072 is 1024 to represent the image and then multiply by 3 for the three possible color channels (r,g,b)
   e. We will differentiate data based on the pixel values
8. Convolutional Neural Networks (CNN)
   a. Convolutions
   b. Cooling
9. Capstone Project
   a. Face detection
   b. Face recognition
   c. Whispers Algorithm, which follows unsupervised learning