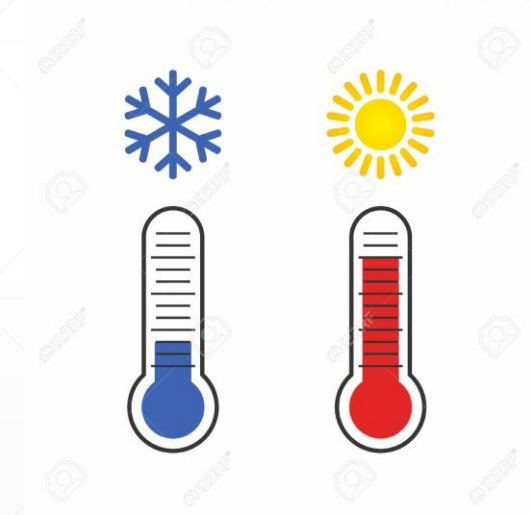


回归问题

主讲人：龙良曲

Machine Learning

- make decisions
- going left/right → discrete
- increase/decrease → continuous



Continuous Prediction

- $f_{\theta}: x \rightarrow y$
- x : input data
- $f(x)$: prediction
- y : real data, ground-truth



Linear Equation

- $y = w * x + b$
- $1.567 = w * 1 + b$
- $3.043 = w * 2 + b$
- $w = 1.477$
- $b = 0.089$

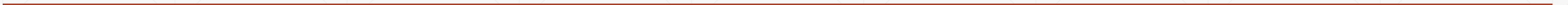


With Noise?

- $y = w * x + b + \epsilon$
- $\epsilon \sim N(0, 1)$

- $1.567 = w * 1 + b + \text{eps}$
- $3.043 = w * 2 + b + \text{eps}$
- $4.519 = w * 3 + b + \text{eps}$
- ...

$$Y = (WX + b)$$

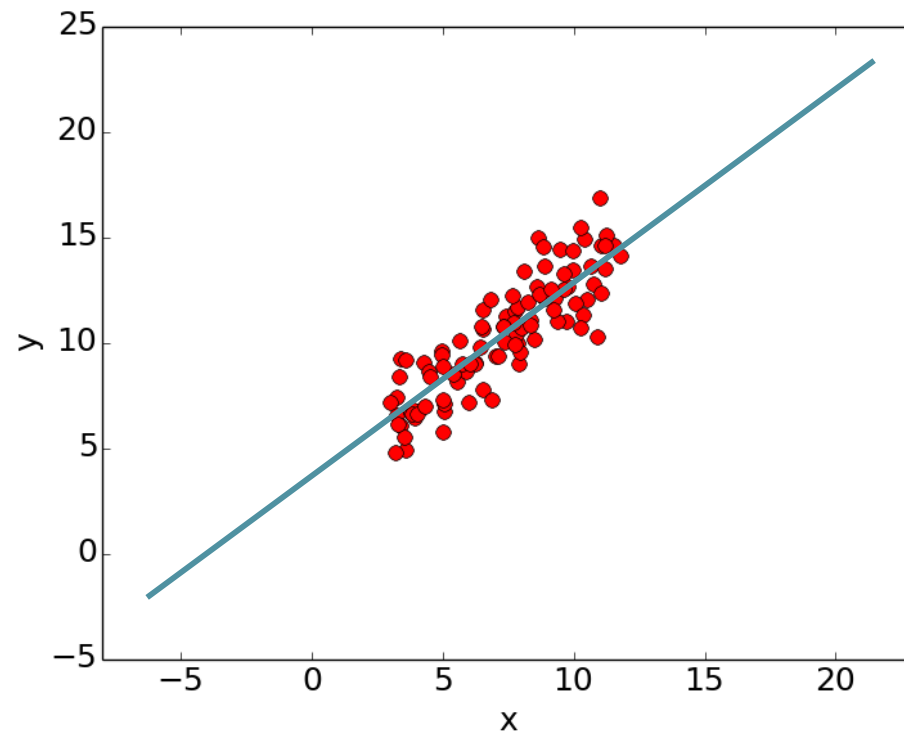


For Example

- $y = 1.477 * x + 0.089 + \epsilon$

- $w?$

- $b?$



Find w', b'

