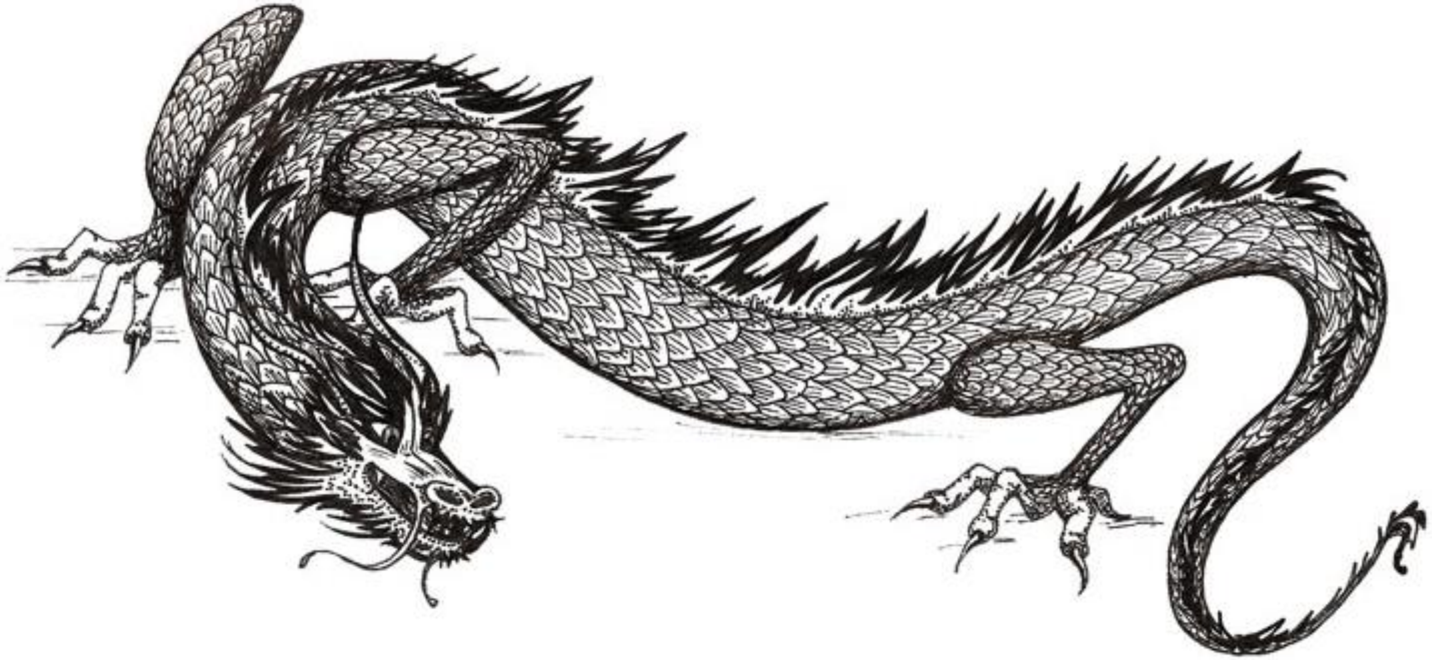
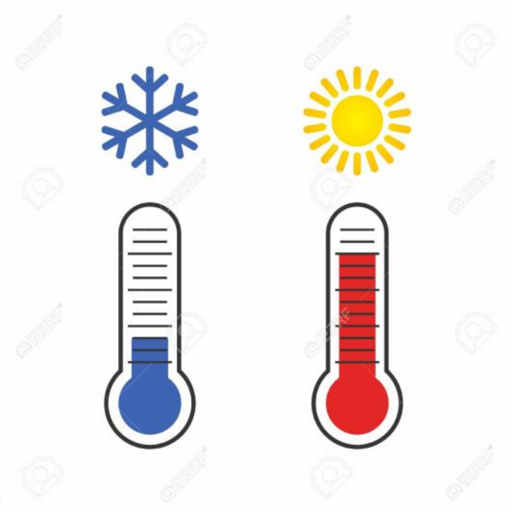


回归问题

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

https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningnd-deep-learning-techniques-python/

Linear Equation

- $y = w * x + b$

  - 1.567 = w * 1 + b
  - 3.043 = w * 2 + b

  - w = 1.477
  - b = 0.089

Closed Form Solution

With Noise?

