

ML w2 multivariate linear regression

Multiple Features

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$$h_{\theta}(x) = \theta_0 + \theta_1 x_1 + \theta_2 x_2 + \theta_3 x_3 \dots + \theta_n x_n$$

$$\uparrow$$
$$x_0 = 1$$

$$X = \begin{bmatrix} x_0 \\ x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix} \in \mathbb{R}^{n+1} \quad \theta = \begin{bmatrix} \theta_0 \\ \theta_1 \\ \theta_2 \\ \vdots \\ \theta_n \end{bmatrix} \in \mathbb{R}^{n+1}$$

Transpose

$$[\theta_0, \theta_1, \theta_2 \dots \theta_n] \times \begin{bmatrix} x_0 \\ x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix}$$

θ^T
(n+1) x 1 matrix

$$h_{\theta} = \theta^T X$$

Feature Scaling

$$-1 \leq x_i \leq 1 \text{ range.}$$

- Dividing by maximum value.

e.g. $\frac{x_2}{2200}$ size of feet < 2200

$\frac{x_2}{5}$ bedrooms

- make features approximately zero mean.

e.g. $x_1 = \frac{\text{size} - 1000}{2000}$

$$x_2 = \frac{\text{size} - 2}{5}$$

$$x_1 \leftarrow \frac{x_1 - \mu_1}{s_1} \leftarrow \text{average value of training set } (2)$$

$\leftarrow \text{range (max - min)}$

Learning Rate

