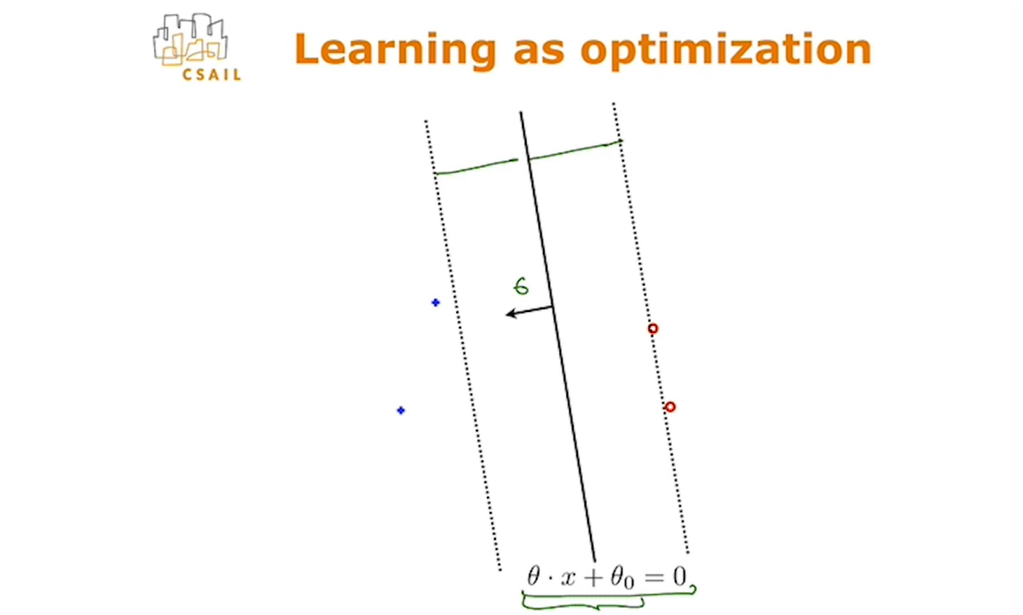
3. Margin Boundary
Margin Boundary



0:35 / 6:59 Speed 1.50x

and how we can control them, how far they are from the decision

boundary.

Remember that they are equidistant from the decision

boundary.

So let's look at now the decision

boundary, the equation, and the linear function that

is defined on the basis.

That linear function takes the value 0 at exactly on the decision boundary.

And if we move in the direction of theta,

that linear function--

that is theta dot x plus theta naught--

we'll start having more positive values.

We can then define the margin boundary

as the set of x's where this linear function takes the value

1 exactly.

We can see that this new boundary, right,

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The **decision boundary** is the set of points x which satisfy

$$\theta \cdot x + \theta_0 = 0.$$

The **Margin Boundary** is the set of points x which satisfy

$$\theta \cdot x + \theta_0 = \pm 1.$$

So, the distance from the decision boundary to the margin boundary is $\frac{1}{|| \theta ||}$.

Margin Boundary 1

1 point possible (graded)

As explained in the lecture video, margin boundary is the set of points (x, y) at which the distance from the decision boundary to (x, y) is $\frac{1}{||\theta||}$.

Now, what is the value of $y^{(i)} (\theta \cdot x^{(i)} + \theta_0)$ for a correctly classified point $(x^{(i)}, y^{(i)})$ on the margin boundary?

Answer: 1

Solution:

From the previous problem, we know that the distance from a line $L : \theta x + \theta_0 = 0$ to $P = (x_0)$ is given by $\frac{||\theta x_0 + \theta_0||}{||\theta||}$. Because we know that the distance from the decision boundary to (x, y) is $\frac{1}{||\theta||}$,

$$|| \theta x_0 + \theta_0 || = 1$$

. Thus,

$$|| \theta x_0 + \theta_0 || = y^{(i)} (\theta \cdot x^{(i)} + \theta_0) = 1$$

Submit You have used 0 of 2 attempts

Answers are displayed within the problem

Margin Boundary 2

1 point possible (graded)
What happens to the margin boundaries as we increase $||\ \theta\ ||$?

- The margin boundaries move closer to the decision boundary ✔
- The margin boundaries move further away from the decision boundary
- The margin boundaries converge to a certain location no matter what

Solution:

As we increase $||\ \theta\ ||$, $\frac{1}{||\theta||}$ decreases. For now, acknowledge that $\frac{1}{||\theta||}$ is the distance from the decision boundary to the margin boundary (which we will closely examine in the next set of problems.) Thus, the distance from the point $\left(x^{(i)}, y^{(i)}\right)$ that satisfy

$$y^{(i)}\left(\theta \cdot x^{(i)} + \theta_0\right) = 1$$

to the decision boundary will decrease. Thus the margin moves closer to the decision boundary.

Submit You have used 0 of 1 attempt

Answers are displayed within the problem

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Topic: Unit 1 Linear Classifiers and Generalizations (2 weeks):Lecture 3 Hinge loss, Margin boundaries and Regularization / 3. Margin Boundary

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The submit button remains grayed out

I've entered the answers to both questions, cannot press "Submit" because it's grayed out - is it only me? 3

? How does the value of the linear function (for the margin boundary) increase at a rate that's related to the norm of theta? 2
This was mentioned in the video for intuitively understanding how the norm of theta can be used to push the margins apart. (0) But I don't understand how the value of t...

Support Vector Machine 2
Its pretty similar for what we are studing on those lectures.

Why exactly is the margin boundaries being defined by the parameters we wish to optimize relevant for us to be able to push them apart? 3
That's what the video says - > And we can now try to push these apart, because they are-- > the margin boundaries themselves are also > defined by the parameters that ...

About margin and decision boundary 3
so to get rid of mislabeling clustered/noisy data we use this format. Its looks like a thick line with a width of 2. But if btw margin boundaries there is no point lies then why ...

Confused about use of y as coordinate in input space/margin boundary. 4

Degree of Freedom 3

Submitting Error 2
I get both of them correctly but there is check mark appeared next to the submit button but didnt appear on prev/next lesson part.

why marginal boundaries, Theta*X+Theta_0=1 or -1 ,not 2 or -2 or other number 5
why marginal boundaries, Theta*X+Theta_0=1 or -1 ,not 2 or -2 or other number

How the margin boundary is defined? 8
In the lecture video at 0:59, the Professor mentioned that "we can then define the margin boundary as the set of x's where this linear function takes the value 1 exactly" or...

Definition of decision boundary in text below video appears incorrect 4
Community TA

margin boundary two possible answers? 13
Isn't the value asked about in margin boundary 1 a signed value that can be positive or negative depending on whether or not the prediction agrees with the label?

[Staff] Incorrect statement in the solution of 'margin boundary 2' 2
The last statement in the solution of 'margin boundary 2' negates the earlier argument about the correct choice.

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