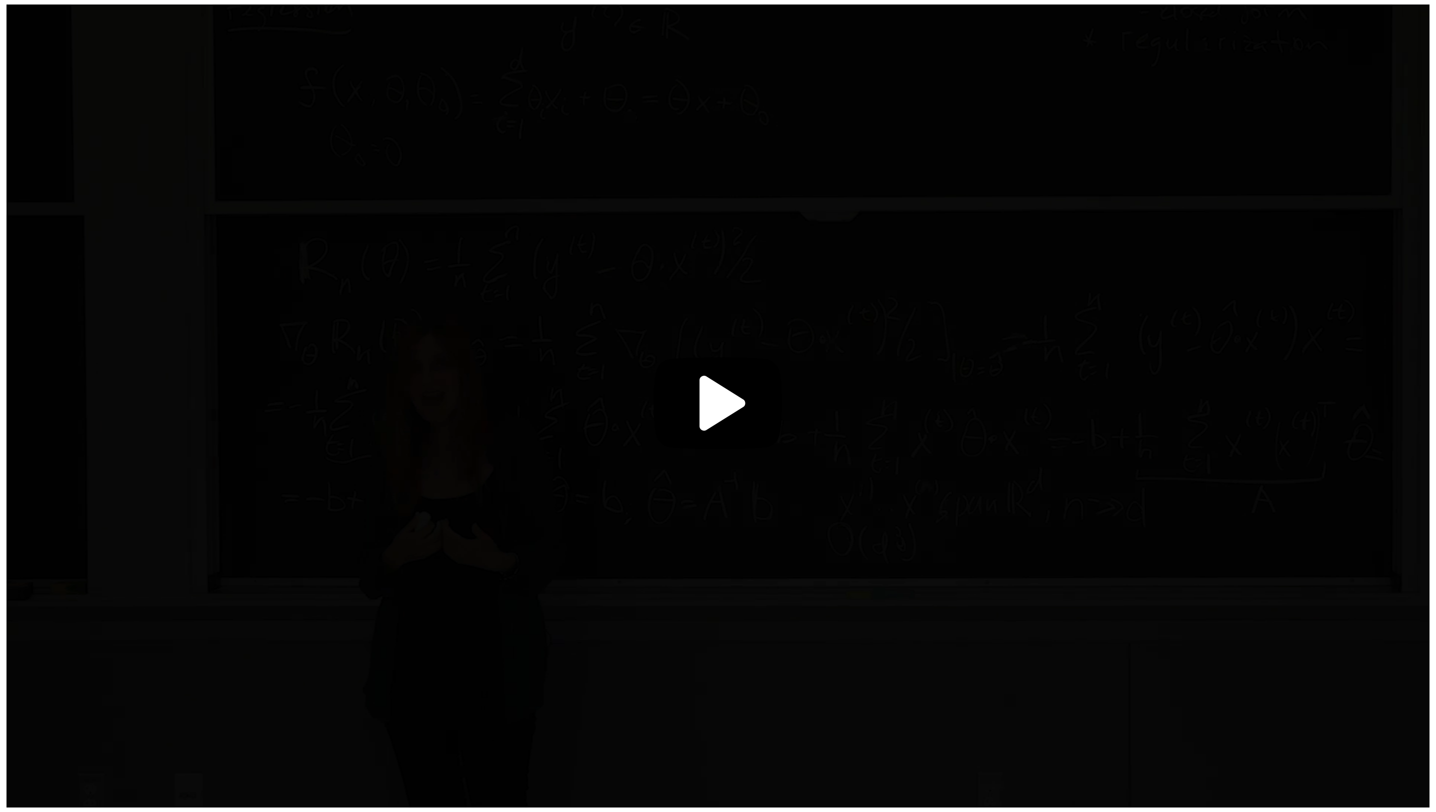
6. Closed Form Solution

Closed Form Solution



9:54 / 9:54 Speed 1.50x

But at any rate, here you can get the exact solution.

And it would be helpful for us to have this solution.

Because we can do the various type of analysis

directly on this sort of presentation, even though it

comes with different limitations and expensive costs.

And you will see in the homework another form

of writing this solution that may be more intuitive for some.

End of transcript. Skip to the start.

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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

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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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- If youve taken Fundamentals of Statistics (18.6501x)... — Community TA — 1
- Closed Form Solution: why theta is not transposed? — 2
- Why n >> d? — 4
- Computational complexity - a little question — Community TA — 3

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