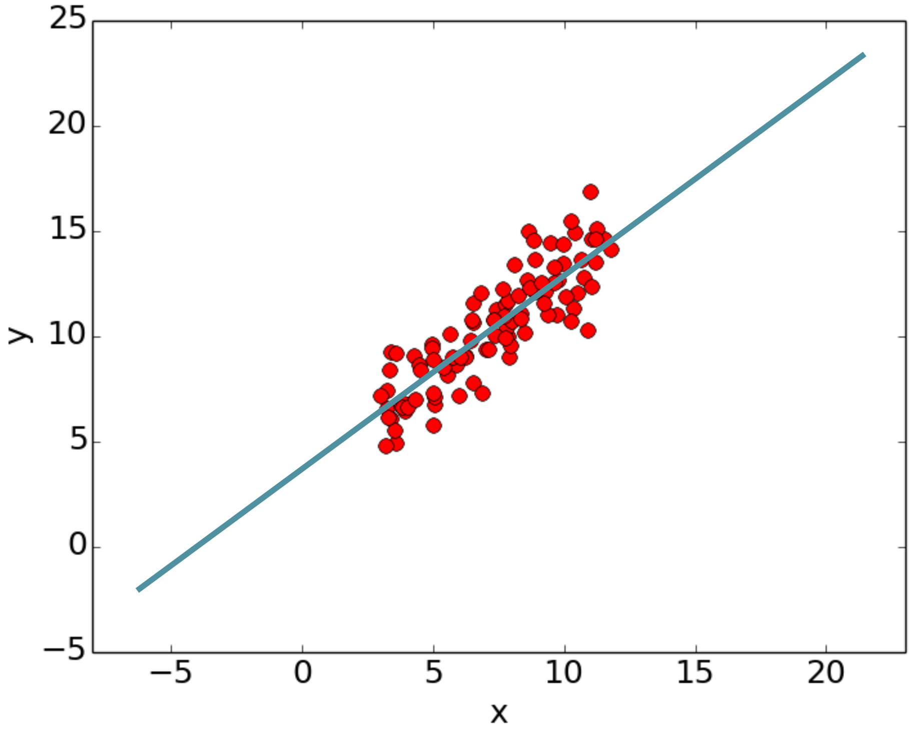
- $y = w * x + b + \epsilon$
- $\epsilon \backsim N(0,1)$
    - 1.567 = w * 1 + b + eps
    - 3.043 = w * 2 + b + eps
    - 4.519 = w * 3 + b + eps
    - …

$$Y = (WX + b)$$

For Example

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

- w?
- b?



Find w', b'

