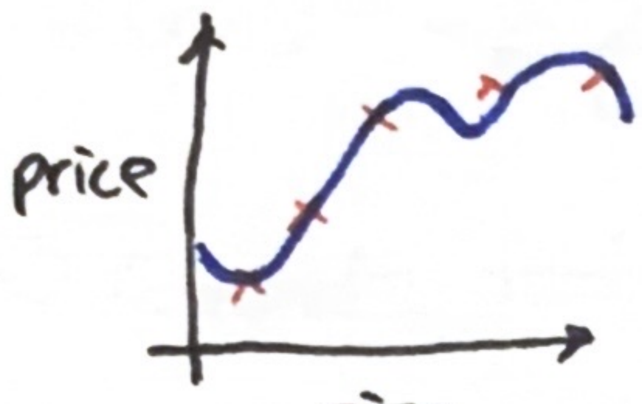
< Evaluation and Choosing Model - Evaluating Model >

ex) housing price prediction



$$f_{\vec{w},b}(\vec{x}) = w_1 x + w_2 x^2 + \cdots + \underbrace{w_n x^n}_{w_4 x^4} + b$$

⇒ Model fits the training data well but will fail to generalize to new examples not in the training set.

∴ 주어진 데이터를 모두 training example로 사용하지 않고 일부는 training에, 일부는 test에 사용하여 성능을 평가

* Split training set into two subsets

	size	price	
70%	2104	400	training set
	1608	330	
	2400	369	
	⋮	⋮	
30%	1427	199	test set
	1380	212	
	1494	243	

training set → $(x^{(1)}, y^{(1)})$, $(x^{(2)}, y^{(2)})$, ⋮, $(x^{(m_{train})}, y^{(m_{train})})$

m_{train} = number of training examples

test set → $(x^{(1)}_{test}, y^{(1)}_{test})$, ⋮, $(x^{(m_{test})}_{test}, y^{(m_{test})}_{test})$

m_{test} = number of test examples

* Training / Test procedure for linear regression (with squared error cost)

① fit parameters by minimizing cost function $J(\vec{w},b)$

$$J(\vec{w},b) = \min_{\vec{w},b}\left[\frac{1}{2m_{train}}\sum_{i=1}^{m_{train}}\left(f_{\vec{w},b}(\vec{x}^{(i)}) - y^{(i)}\right)^2 + \frac{\lambda}{2m_{train}}\sum_{j=1}^{n} w_j^2\right]$$

② Compute test error

$$J_{test}(\vec{w},b) = \frac{1}{2m_{test}}\left[\sum_{i=1}^{m_{test}}\left(f_{\vec{w},b}(\vec{x}^{(i)}_{test}) - y^{(i)}_{test}\right)^2\right]$$

③ Compute train error

$$J_{train}(\vec{w},b) = \frac{1}{2m_{train}}\left[\sum_{i=1}^{m_{train}}\left(f_{\vec{w},b}(\vec{x}^{(i)}_{train}) - y^{(i)}_{train}\right)^2\right]$$

⇒ $J_{train}(\vec{w},b)$ will be low
$J_{test}(\vec{w},b)$ will be high

⇓

Model predicts great on training set, it's not good at generalizing to new example that were not in the training set