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).

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
5	4
3	4
0	1
4	3

For the training set given above (note that this training set may also be referenced in other questions in this quiz), what is the value of m? In the box below, please enter your answer (which should be a number between 0 and 10).

4

1
point

2.

Many substances that can burn (such as gasoline and alcohol) have a chemical structure based on carbon atoms; for this reason they are called hydrocarbons. A chemist wants to understand how the number of carbon atoms in a molecule affects how much energy is released when that molecule combusts (meaning that it is burned). The chemist obtains the dataset below. In the column on the right, "kJ/mol" is the unit measuring the amount of energy released.

Name of molecule	Number of hydrocarbons in molecule (x)	Heat release when burned (kJ/mol) (y)
methane	1	-890
ethene	2	-1411
ethane	2	-1560
propane	3	-2220
cyclopropane	3	-2091
butane	4	-2878
pentane	5	-3537
benzene	6	-3268
cycloexane	6	-3920
hexane	6	-4163
octane	8	-5471
napthalene	10	-5157

You would like to use linear regression ($h_\theta(x) = \theta_0 + \theta_1 x$) to estimate the amount of energy released (y) as a function of the number of carbon atoms (x). Which of the following do you think will be the values you obtain for θ_0 and θ_1? You should be able to select the right answer without actually implementing linear regression.

- $\theta_0 = -569.6, \theta_1 = -530.9$
- $\theta_0 = -1780.0, \theta_1 = 530.9$
- $\theta_0 = -1780.0, \theta_1 = -530.9$
- $\theta_0 = -569.6, \theta_1 = 530.9$

1 point

3. Suppose we set $\theta_0 = -2, \theta_1 = 0.5$ in the linear regression hypothesis from Q1. What is $h_\theta(6)$?

1

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.)

- [ ] No matter how θ_0 and θ_1 are initialized, so long as α is sufficiently small, we can safely expect gradient descent to converge

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to the same solution.

- [x] If θ_0 and θ_1 are initialized at

  the global minimum, then one iteration will not change their values.

- [ ] Setting the learning rate α to be very small is not harmful, and can

  only speed up the convergence of gradient descent.

- [x] If the first few iterations of gradient descent cause $f(\theta_0, \theta_1)$ to

  increase rather than decrease, then the most likely cause is that we have set the

  learning rate α to too large a value.

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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.)

- [ ] For this to be true, we must have $y^{(i)} = 0$ for every value of $i = 1, 2, \ldots, m$.

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

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

- [x] Our training set can be fit perfectly by a straight line,

  i.e., all of our training examples lie perfectly on some straight line.

- [ ] Gradient descent is likely to get stuck at a local minimum and fail to find the global minimum.

- [x] I, **Mark R. Lytell**, understand that submitting work that isn't my own may result in permanent failure of this course or deactivation of my Coursera account. Learn more about Coursera's Honor Code

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