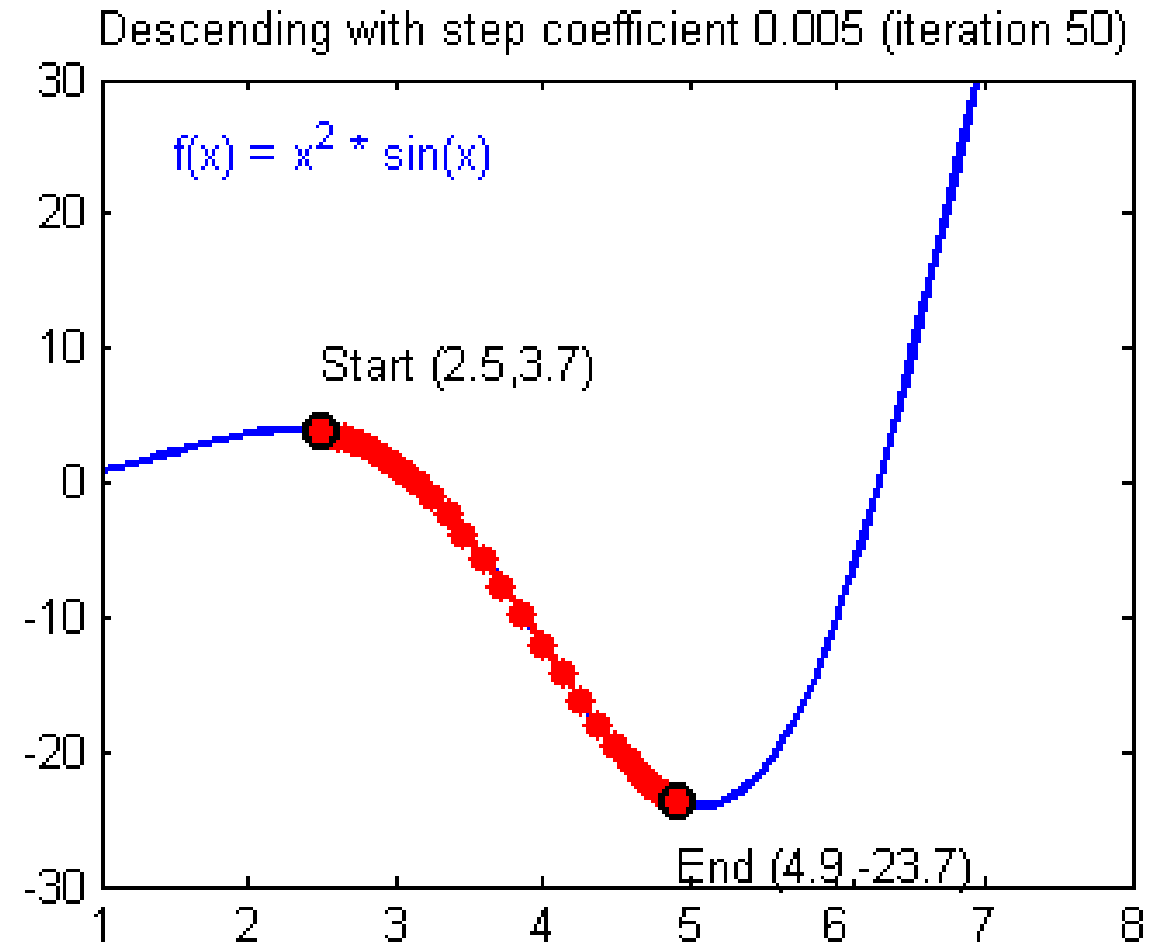
- $(WX + b - Y)^2$
- $loss = \sum_i (w * x_i + b - y_i)^2$
- Minimize $loss$
- $w' * x + b' \rightarrow y$



