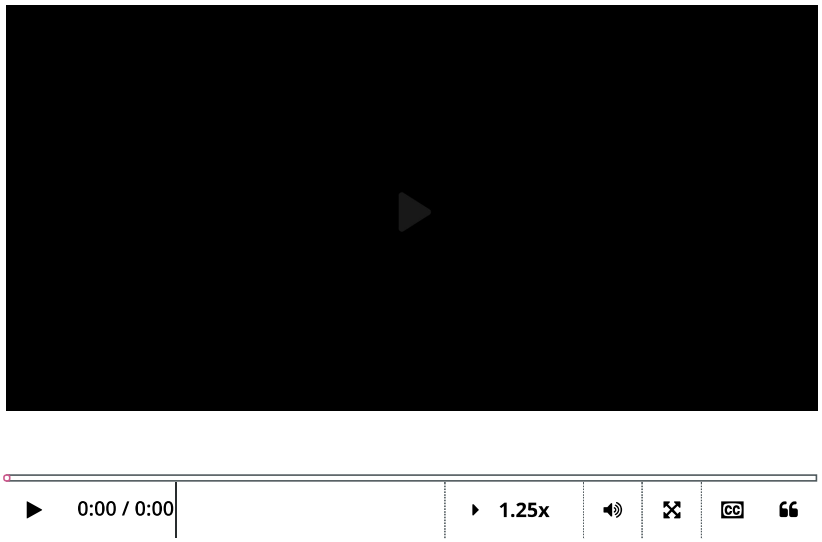
6. Closed Form Solution

Exercises due Oct 14, 2020 05:29 IST *Completed*

Closed Form Solution



Start of transcript. Skip to the end.

But we will not stop here.

We finished already the gradient-based algorithm.

And now, I want to talk to you about closed form solution.

And it's actually very interesting.

Because for many, many algorithms

in machine learning [INAUDIBLE] what

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Necessary and Sufficient Condition for a Solution

1/1 point (graded)
In the above video lecture, we verified the following result:

Computing the gradient of

$$R_n(\theta) = \frac{1}{n}\sum_{t=1}^{n}\frac{\left(y^{(t)} - \theta \cdot x^{(t)}\right)^2}{2},$$

we get

$$\nabla R_n(\theta) = A\theta - b\,(=0) \quad \text{where } A = \frac{1}{n}\sum_{t=1}^{n} x^{(t)}\left(x^{(t)}\right)^T,\ b = \frac{1}{n}\sum_{t=1}^{n} y^{(t)}x^{(t)}.$$

Now, what is the necessary and sufficient condition that $A\theta - b = 0$ has a unique solution?

- ◯ None of A's entries is 0.
- ◉ A is invertible.
- ◯ A's dimension is the same as that of θ's

✔

Solution:

For any square matrix A, $A\theta - b = 0$ has a unique solution $\theta = A^{-1}b$ if and only if A is invertible.

Submit You have used 1 of 1 attempt

Answers are displayed within the problem

Discussion

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Topic: Unit 2 Nonlinear Classification, Linear regression, Collaborative Filtering (2 weeks):Lecture 5. Linear Regression / 6. Closed Form Solution

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I am curious about the practical usefulness of this closed form solution Is it useful in practice or has more theoretical value?	4
Shouldn't Θ be transposed as well?	14
about the cost of this algorithm Why big O of this algorithm is d^3?	5
Why n>>d? I'm looking at the Invertible Matrix Theorem: https://mathworld.wolfram.com/InvertibleMatrixTheorem.html. And looking at the various ...	5
What does THETA represent here? In the classification case, as I understood theta represented a vector from which we identified the hyperplane orientation, so what does ...	2
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confuse i feel there is not enough option.	3

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