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Introduction & Supervised Learning

Defination:

“A computer program is said to learn from experience E with respect to some task T and some performance measure P, if its performance on T, as measured by P, improves with experience E.”

Machine learning algorithms:

1. **Supervised Learning;**
2. **Unsupervised Learning;**
3. others, including Reinforcement learning, recommender systems.

Method	right answer	output
Supervised Learning	"right answer" **given**	**Regression:** Predict continuous valued output
Unsupervised Learning:	"right answer" **ungiven**	**Classification:** Discrete valued output

Supervised Learning:

Hyposthesis: $h_\theta(x) = \sum_{i=0}^{n} \theta_i x^k$
CostFunctionJ: $J = \frac{1}{2m} \sum_{i=1}^{m} (h_\theta(x^{(i)}) - y^{(i)})^2$
Targer: choose θ to minimize CostFunction J

Gradient descent

$\theta_j := \theta_j - \alpha \frac{\partial}{\partial \theta_j} J(\theta)$

when CostFunctionJ is shown above, $\theta_j := \theta_j - \alpha \frac{1}{m} \sum_{i=1}^{m} [(h_\theta(x^{(i)}) - y^{(i)}) \cdot \frac{\partial h_\theta(x^{(i)})}{\partial \theta_j}]$

“Batch” Gradient Descent

Batch: Each step of gradient descent uses all the training examples.