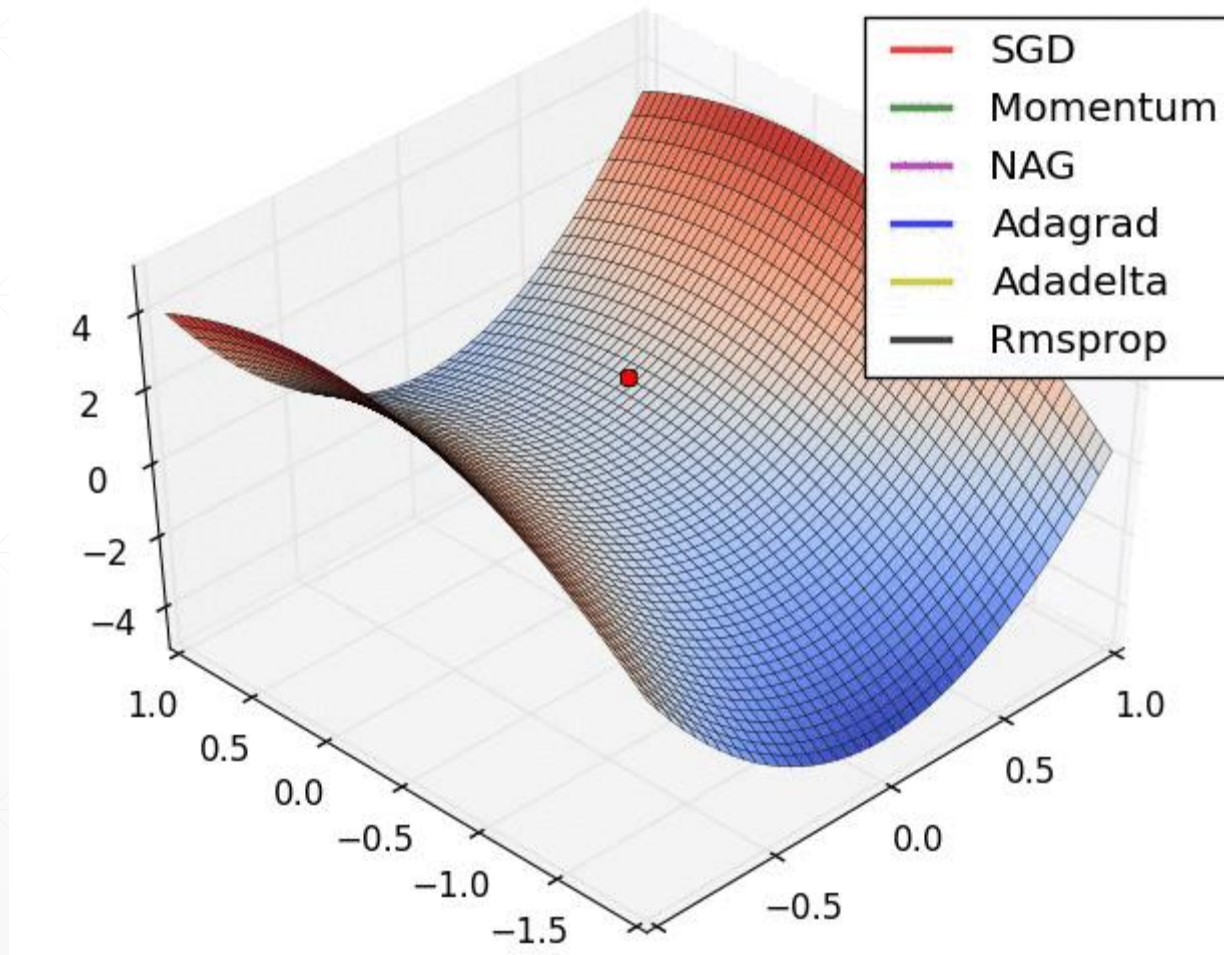
Gradient Descent

$$w' = w - lr * \frac{dy}{dw}$$

$$x' = x - 0.005 * \frac{dy}{dx}$$



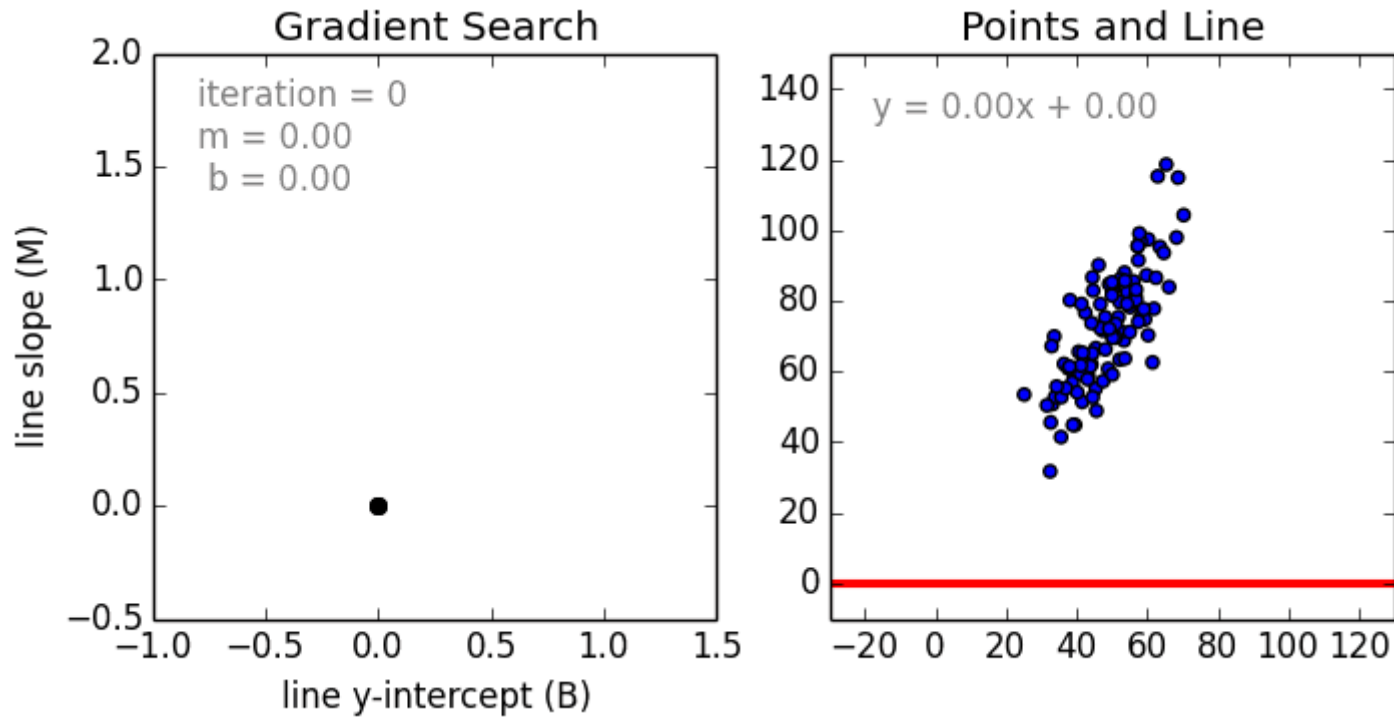
Gradient Descent



Find w', b'

- $loss = \sum_i (w * x_i + b - y_i)^2$
 - $w' = w - lr * \frac{\partial loss}{\partial w}$
 - $b' = b - lr * \frac{\partial loss}{\partial b}$
 - $w' * x + b' \rightarrow y$
-

