4. Pegasos Algorithm

Bookmark this page

Project due Oct 7, 2020 05:29 IST *Completed*
Now you will implement the Pegasos algorithm. For more information, refer to the original paper at original paper.

The following pseudo-code describes the Pegasos update rule.

Pegasos update rule $\left(x^{(i)}, y^{(i)}, \lambda, \eta, \theta\right)$:
if $y^{(i)}\left(\theta \cdot x^{(i)}\right) \leq 1$ then
    update $\theta = (1 - \eta\lambda)\,\theta + \eta y^{(i)} x^{(i)}$
else:
    update $\theta = (1 - \eta\lambda)\,\theta$

The η parameter is a decaying factor that will decrease over time. The λ parameter is a regularizing parameter.

In this problem, you will need to adapt this update rule to add a bias term (θ_0) to the hypothesis, but take care not to penalize the magnitude of θ_0.

Pegasos Single Step Update

1.0/1 point (graded)
Next you will implement the single step update for the Pegasos algorithm. This function is very similar to the function that you implemented in **Perceptron Single Step Update**, except that it should utilize the Pegasos parameter update rules instead of those for perceptron. The function will also be passed a λ and η value to use for updates.

Available Functions: You have access to the NumPy python library as `np`.

```
def pegasos_single_step_update(
        feature_vector,
        label,
        L,
        eta,
        current_theta,
        current_theta_0):
    """
    Properly updates the classification parameter, theta and theta_0, on a
    single step of the Pegasos algorithm

    Args:
        feature_vector - A numpy array describing a single data point.
        label - The correct classification of the feature vector.
        L - The lamba value being used to update the parameters.
        eta - Learning rate to update parameters
```

Press ESC then TAB or click outside of the code editor to exit

Correct

Test results

See full output

CORRECT

See full output

Submit You have used 3 of 25 attempts

Full Pegasos Algorithm

1.0/1 point (graded)

Finally you will implement the full Pegasos algorithm. You will be given the same feature matrix and labels array as you were given in **Full Perceptron Algorithm**. You will also be given T, the maximum number of times that you should iterate through the feature matrix before terminating the algorithm. Initialize θ and θ_0 to zero. For each update, set $\eta = \frac{1}{\sqrt{t}}$ where t is a counter for the number of updates performed so far (between 1 and nT inclusive). This function should return a tuple in which the first element is the final value of θ and the second element is the value of θ_0.

Note: Please call `get_order(feature_matrix.shape[0])`, and use the ordering to iterate the feature matrix in each iteration. The ordering is specified due to grading purpose. In practice, people typically just randomly shuffle indices to do stochastic optimization.

Available Functions: You have access to the NumPy python library as `np` and `pegasos_single_step_update` which you have already implemented.

```
def pegasos(feature_matrix, labels, T, L):
    """
    Runs the Pegasos algorithm on a given set of data. Runs T
    iterations through the data set, there is no need to worry about
    stopping early.

    For each update, set learning rate = 1/sqrt(t),
    where t is a counter for the number of updates performed so far (between 1
    and nT inclusive).

    NOTE: Please use the previously implemented functions when applicable.
    Do not copy paste code from previous parts.

    Args:
        feature_matrix - A numpy matrix describing the given data. Each row
            represents a single data point
```

Press ESC then TAB or click outside of the code editor to exit

Correct

Test results

See full output

CORRECT

See full output

Submit You have used 2 of 25 attempts

Discussion

Hide Discussion

Topic: Unit 1 Linear Classifiers and Generalizations (2 weeks):Project 1: Automatic Review Analyzer / 4. Pegasos Algorithm

Add a Post

Show all posts by recent activity

? could you please briefly explain to me what is the terms eta and lambda ? 3
could you please briefly explain to me what is the terms eta and lambda ?

? Is there any resource other than the mentioned paper ? 6
I need a simpler material other than the paper explaining the Pegsos algorithm

? Type errors in pegasos_single_step_update (staff help needed?) 11
I sucessfully submitted pegasos_single_step_update, but realized when working on pegasos that using python * (in the pegasos_sing...

? [Staff] TypeError: only size-1 arrays can be converted to Python scalars? 2
I passed all check but the first one, I cannot figure out what's wrong? pegasos_single_step_update input: feature_vector: [-2.3297302...

Pegasos Single Step Update question 25
I am getting the output vector correct but not the bias. I can't tell if my code is wrong or the way I'm setting the bias is wrong. Basical...

💬	single pegasos step 1 Hi, i'm stuck on the single pegasos step update 1, the other update work's fine. I checked my code but i don't see.. i dont know why i...	11
💬	eta in full pegasos here is sqrt of the number of steps, unlike the paper. Why? In the paper, which I've admittedly only skimmed so far, there is no square root of eta. Eta is used to the first power. Are we suppos...	2
💬	Just need to clarify some intuition about pegasos (1−ηλ)θ this term corresponds to the regularization and ηy(i)x(i) this term corresponds to reducing errors. There is no penalizing thet...	2
?	[STAFF] What is the error in my Code?, it passes all tests, it passes all my set examples, but give different values for most examples(not all though). Please help!! as above, this one has driven me crazy, I do not see any fault in the code, please help: def pegasos(feature_matrix, labels, T, L): theta...	6
💬	Setting the Value of eta Hi, As described in the question the eta will be 1/sqrt(t) It makes sense to update eta at the starting of every itteration. Yet after pass...	6
?	Clarification needed Why does one need to use get_order(feature_matrix.shape[0]) ? I thought I would achieve the same thing by setting m = feature_mat...	2
?	get_order function Having problems with the Full Pegasos algorithm. The single step is fine. The full implementation, however, yields small differences ...	1
?	Website is responding badly: Staff can you please answer? [solved except the submit incorrect for the second exercise]	1

‹ Previous Next ›

Donate