

CS 66: Machine Learning

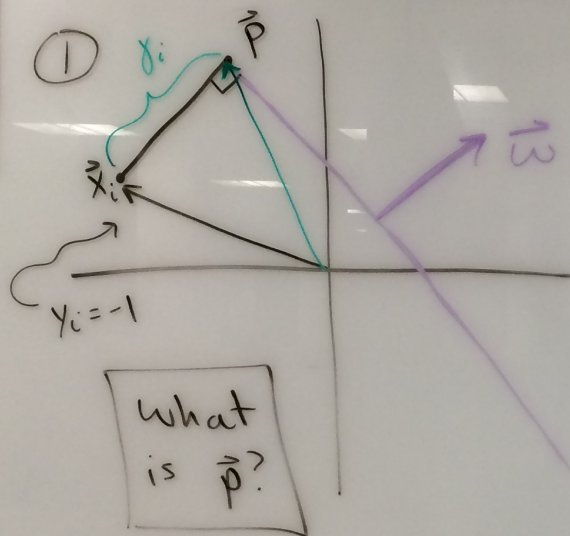
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Lab 6: in-lab notes (Part 2)

Problem Set Hints



②

$$(x_1 + x_2)^2 = x_1 x_1 + \overbrace{x_1 x_2 + x_2 x_1}^{\sum_{i=1}^2 \sum_{j=1}^2 x_i x_j} + x_2 x_2$$

$$= x_1^2 + 2x_1 x_2 + x_2^2$$

③ minimum: representative example

⊕ intuitive explanation.

more: what is $\min_y f(x, y)$?

a value?, a function?

try: $f(x, y) = 3y^2 - 2x^2 + 4xy$

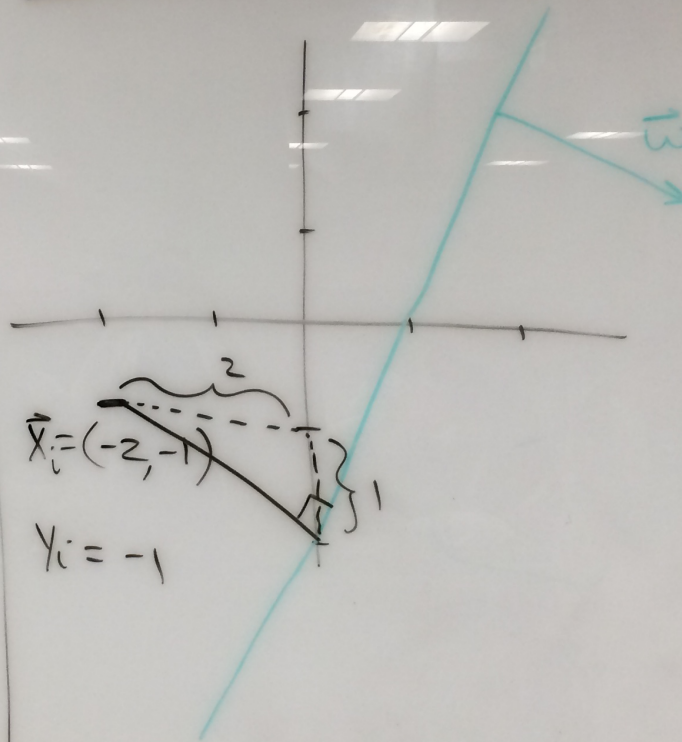
⑤ (f) may assume:

$$\alpha_1 = \alpha_3$$

(don't need to run
entire optimization
problem)

since $d(x_1, x_s)$
 $= d(x_3, x_s)$

Functional vs. Geometric Margin



$$\vec{w} = \begin{bmatrix} 2 \\ -1 \end{bmatrix}$$

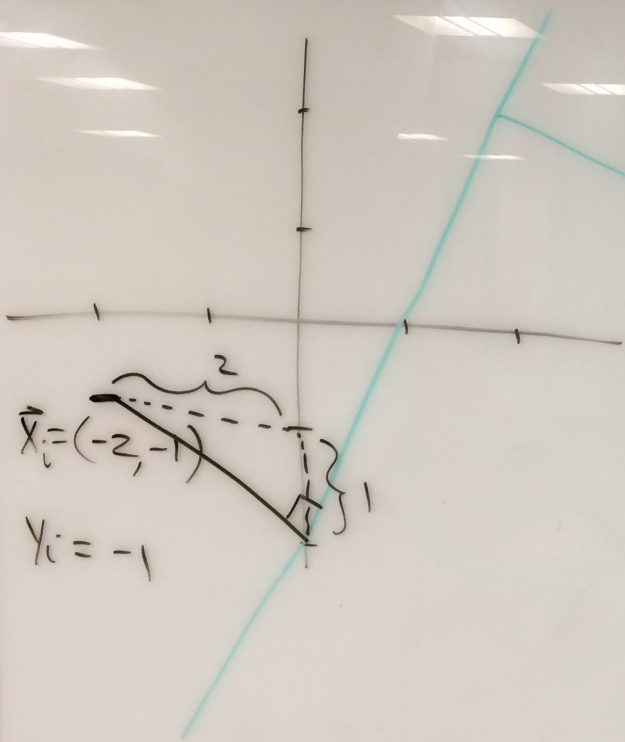
functional margin

$$\hat{\gamma}_i = y_i (\vec{w} \cdot \vec{x}_i + b)$$

$$\vec{w} = \begin{bmatrix} 2 \\ -1 \end{bmatrix}$$

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Functional vs. Geometric Margin



$$\vec{w} = \begin{bmatrix} 2 \\ -1 \end{bmatrix}$$

functional margin

$$\hat{\gamma}_i = y_i (\vec{w} \cdot \vec{x} + b)$$

$$\vec{w} = \begin{bmatrix} 2 \\ -1 \end{bmatrix}, \hat{\gamma}_i = 5, \gamma_i = \sqrt{5}$$

$$\vec{w} = \begin{bmatrix} 4 \\ -2 \end{bmatrix}, \hat{\gamma}_i = 10, \gamma_i = \sqrt{5}$$

↑ find as exercise!