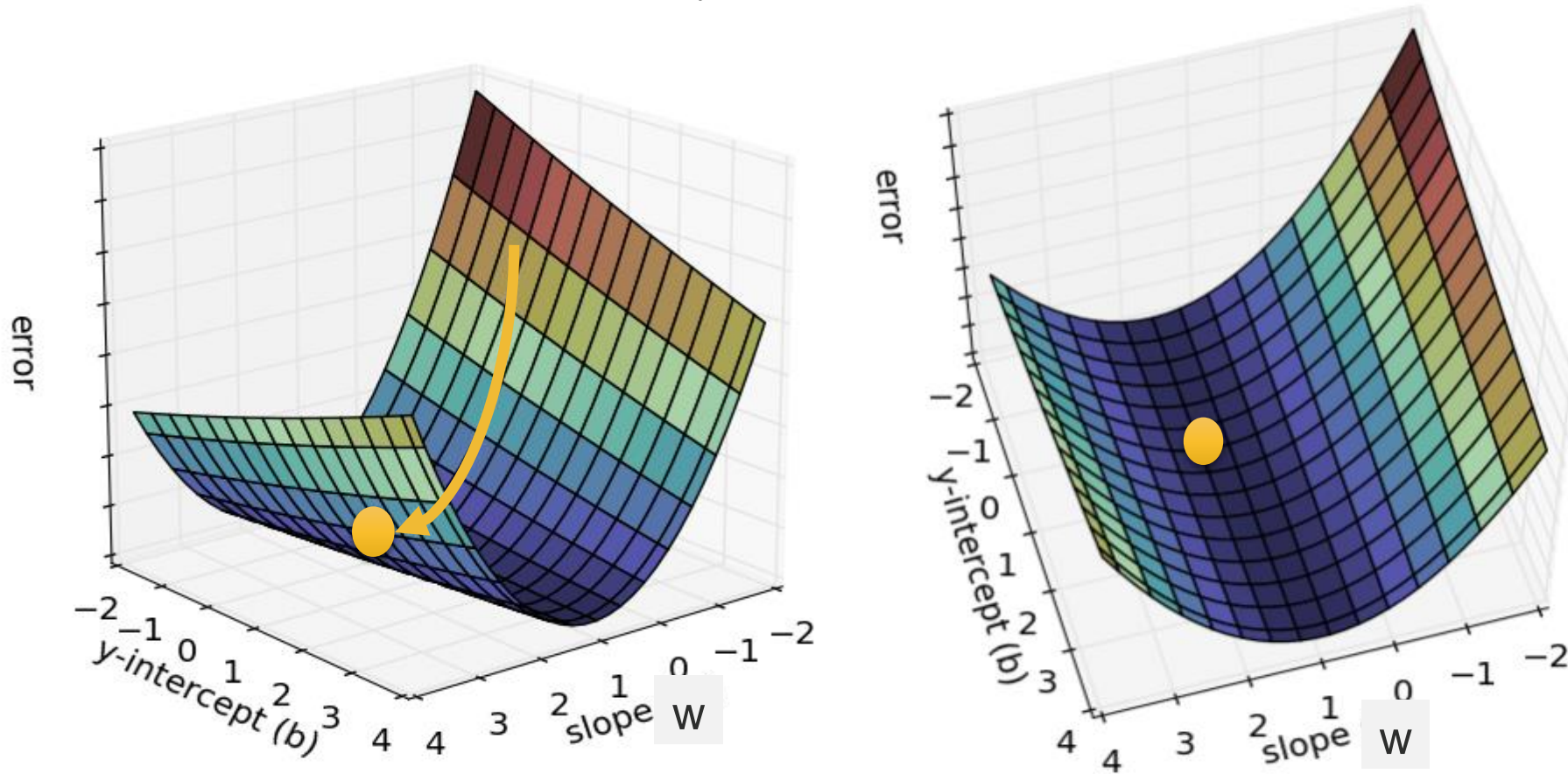
Learning Process



Loss surface

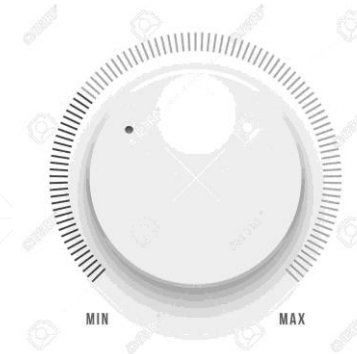
$$\text{loss} = \sum_{i=1} (w * x_i + b - y_i)^2$$

Convex
Optimization



Linear Regression

- Linear Regression
- Logistic Regression
- Classification



下一课时

实战Linear
Regression

Thank You.
