5. Passive-aggressive algorithm

Homework due Feb 22, 2023 08:59 -03 Past due

In this problem, we will try to understand the loss in Passive-Aggressive (PA) Perceptro

The passive-aggressive (PA) algorithm (without offset) responds to a labeled training e
θ that minimizes

$$\frac{\lambda}{2}\left\|\theta - \theta^{(k)}\right\|^2 + \text{Loss}_h\left(y\theta \cdot x\right)$$

where $\theta^{(k)}$ is the current setting of the parameters prior to encountering (x, y) and

$$\text{Loss}_h\left(y\theta \cdot x\right) = \max\{0, 1 - y\theta \cdot x\}$$

is the hinge loss. (If we wished, we could replace the loss function with something else
loss); this would give a different algorithm.) The above determines $\theta^{(k+1)}$ in terms of θ
exercise to write $\theta^{(k+1)}$ more concretely in terms of those latter parameters — i.e., to v
equation. The form of the update is similar to the perceptron algorithm, i.e.,

$$\theta^{(k+1)} = \theta^{(k)} + \eta\, y x$$

but the real-valued step-size parameter η is no longer equal to one; it now depends on
training example (x, y).

Update equation

1 point possible (graded)

Consider minimizing the above defined loss function with the hinge loss component.
What happens to the step size at large values of λ? Please choose one from the option

- ◯ If λ is large, the step-size of the algorithm (η) would be large
- ◯ If λ is large, the step-size of the algorithm (η) would be small

Submit You have used 0 of 3 attempts

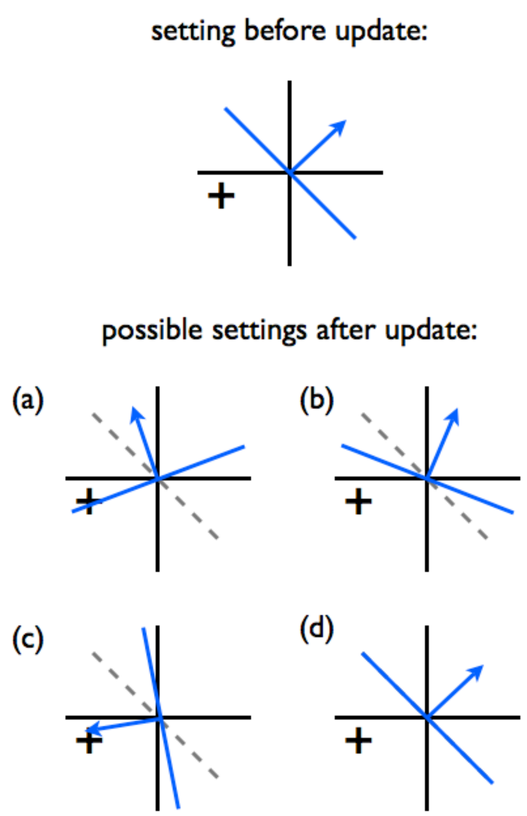
Loss functions and decision boundaries

0.0/1.0 point (graded)

Consider minimizing the above defined loss function and the setting of our decision bo
We ran our PA algorithm on the next data point in our sequence - a positively-labeled v
). We plotted the results of our algorithm after the update, by trying out a few differe
function and as follows:

1. hinge loss and a large
2. hinge loss and a small
3. 0-1 loss and a large
4. 0-1 loss and a small

Each of the options below provides a matching between the 4 variations above with a c
plotted in a-d below. Please choose the options that match them correctly. Note that th
correspond to the previous decision boundary, and the solid blue lines correspond to th
boundary; also, note that these are just sketches which ignore any changes to the mag



(a) Select an option

(b) Select an option

Last question answer explanation?

For 1-b, Loss can be minimised by moving theta vector towards example. Does the example mean the positiv

still confused about theta, theta_k and theta_k+1

I understand that theta is the output we want to get. theta_k is the current setting of parameters, and we up

Unclear if we should ditch influence of x, y in optimal parameter eta

It is unclear if we should ditch influence of x, y in optimal parameter eta.

Hinge Loss notatin -- subscript h

The hinge loss funciton is always written as "Loss_h", and I've been wondering what "h" refers to. It just dawn

dot product notation

Hi, how can I write the dot product of the vectors x and y? he is not recognizing dot(x,y). Should I use the *?

Loss function and decision boundaries

How do we determine the loss function and decision boundaries based on the graphs?

Where can I learn all that?

Can we at least get a list of resources where we could study all this? I can accept a gap, but this is all a comp

How to calculate step size question

lambda is in the objective function while the step size is in the updating of theta function. How do I link them

please read these highlights first

difference between hinge loss and 0-1 losshttps://discussions.edx.org/course-v1:MITx+6.86x+1T2023/topics

Community TA

Theta vs Theta_k?

This might be a stupid question, but I am having trouble wrapping my mind around the distinction between th

What is the "zero-one loss"?

Hi everyone. If I've been following this class attentively, we haven't defined what the "zero-one loss" is, right

differentiating a norm

Getting a little confused with differentiating norm vars. ie is norm(nyx)^2 differentiated with respect to theta

Relationship between magnitude of hinge loss and step size

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