Linear Regression with One Variable

Quiz, 5 questions

1 point

1.

Consider the problem of predicting how well a student does in her second year of college/university, given how well she did in her first year.

Specifically, let x be equal to the number of "A" grades (including A-. A and A+ grades) that a student receives in their first year of college (freshmen year). We would like to predict the value of y, which we define as the number of "A" grades they get in their second year (sophomore year).

Refer to the following training set of a small sample of different students' performances (note that this training set may also be referenced in other questions in this quiz). Here each row is one training example. Recall that in linear regression, our hypothesis is $h_\theta(x) = \theta_0 + \theta_1 x$, and we use m to denote the number of training examples.

x	y
3	4
2	1
4	3
0	1

For the training set given above, what is the value of m? In the box below, please enter your answer (which should be a number between 0 and 10).

Enter answer here

1 point

2.

Consider the following training set of $m = 4$ training examples:

x	y
1	0.5
2	1
4	2
0	0

Consider the linear regression model $h_\theta(x) = \theta_0 + \theta_1 x$. What are the values of θ_0 and θ_1 that you would expect to obtain upon running gradient descent on this model? (Linear regression will be able to fit this data perfectly.)

- $\theta_0 = 1, \theta_1 = 1$
- $\theta_0 = 0, \theta_1 = 0.5$
- $\theta_0 = 0.5, \theta_1 = 0$
- $\theta_0 = 1, \theta_1 = 0.5$
- $\theta_0 = 0.5, \theta_1 = 0.5$

1
point

3.
Suppose we set $\theta_0 = 0, \theta_1 = 1.5$ in the linear regression hypothesis from Q1. What is $h_\theta(2)$?

Enter answer here

1
point

4.

Let f be some function so that

$f(\theta_0, \theta_1)$ outputs a number. For this problem,

f is some arbitrary/unknown smooth function (not necessarily the

cost function of linear regression, so f may have local optima).

Suppose we use gradient descent to try to minimize $f(\theta_0, \theta_1)$

as a function of θ_0 and θ_1. Which of the

following statements are true? (Check all that apply.)

- [ ] If θ_0 and θ_1 are initialized so that $\theta_0 = \theta_1$, then by symmetry (because we do simultaneous updates to the two parameters), after one iteration of gradient descent, we will still have $\theta_0 = \theta_1$.

- [ ] Even if the learning rate α is very large, every iteration of

  gradient descent will decrease the value of $f(\theta_0, \theta_1)$.

- [ ] If the learning rate is too small, then gradient descent may take a very long

  time to converge.

- [ ] If θ_0 and θ_1 are initialized at

  a local minimum, then one iteration will not change their values.

1
point

5.
Suppose that for some linear regression problem (say, predicting housing prices as in the lecture), we have some training set, and for our training set we managed to find some θ_0, θ_1 such that $J(\theta_0, \theta_1) = 0$.

Which of the statements below must then be true? (Check all that apply.)

- [ ] We can perfectly predict the value of y even for new examples that we have not yet seen.

  (e.g., we can perfectly predict prices of even new houses that we have not yet seen.)

- [ ] For these values of θ_0 and θ_1 that satisfy $J(\theta_0, \theta_1) = 0$,

  we have that $h_\theta(x^{(i)}) = y^{(i)}$ for every training example $(x^{(i)}, y^{(i)})$

- [ ] For this to be true, we must have $\theta_0 = 0$ and $\theta_1 = 0$

so that $h_\theta(x) = 0$

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- [ ] This is not possible: By the definition of $J(\theta_0, \theta_1)$, it is not possible for there to exist θ_0 and θ_1 so that $J(\theta_0, \theta_1) = 0$

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