



[Unit 2 Nonlinear Classification,](#)  
[Linear regression, Collaborative](#)

[Course](#) > [Filtering \(2 weeks\)](#)

> [Lecture 5. Linear Regression](#) >

6. Closed Form Solution

### **Audit Access Expires May 11, 2020**

You lose all access to this course, including your progress, on May 11, 2020.

Upgrade by Mar 25, 2020 to get unlimited access to the course as long as it exists on the site. **Upgrade now**

## 6. Closed Form Solution

## Closed Form Solution



### Video

[Download video file](#)

### Transcripts

[Download SubRip \(.srt\) file](#)

[Download Text \(.txt\) file](#)

## 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

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

we get

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

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  $\theta$ '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

**i** Answers are displayed within the problem

## Discussion

Hide Discussion

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

Add a Post

Show all posts

by recent activity

Doubt on closed form solution when  $\theta_0 \neq 0$

3







If we don't have enough training examples...

4

At 8:18, this is important. In MITx - 6.431x, Probability - The Science of Uncertainty and Data, Prof John...

Transpose

5

- |  |   |
|--|---|
|  <u>I am connecting with a metered modem, 600 MB to see part of this unit....please DO NOT use HD or at least let me choose....</u> | 1 |
| <u>I am connecting with a metered modem, 600 MB to see part of this unit....please DO NOT use HD or a...</u>   |   |
|  <u>at time 3:00 the minus comes out ?</u>  | 2 |
| <u>at time 3:00 the minus comes out ? any reason , even the minus comes out but the remaining formul...</u>  |   |
|  <u>Formula at 1:59?</u>  | 4 |
|  <u>Reason <math>x(t)</math>s are brought together</u>  | 1 |
| <u>The intuition behind rewriting <math>x(t\theta, x)</math> as <math>x(t(xt\text{-transpose})\theta\text{-transpose})</math> is bring out theta outsid...</u>   |   |
|  <u>Why the minus before the b term at 3min50 in the video?</u>   | 2 |
|  <u>Order of the closed form solution</u>   | 3 |
| <u>Can someone please explain how the professor was able to determine the order of the closed form s...</u>  |   |

[Learn About Verified Certificates](#)

© All Rights Reserved