Submission to SuperAGI

Amit Prasad (2020SIY7564)

November 2023

1 Question 1

$w_{new_0} = w_{old_0}$
$w_{new_1} = w_{old_1}$
.
.
.
$w_{new_n} = w_{old_n}$
$w_{new_{n+1}} = 0$
since the last attribute is redundant, the weight associated with it will be 0.

2 Question 2

a. We have too little data as variance needs to be provided to know the spread of the distributions for a t-test.

3 Question 3

The cost of the mentioned computation is the cost of calculating the following update

$$w^{t+1} \leftarrow w^t + \sum_i^m (y_i - h(x_i))x_i \tag{1}$$

where m is the number of examples and $h(x_i)$ is the value of the sigmoid function.

3.1 Cost of $(y_i - h(x_i))$

$O(n)$ as there are n subtractions. For simplicity, we do not factor in the cost encountered to find the value of exponentials.

3.2 Cost of $(y_i - h(x_i)) * x_i$

this comprises of $O(n)$ multiplications.

3.3 Cost of $\sum_{i=1}^{m}(y_i - h(x_i)) * x_i$

this comprises of $O(m)$ additions, each of which has a cost $O(n)$ as there are n elements. So $O(mn)$.

3.4 Cost of update

it requires one addition and one assignment of cost $O(n)$.

3.5 Total cost

$O(mn + n) = O(mn)$. Considering sparsity, this cost is $O(km + k)$.