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Machine Learning with Python-From Linear Models to Deep Learning

<u>Help</u>



<u>sandipan\_dey</u>

Unit 2 Nonlinear Classification, Linear regression, Collaborative

<u>Course</u> > <u>Filtering (2 weeks)</u>

> <u>Lecture 5. Linear Regression</u> > 6. Closed Form Solution

# 6. Closed Form Solution **Closed Form Solution**



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

And it would be helpful for us to have this

Because we can do the various type of analysis directly on this sort of presentation, even though it

comes with different limitations and expensive

And you will see in the homework another form of writing this solution that may be more intuitive for some.

9:54 / 9:54 X CC ▶ Speed 1.50x 66

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

$$R_{n}\left( heta
ight)=rac{1}{n}\sum_{t=1}^{n}rac{\left(y^{\left(t
ight)}- heta\cdot x^{\left(t
ight)}
ight)^{2}}{2},$$

we get

$$abla R_n\left( heta
ight) = A heta - b\left(=0
ight) \quad ext{where } A = rac{1}{n}\sum_{t=1}^n x^{(t)}{\left(x^{(t)}
ight)}^T, \, b = rac{1}{n}\sum_{t=1}^n y^{(t)}x^{(t)}.$$

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

- lacksquare None of A's entries is 0.
- ullet A is invertible.  $\checkmark$
- ullet A's dimension is the same as that of heta's

#### **Solution:**

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

Submit

You have used 1 of 1 attempt

**1** 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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		. 4
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