ML

- Supervised learning: prediction based on examples of correct behavior

- Unsupervised learning: no explicit target, only data, goal to model/discover

- Semi-supervised learning: supplement limited annotations with unsupervised learning

- Active learning: learn to query the examples actually needed for learning

- Transfer learning: how to apply what you have learned from A to B

- Reinforcement learning: learning to act, not just predict; goal to optimize the consequences of actions

Linear Regression

Linear Perception Algorithm without Offset

Initialize $\theta \leftarrow 0(vector)$
for $t = 1, ..., T$ do **do**
    for $i = 1, ..., n$ then **do**
        if $y^i * (\theta * x^{(i)}) \leq 0$ **then**
            update $\theta = \theta + y^{(i)} x^{(i)}$
        end if
    end for
end for

Linear Perception Algorithm with Offset

Initialize $\theta \leftarrow 0(vector); \theta_0 \leftarrow 0(scalar)$
for $t = 1, ..., T$ do **do**
    for $i = 1, ..., n$ then **do**
        if $y^i * (\theta * x^{(i)} + \theta_0) \leq 0$ **then**
            update $\theta = \theta + y^{(i)} x^{(i)}$
            update $\theta_0 = \theta_0 + y^{(i)}$
        end if
    end for
end for

Decision Boundary

The decision boundary is the set of points which satisfy
$\theta * x^{(i)} + \theta_0 = 0$

Margin Boundary

The margin boundary is the set of points which satisfy
$\theta * x^{(i)} + \theta_0 = \pm 1$