Gradient Based Learning

☰ Week	THURS. Week 5
☰ Assignment Due	HW2 Due — (Multi-Class Classification)
☑ Assignment Done	☑
📅 Due Date	@February 10, 2023 11:59 PM
☑ Notes Done	☑

Announcements

Homework 3 has been released as of today.

- It involves implementing LDA and logistic regression.

Class Notes

Logistic Regression Review

With logistic regression, we ask whether we can take the sum of the features, with some weight, and get a value that gives us a probability of class 1 in binary classification.

- <u>Goal:</u> Learn weights that gives us the best classification

- We want to set up an ***objective function***
    - We begin with the **<u>likelihood</u>** function, which depends on what y is.
        - Want to **maximize** this value as much as possible
        - To make calculus easier, we take the log of this likelihood, giving us the **<u>log likelihood</u>**.
        - Since many objective functions are called loss functions, we can negate this **<u>log likelihood</u>** function to minimize as much as possible.

- Essentially, we want weights and bias that will minimize this function as much as possible.
- To calc these weights, we can attempt:
  - A direct solution
    - Take derivate with respect to our weight, set it equal to 0, and solve for those weights.
    - <u>Pros:</u> Global solution
    - <u>Cons:</u> May not be feasible or even *possible* to solve
    - NOT possible with **log likelihood** function
  - A iterative solution
    - Start with an init guess and use derivatives wrt our weights to update the weights iteratively
    - <u>Pros:</u> Flexible
    - <u>Cons:</u> May take a while to get to a good solution (which may not be a global one)
    - This iterative approach is often called **<u>gradient ascent</u>** or **<u>hill climbing</u>**.

Notes continued on Logistic Regression notes from previous class