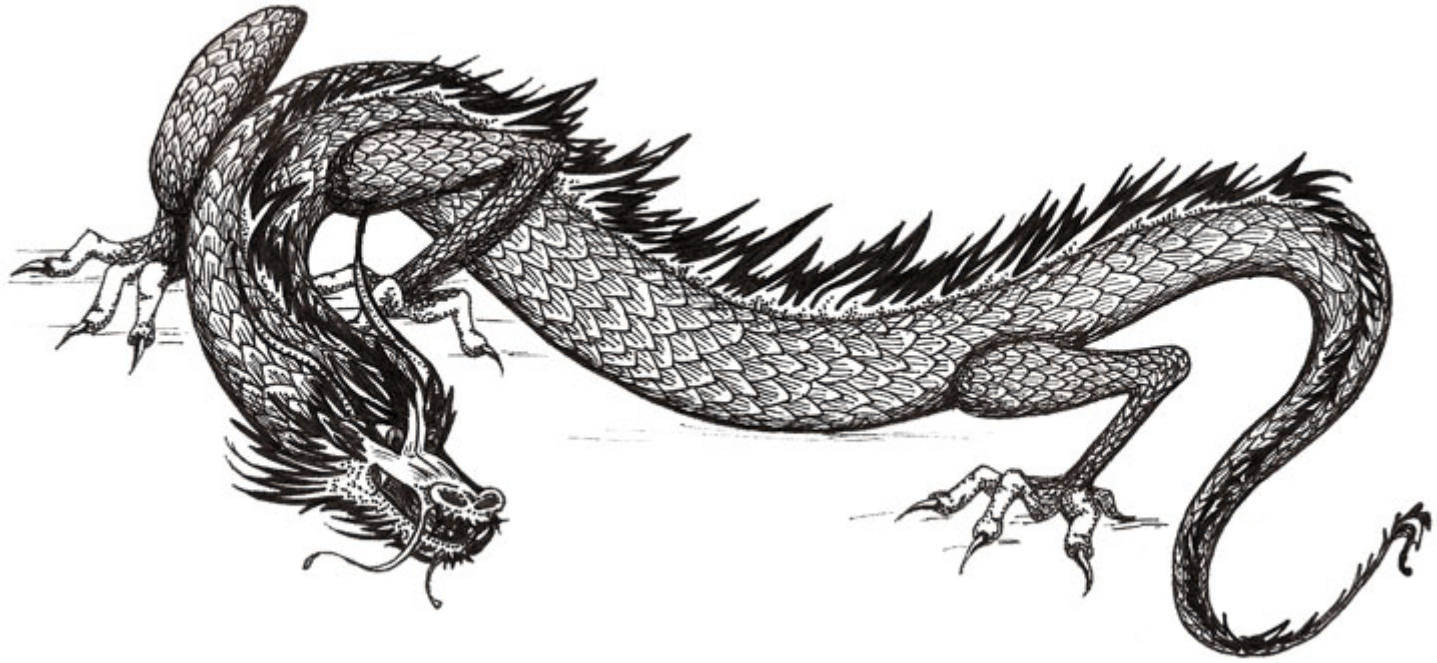
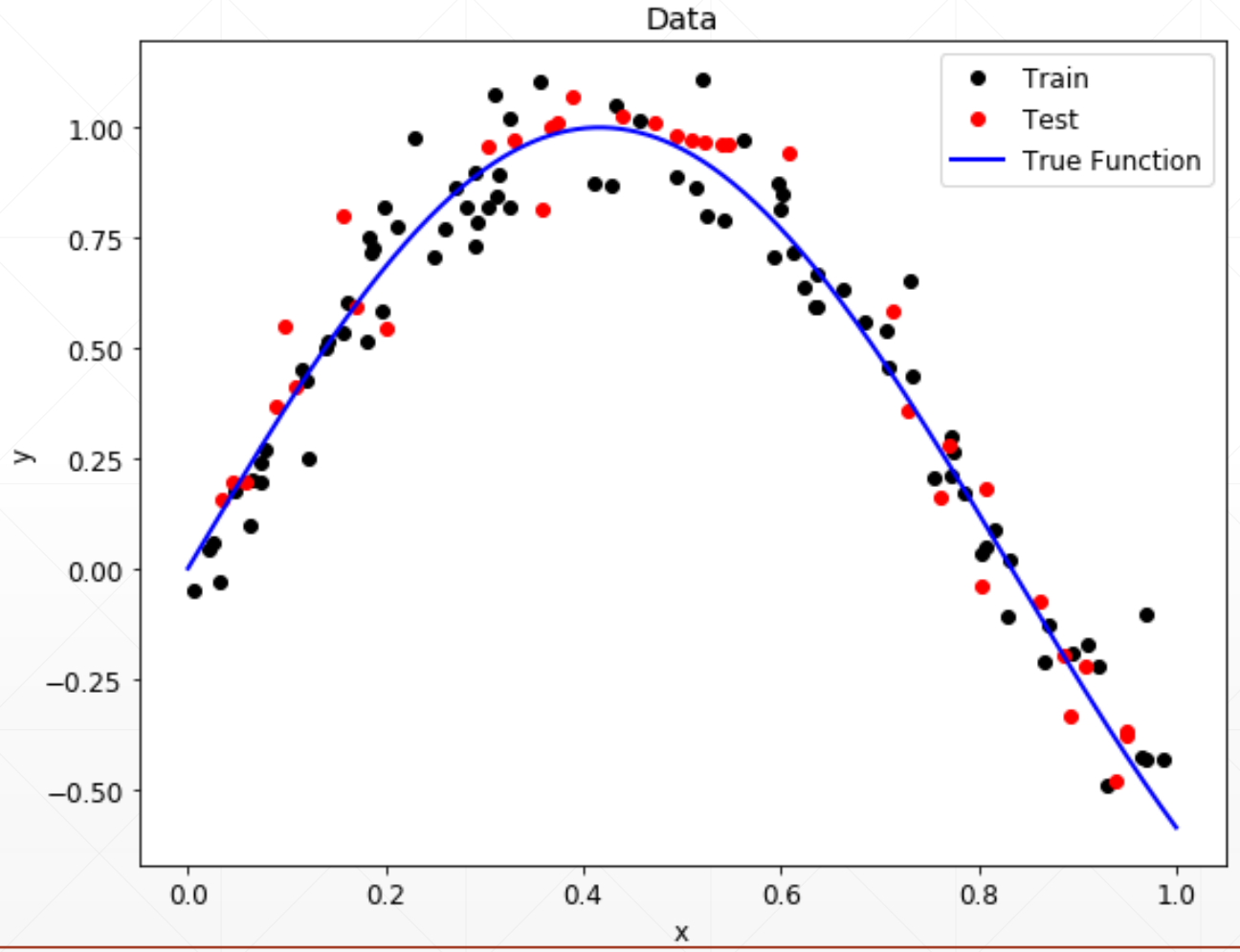


