Logistic Regression

Quiz, 5 questions

1 point

1.

Suppose that you have trained a logistic regression classifier, and it outputs on a new example x a prediction $h_\theta(x) = 0.2$. This means (check all that apply):

- [ ] Our estimate for $P(y = 1 | x; \theta)$ is 0.2.
- [ ] Our estimate for $P(y = 0 | x; \theta)$ is 0.8.
- [ ] Our estimate for $P(y = 1 | x; \theta)$ is 0.8.
- [ ] Our estimate for $P(y = 0 | x; \theta)$ is 0.2.

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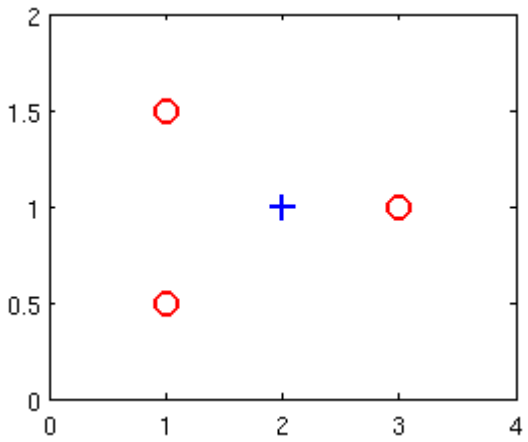
2.

Suppose you have the following training set, and fit a

logistic regression classifier $h_\theta(x) = g(\theta_0 + \theta_1 x_1 + \theta_2 x_2)$.

x_1	x_2	y
1	0.5	0
1	1.5	0
2	1	1
3	1	0



Which of the following are true? Check all that apply.

- [ ] Adding polynomial features (e.g., instead using $h_\theta(x) = g(\theta_0 + \theta_1 x_1 + \theta_2 x_2 + \theta_3 x_1^2 + \theta_4 x_1 x_2 + \theta_5 x_2^2)$) could increase how well we can fit the training data.

- [ ] At the optimal value of θ (e.g., found by fminunc),

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3.

For logistic regression, the gradient is given by

$\frac{\partial}{\partial \theta_j} J(\theta) = \frac{1}{m} \sum_{i=1}^{m} (h_\theta(x^{(i)}) - y^{(i)}) x_j^{(i)}$ Which of these is a correct gradient descent update for logistic regression with a learning rate of α? Check all that apply.

- [ ] $\theta := \theta - \alpha \frac{1}{m} \sum_{i=1}^{m} \frac{1}{1+e^{-\theta^T x^{(i)}}} - y^{(i)} \; x_\cdot^{(i)}$
- [ ] $\theta := \theta - \alpha \frac{1}{m} \sum_{i=1}^{m} (h_\theta(x^{(i)}) - y^{(i)}) x_\cdot^{(i)}$
- [ ] $\theta := \theta - \alpha \frac{1}{m} \sum_{i=1}^{m} \theta^T x - y^{(i)} \; x_\cdot^{(i)}$
- [ ] $\theta_j := \theta_j - \alpha \frac{1}{m} \sum_{i=1}^{m} \theta^T x - y^{(i)} \; x_j^{(i)}$ (simultaneously update for all j).

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4.

Which of the following statements are true? Check all that apply.

- [ ] Linear regression always works well for classification if you classify by using a threshold on the prediction made by linear regression.
- [ ] For logistic regression, sometimes gradient descent will converge to a local minimum (and fail to find the global minimum). This is the reason we prefer more advanced optimization algorithms such as fminunc (conjugate gradient/BFGS/L-BFGS/etc).
- [ ] The cost function $J(\theta)$ for logistic regression trained with $m \geq 1$ examples is always greater than or equal to zero.
- [ ] The sigmoid function $g(z) = \frac{1}{1+e^{-z}}$ is never greater than one (> 1).

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5.

Suppose you train a logistic classifier

$h_\theta(x) = g(\theta_0 + \theta_1 x_1 + \theta_2 x_2)$. Suppose

$\theta_0 = 6, \theta_1 = 0, \theta_2 = -1$. Which of the following figures represents the decision boundary found by your classifier?

Figure:

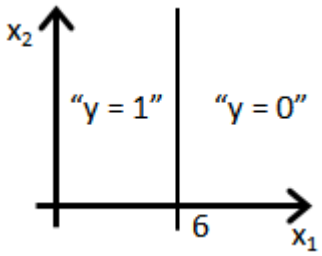


Figure:

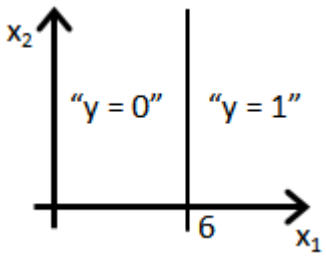
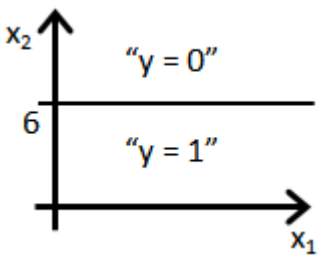


Figure:



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