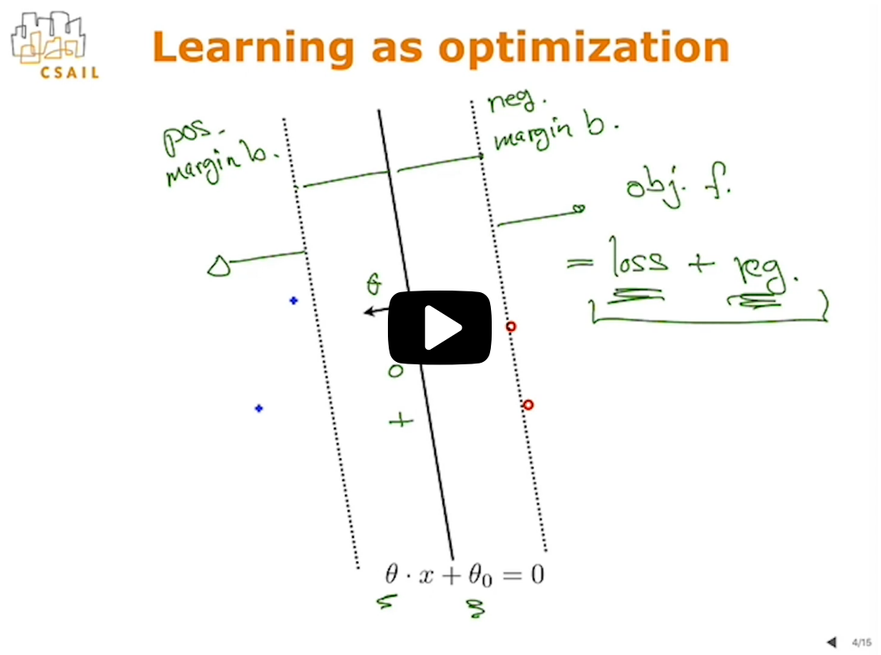
2. Introduction
Introduction



6:19 / 6:19 Speed 1.50x

for selecting the parameters theta and theta naught.

That's a balance between the loss, how examples

fit within this ideal notion, and regularization,

our preference towards large mounting solutions.

So we will find--

we will formalize-- the objective function

and then find parameters theta and theta

nought that optimize, minimize, this objective function.

End of transcript. Skip to the start.

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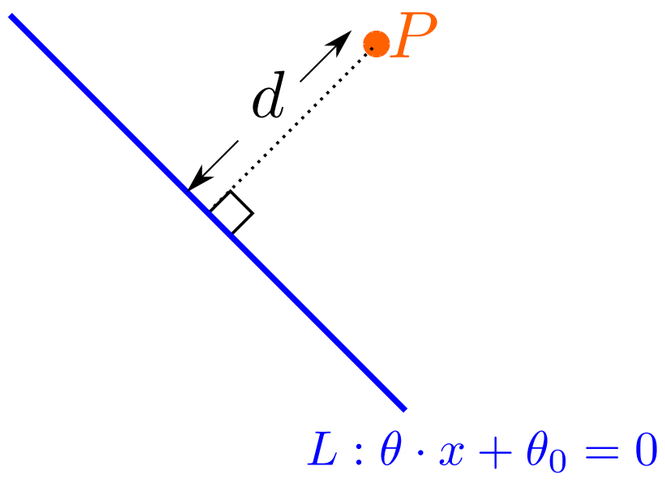
Review: Distance from a Line to a Point

1 point possible (graded)
Consider a line L in $\mathbb{R}^2$ given by the equation

$$L : \theta \cdot x + \theta_0 = 0$$

where θ is a vector normal to the line L. Let the point P be the endpoint of a vector x_0 (so the coordinates of P equal the components of x_0).

What is the the shortest distance d between the line L and the point P? Express d in terms of θ, θ_0, x, x_0.



$d =$

- $\frac{|\theta \cdot x + \theta_0|}{||\ \theta\ ||}$
- $\frac{|\theta \cdot x_0 + \theta_0|}{||\ \theta\ ||}$ ✔
- $\frac{|\theta \cdot \theta_0 + \theta_0|}{||\ \theta\ ||}$

- $|\theta \cdot x_0 + \theta_0|$

Solution:

If there is no offset θ_0, The distance d is the projection from x_0 to θ, which is $\frac{|x_0 \cdot \theta|}{||\theta||}$ (definition of projection). With the offset θ_0 added, d is $\frac{|x_0 \cdot \theta + \theta_0|}{||\theta||}$. Thus the distance from a $L : \theta \cdot x + \theta_0 = 0$ to the point $P = x_0$ is given by $\frac{|\theta \cdot x_0 + \theta_0|}{||\theta||}$.

Submit You have used 0 of 3 attempts

Answers are displayed within the problem

Discussion

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

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- Can someone explain the distance problem please? — 11
  I don't understand the answer to the distance question. Can someone please explain, or provide references where I can learn more about the equations and meaning of the s...
- Reset grader — 6
  In all fairness, I request staff to reset grader for unit 1 lecture 3 and Homework 1 since the timeline is extended by a day. Thanking you.
- What is the significance of the "regularization term" in context of this "optimization problem"? — 2
  Lesson says it's the favoring of margin boundaries that are far apart from the decision boundary. I am not sure about two things here - 1. What having margin boundaries tha...
- What exactly is an "optimization problem" and why do we need it here? — 2
  I don't think the lesson clarifies this. I am confused why we are even defining all of this.
- Clarification regarding the loss function — 5
  at 5:14, Professor says "we might start violating the preference that all the training examples are outside this fat boundary. They may go within the fat boundary or even be m...
- Staff - Caption [INAUDIBLE] — 4
  Please correct the caption [INAUDIBLE], because my studies are only with the legend and in some lectures they are with this message.
- Course Progress Does Not Give Credit for Correct Answer to "Review: Distance from a Line to a Point" Question — 2
  Grader gives me 12 points for Excercise 3, but Course Progress gives me only 11 points! After I get correct answer to "Review: Distance from a Line to a Point" question, I see I ...

☑	Distance from a Line to a Point - always abs(nominator)? Can this value be negative? Or it's always expressed as abs?	3
☑	Equidistant Margin Boundary Is it necessary to have equidistant margin boundary? If yes, then what advantage it will offer compare to non- equidistant margin boundary?	3
☑	the coordinates of P equal the components of x0 ? If x0 is a vector and P is its end point, then P doesn't equal coordinates (components) of the vector unless the beginning of the vector is in origin. Can you please clarify? I got t...	2
☑	Latex typo in the explanation	2

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