2. Introduction
Introduction

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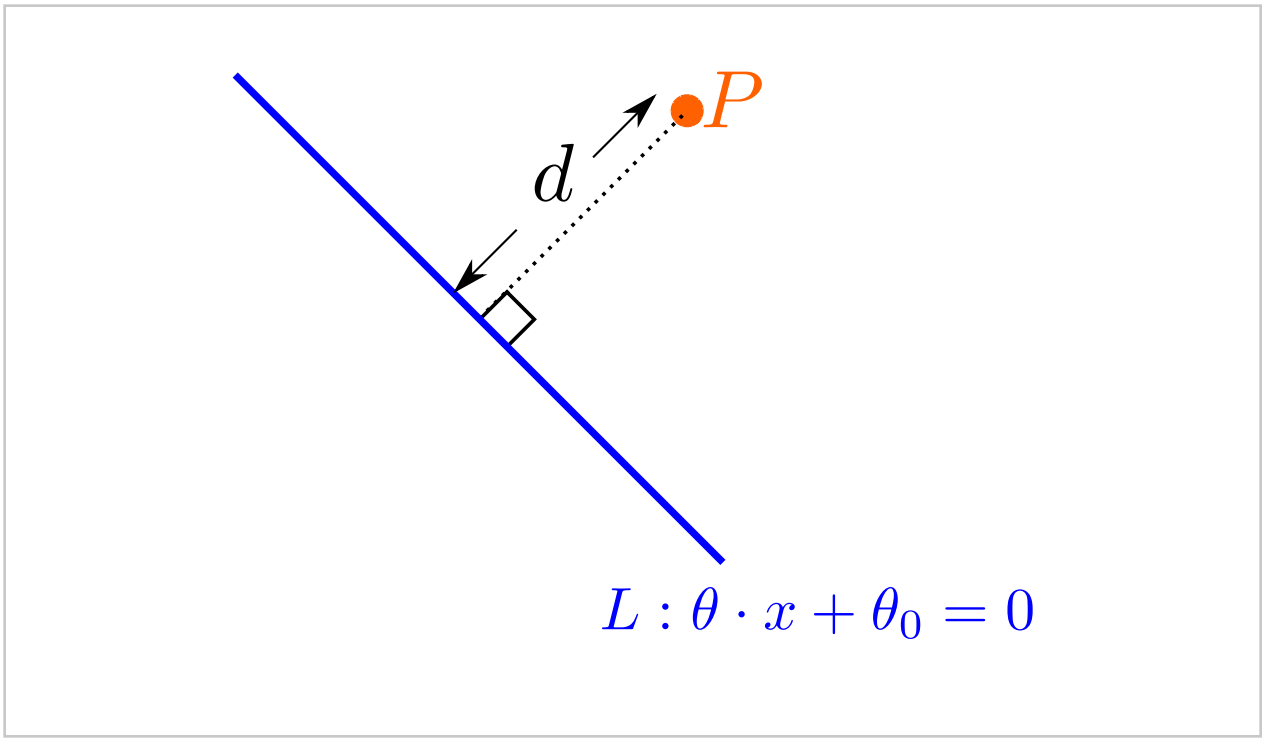
Review: Distance from a Line to a Point

1/1 point (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 2 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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4:34 What is the sound at 4:34. It sounded really weird and something felt wrong?	1
What happens to training set values if we push the margin boundary? What happens to training set values if we push the margin boundary?	4
Not getting the intuition of outset Can outset be understood as the "diagonal" movement of the line?	3
Classification inside the fat decision boundary Would the training points inside the fat decision boundary classify as +1, or -1?	3
Beautiful lecture Hello: Congrats professor Jaakola, this lecture is beautiful, the way you define the problem is ...	2

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