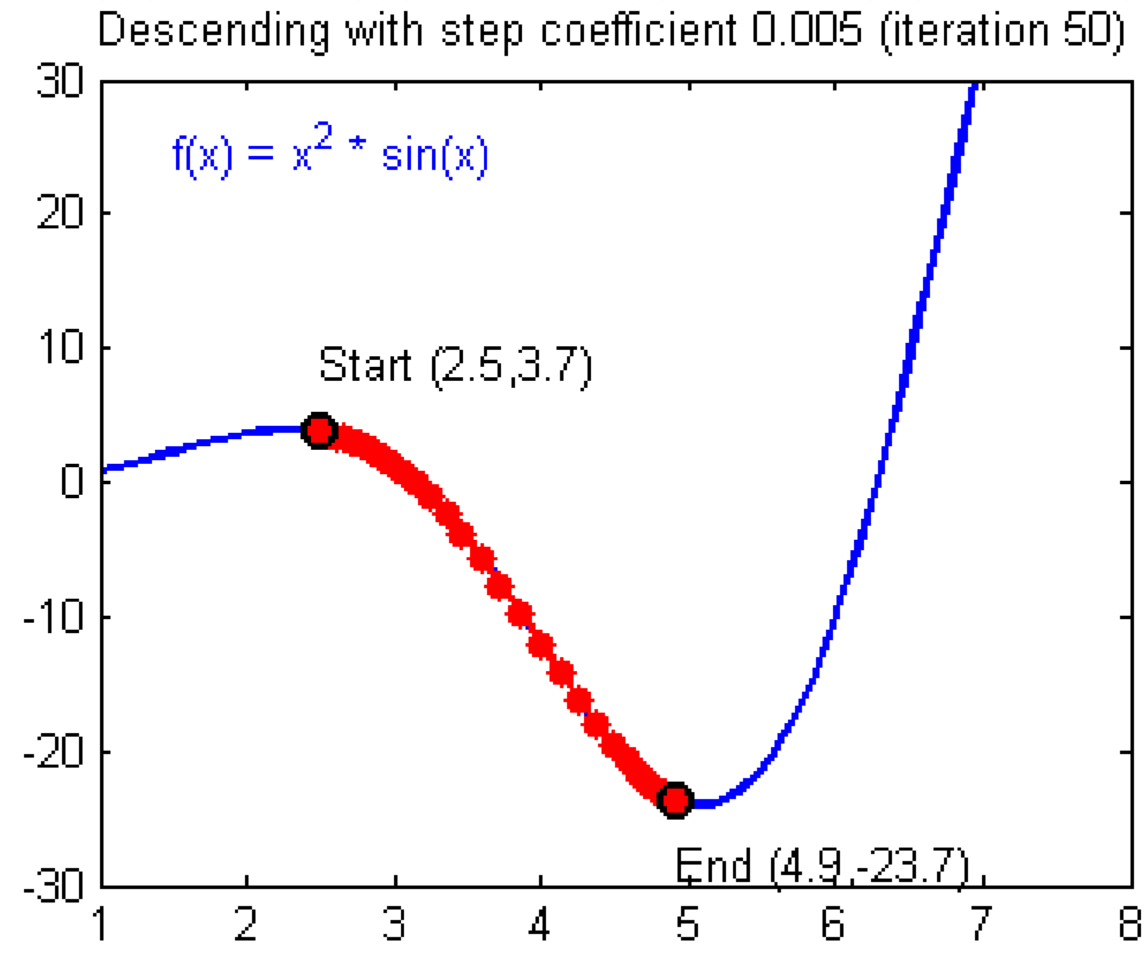
- $(WX + b - Y)^2$
- $loss = \sum_i (w * x_i + b - y_i)^2$

