## SVM Problems Solutions:

## Find a linear model that minimizes the training error,

In here we use a new and and for convenience. So by lecture note, we can easy to know that we get that the minimum will occur at that satisfy

So, let

If is invertible,

If is not invertible or poorly conditioned, we can assume a such that ,

## Assume there is some true linear model, such that...

From lecture we know that since , we have , so we can get

That is

So we can know that the expect of is which means and .

So we can know that

## Assume that each x value was sampled from some underlying distribution with expectation…

From 2). We get

And , , .

So we have:

## Argue that recentering the data…

For , we can have

For w and b after re-center, we have new variance(error):

And so , .

So,

Which means the error on b is minimized.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| Expect | 5.0736164989159445 | 0.9992722891965569 | 106.00011770778859 | 0.9992722891966043 |
| Variance | 14.097971581857914 | 0.0013819171525701675 | 0.0004828191987593426 | 0.0013819171525236787 |

It obvious make sense.

It’s because it just the translation transformation but not change the relative position in the axis. So the slope is not change.

And

So,

So, by

We know

In the same way, we know of is: we set

So,. If

So,

And

So,

So,

The same to