代价函数求偏导

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$$\begin{cases} cost = \frac{1}{m}\sum_{i=1}^{m}\left[-y\log(h(z)) - (1-y)\log(1-h(z))\right] \\ h(z) = \frac{1}{1+e^{-z}} \\ z = \theta_0 + \theta_1 x_1 + \theta_2 x_2 \end{cases}$$

$$\frac{\partial cost}{\partial \theta_1} = \frac{1}{m}\sum_{i=1}^{m}\left[-y\frac{1}{h(z)}\frac{\partial h(z)}{\partial \theta_1} - (1-y)\frac{-1}{1-h(z)}\frac{\partial h(z)}{\partial \theta_1}\right]$$

$$\because h'(z) = \frac{+1}{(1+e^{-z})^2}\ e^{-z} = \frac{e^{-z}}{(1+e^{-z})^2} = h(z)(1-h(z))$$

$$\therefore \frac{\partial cost}{\partial \theta_1} = \frac{1}{m}\sum_{i=1}^{m}\left[-y\frac{1}{h(z)}h(z)(1-h(z))\frac{\partial z}{\partial \theta_1} + (1-y)\frac{1}{1-h(z)}h(z)(1-h(z))\frac{\partial z}{\partial \theta_1}\right]$$

$$\therefore \frac{\partial cost}{\partial \theta_1} = \frac{1}{m}\sum_{i=1}^{m}\left[-y(1-h(z))\frac{\partial z}{\partial \theta_1} + (1-y)h(z)\frac{\partial z}{\partial \theta_1}\right]$$

$$= \frac{1}{m}\sum_{i=1}^{m}\left[h(z)-y\right]\frac{\partial z}{\partial \theta_1}$$

$$= \frac{1}{m}\sum_{i=1}^{m}\left[h(z)-y\right]x_1$$

即 $\frac{\partial cost}{\partial \theta_1} = \frac{1}{m}\sum_{i=1}^{m}\left[h(z)-y\right]x_1$

同理 $\frac{\partial cost}{\partial \theta_0} = \frac{1}{m}\sum_{i=1}^{m}\left[h(z)-y\right]\times 1$

$$\frac{\partial cost}{\partial \theta_2} = \frac{1}{m}\sum_{i=1}^{m}\left[h(z)-y\right]x_2$$