- Minimize $loss$
- $w' * x + b' \rightarrow y$

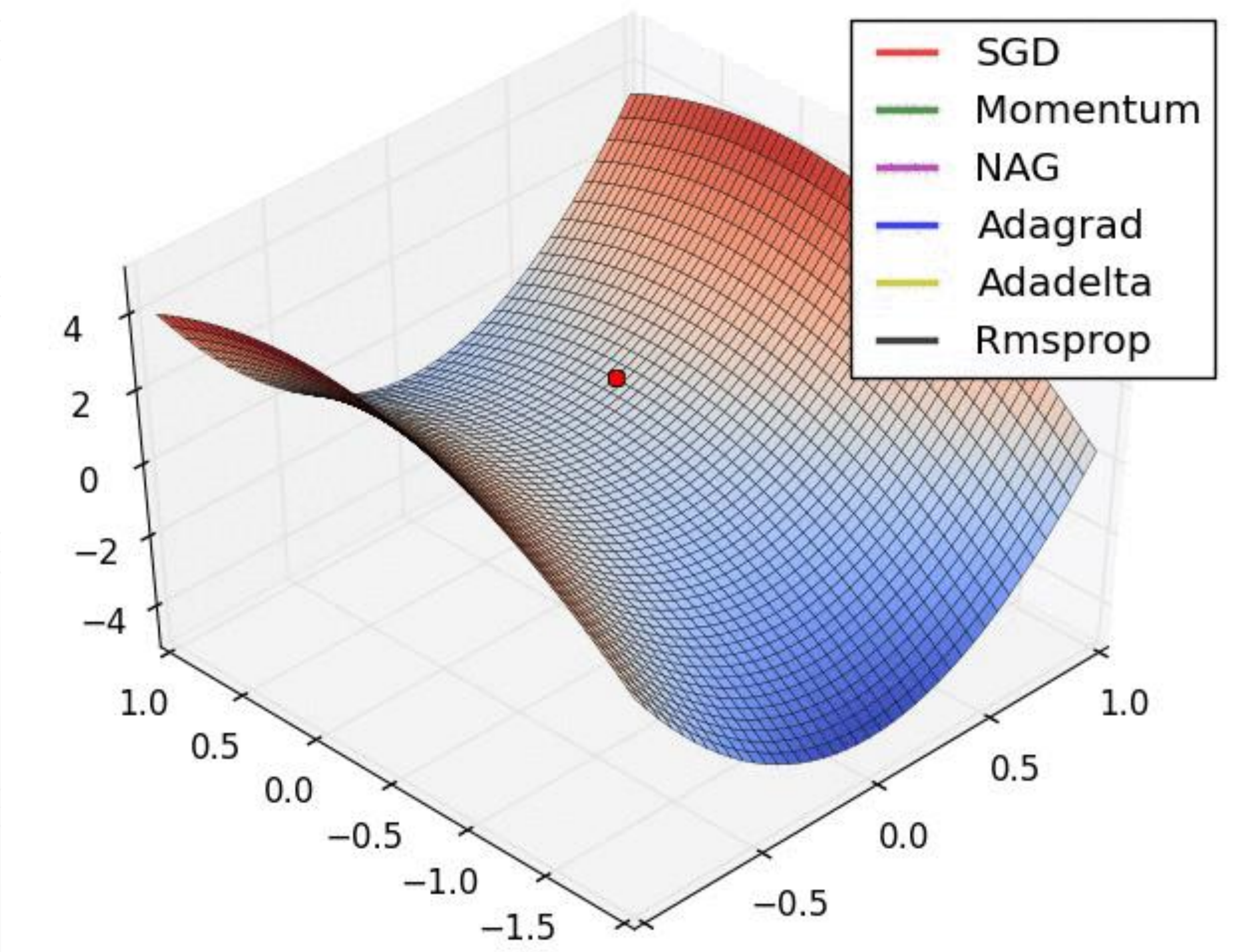
Gradient Descent

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

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



Gradient Descent

