



Machine Learning

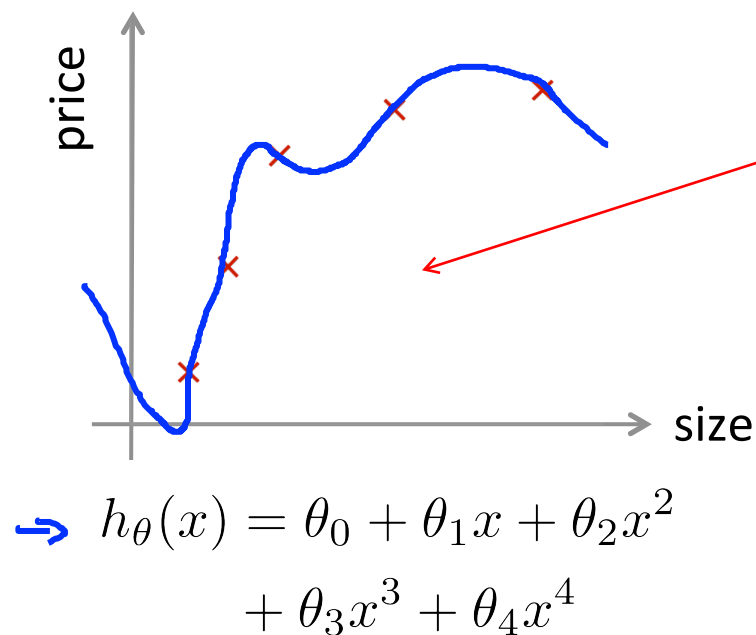
Advice for applying machine learning

Evaluating a hypothesis

Evaluating your hypothesis

com hipóteses
desta é mt difícil
prever se vai
funcionar devido
à complicação
função

Fails to generalize to new
examples not in training set.



x_1 = size of house
 x_2 = no. of bedrooms
 x_3 = no. of floors
 x_4 = age of house
 x_5 = average income in neighborhood
 x_6 = kitchen size
 \vdots
 x_{100}

dividir a training set em 2 porções
70% / 30%

Evaluating your hypothesis

Dataset:

Size	Price
2104	400
1600	330
2400	369
1416	232
3000	540
1985	300
1534	315
1427	199
1380	212
1494	243

70% Training set

30% Test Set

$$\begin{pmatrix} (x^{(1)}, y^{(1)}) \\ (x^{(2)}, y^{(2)}) \\ \vdots \\ (x^{(m)}, y^{(m)}) \end{pmatrix}$$

depois fazemos
random a ordem
nos 70 e 30 %

$$\begin{pmatrix} (x_{test}^{(1)}, y_{test}^{(1)}) \\ (x_{test}^{(2)}, y_{test}^{(2)}) \\ \vdots \\ (x_{test}^{(m_{test})}, y_{test}^{(m_{test})}) \end{pmatrix}$$

$m_{test} = \text{no. of test example}$
 $(x_{test}^{(i)}, y_{test}^{(i)})$

Training/testing procedure for linear regression

→ - Learn parameter θ from training data (minimizing training error $J(\theta)$) 70%

- Compute test set error:

$$J_{\text{test}}(\theta) = \frac{1}{2m_{\text{test}}} \sum_{i=1}^{m_{\text{test}}} \left(\frac{h_{\theta}(x_{\text{test}}^{(i)}) - y_{\text{test}}^{(i)}}{2} \right)^2$$

Training/testing procedure for **logistic regression**

- Learn parameter θ from training data
- Compute test set error:

$$J_{test}(\theta) = -\frac{1}{m_{test}} \sum_{i=1}^{m_{test}} y_{test}^{(i)} \log h_{\theta}(x_{test}^{(i)}) + (1 - y_{test}^{(i)}) \log h_{\theta}(x_{test}^{(i)})$$

- Misclassification error (0/1 misclassification error):

$$\text{err}(h_{\theta}(x), y) = \begin{cases} 1 & \text{if } h_{\theta}(x) \geq 0.5, \quad y = 0 \\ & \text{or if } h_{\theta}(x) < 0.5, \quad y = 1 \\ 0 & \text{otherwise} \end{cases}$$

$$\text{Test error} = \frac{1}{m_{test}} \sum_{i=1}^{m_{test}} \text{err}(h_{\theta}(x_{test}^{(i)}), y^{(i)})$$