

Learning Linear Classifiers



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1.

(True/False) A linear classifier can only learn positive coefficients.



True



False



正确



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2.

(True/False) In order to train a logistic regression model, we find the weights that maximize the likelihood of the model.



True



正确



False



1 / 1 分

3.

(True/False) The data likelihood is the product of the probability of the inputs \mathbf{x} given the weights \mathbf{w} and response y .



True



False



正确



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4.

Questions 4 and 5 refer to the following scenario.

Consider the setting where our inputs are 1-dimensional. We have data

x	y
2.5	+1
0.3	-1
2.8	+1
0.5	+1

and the current estimates of the weights are $w_0 = 0$ and $w_1 = 1$. (w_0 : the intercept, w_1 : the weight for x).

Calculate the likelihood of this data. Round your answer to 2 decimal places.

0.23



正确回答

$$\begin{aligned}
 & P(y_1 = +1|x_1, w)P(y_2 = -1|x_2, w)P(y_3 = +1|x_3, w)P(y_4 = +1|x_4, w) \\
 &= \frac{1}{1 + e^{-2.5}} \frac{e^{-0.3}}{1 + e^{-0.3}} \frac{1}{1 + e^{-2.8}} \frac{1}{1 + e^{-0.5}} \\
 &= 0.230765 \dots
 \end{aligned}$$



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5.

Refer to the scenario given in Question 4 to answer the following:

Calculate the derivative of the log likelihood with respect to w_1 .
Round your answer to 2 decimal places.

0.37

正确回答

$$\begin{aligned}
 \frac{\partial \ell(\mathbf{w})}{\partial \mathbf{w}_1} &= \sum_{i=1}^4 h_1(\mathbf{x}_i) \left(\mathbf{1}[y_i = +1] - P(y_i = +1|\mathbf{x}_i, \mathbf{w}) \right) \\
 &= 2.5 \left(1 - \frac{1}{1 + e^{-2.5}} \right) + 0.3 \left(0 - \frac{1}{1 + e^{-0.3}} \right) \\
 &\quad + 2.8 \left(1 - \frac{1}{1 + e^{-2.8}} \right) + 0.5 \left(1 - \frac{1}{1 + e^{-0.5}} \right) \\
 &= 0.366591 \dots
 \end{aligned}$$



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6.

Which of the following is true about gradient ascent? Select all that apply.



It is an iterative algorithm

正确



It only updates a few of the parameters, not all of them



未选择的是正确的



It finds the maximum by “hill climbing”



正确