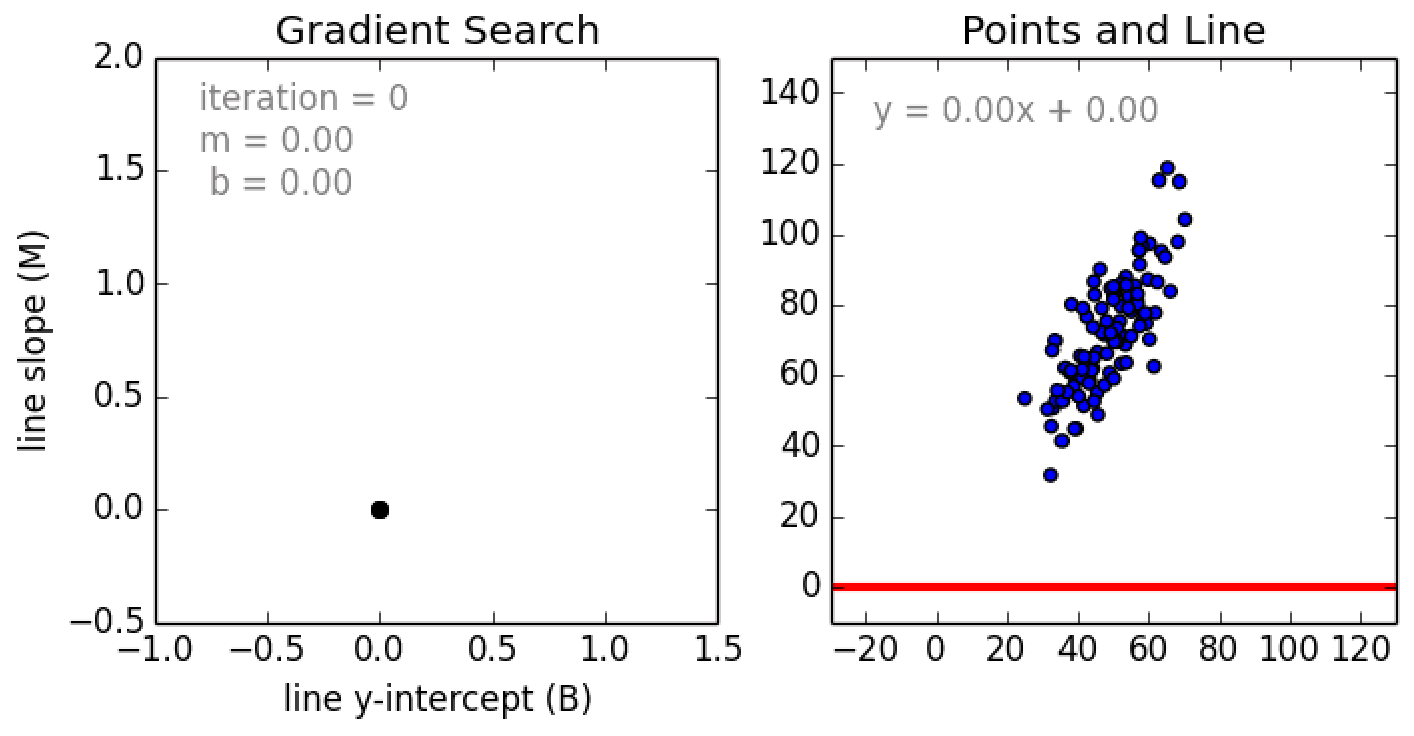


Find w', b'

- $loss = \sum_i (w * x_i + b - y_i)^2$

- $w' = w - lr * \frac{\partial loss}{\partial w}$
- $b' = b - lr * \frac{\partial loss}{\partial b}$
- $w' * x + b' \rightarrow y$