过拟合与欠拟合

主讲：龙良曲

Scenario1: House Price

Scenario2: GPA



Ground-truth distribution?

- That's perfect if known

- However

Another factor: noise

- $y = w * x + b + \epsilon$
- $\epsilon \backsim N(0.01, 1)$

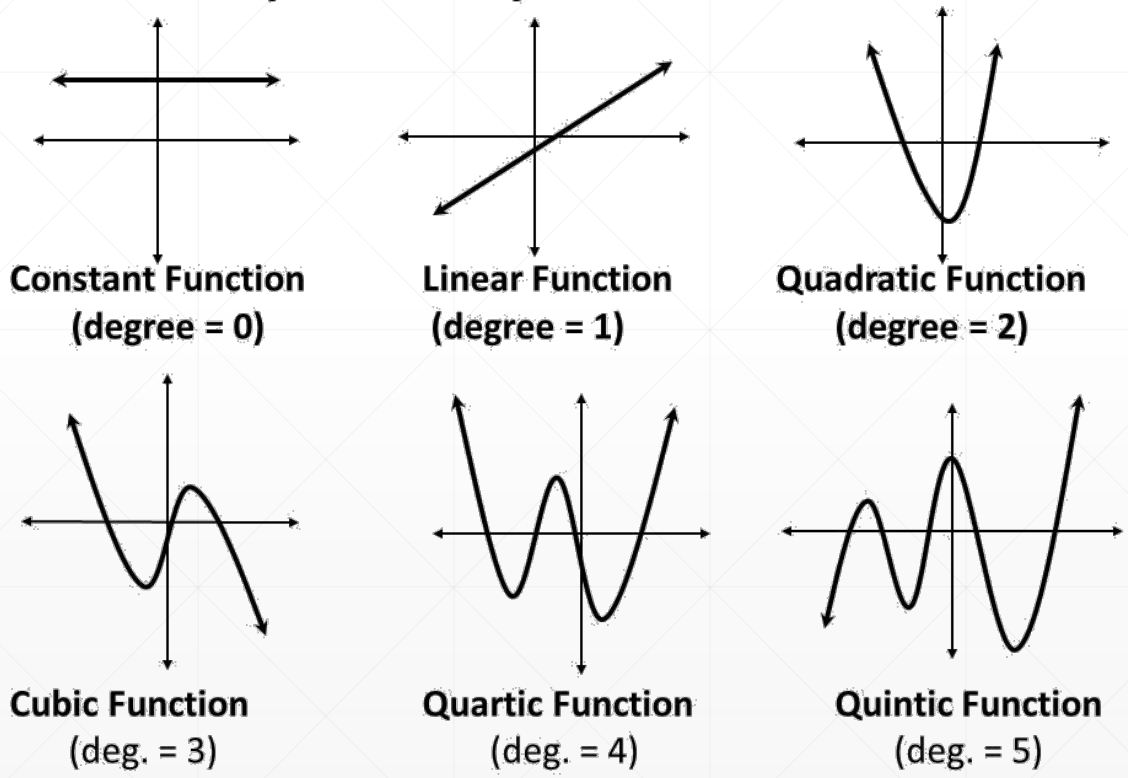
$$loss = (WX + b - y)^2$$

  - 1.567 = w * 1 + b + eps
  - 3.043 = w * 2 + b + eps
  - 4.519 = w * 3 + b + eps
  - …

Let's assume

$$y = \beta_0 + \beta_1 x + \beta_2 x^2 + \beta_3 x^3 + \cdots + \beta_n x^n + \varepsilon.$$

Graphs of Polynomial Functions:

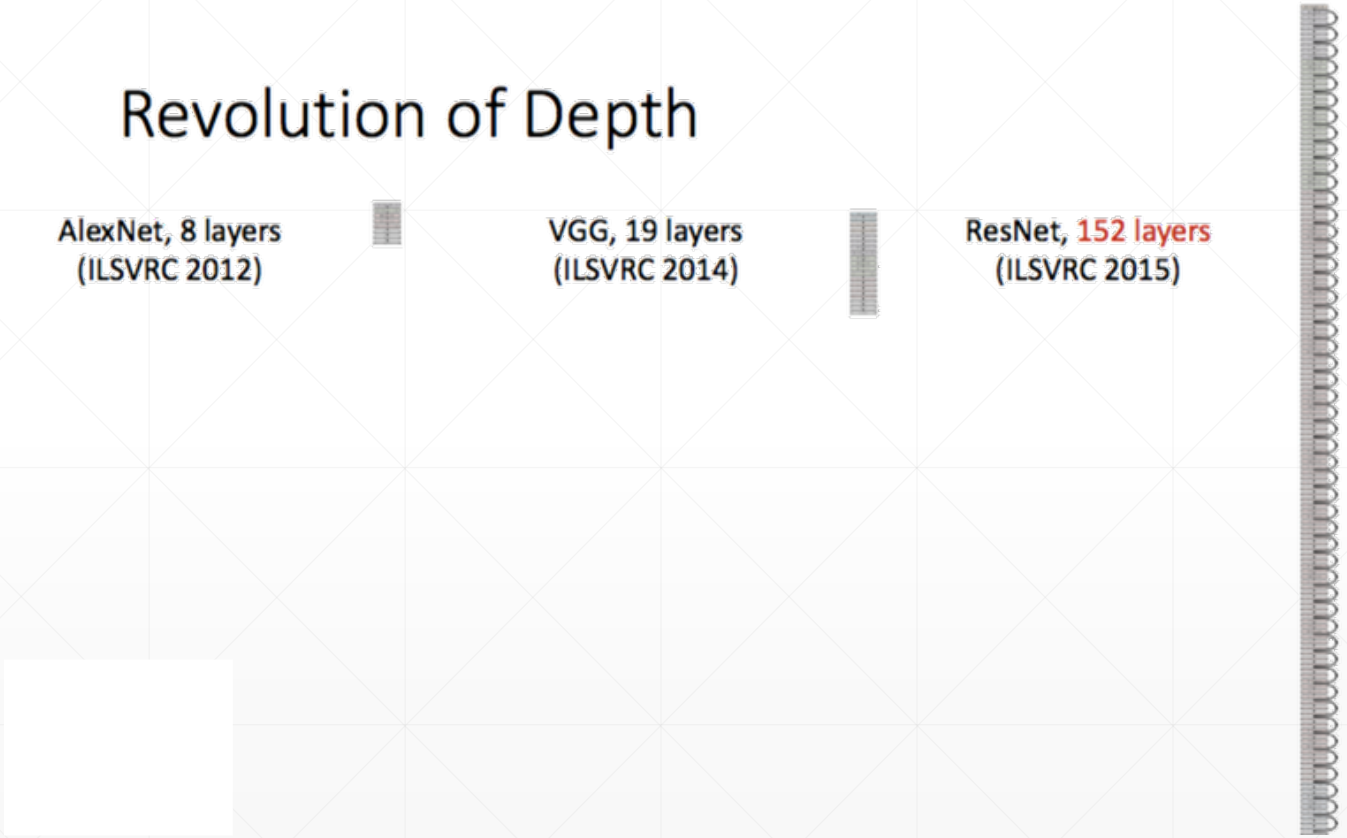


Mismatch: ground-truth VS estimated