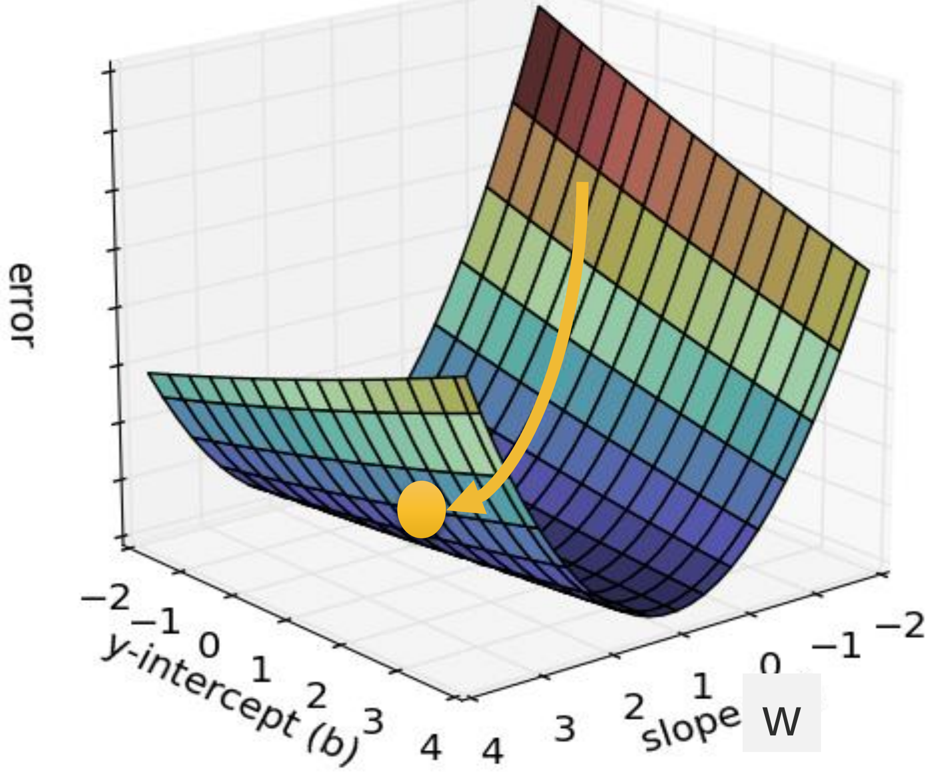
Learning Process

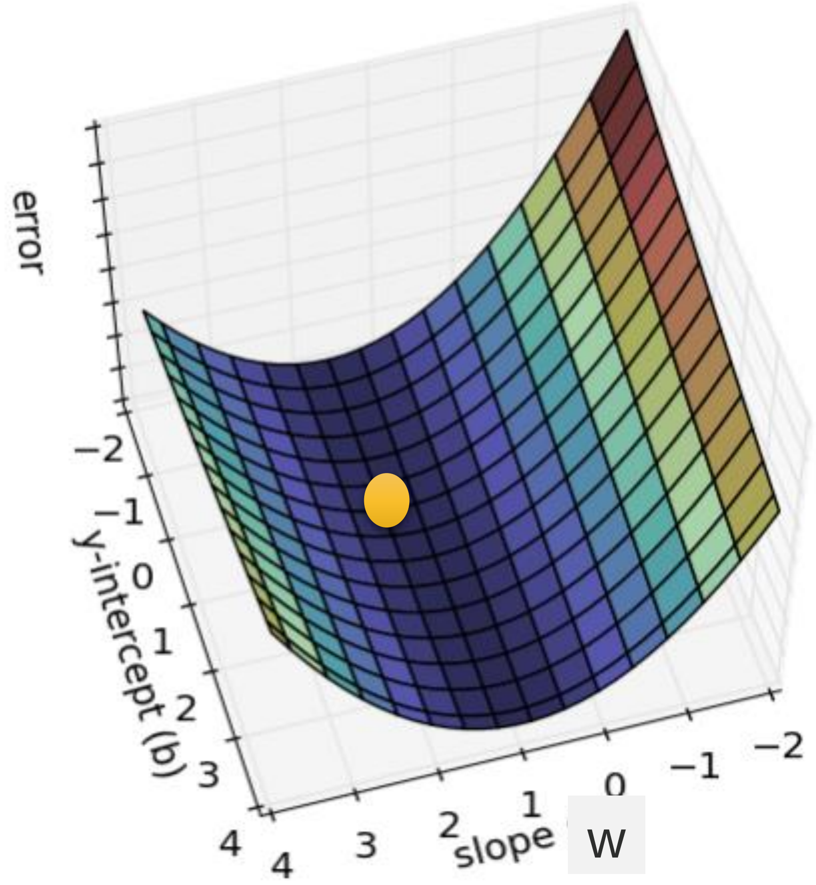


Loss surface

Convex Optimization

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

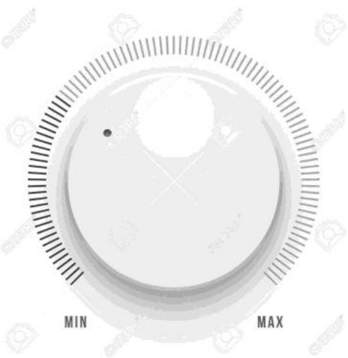




https://spin.atomicobject.com/2014/06/24/gradient-descent-linear-regression/

Linear Regression

- Linear Regression
- Logistic Regression
- Classification



下一课时

实战Linear Regression

Thank You.