- model capacity

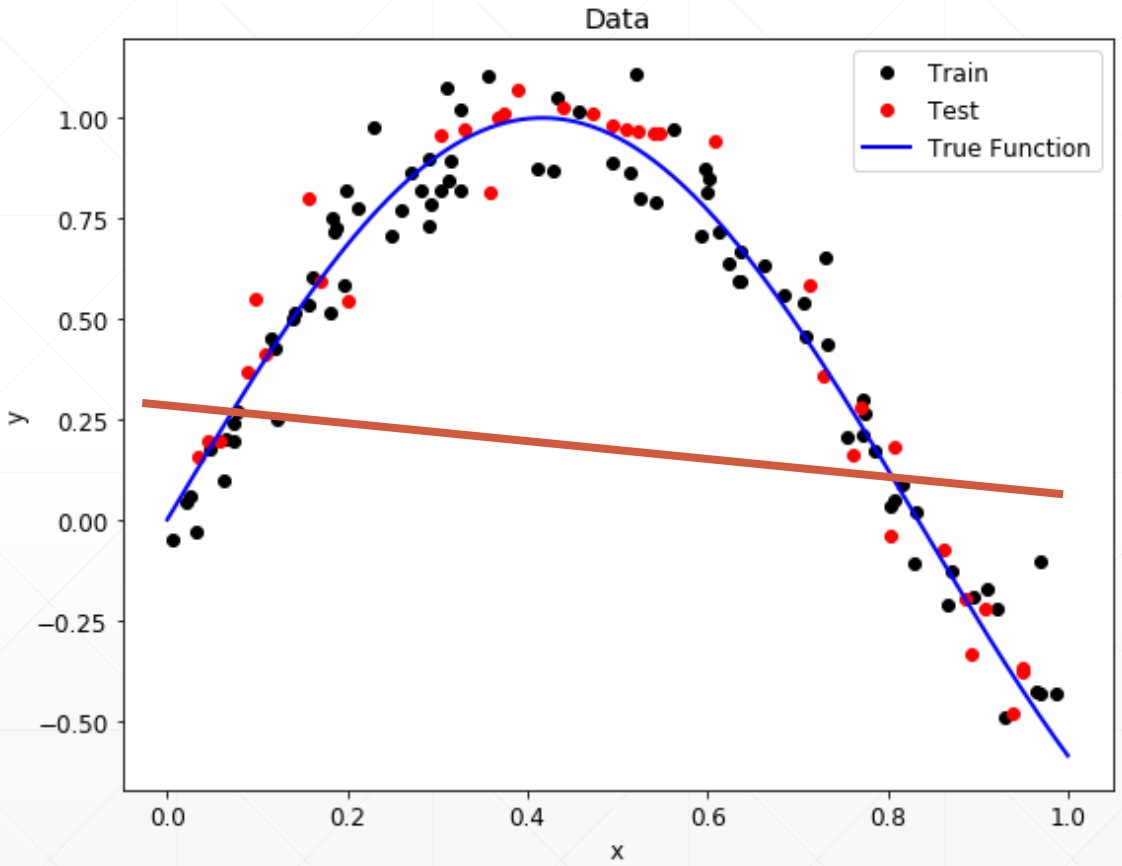
$$y = \beta_0 + \beta_1 x + \beta_2 x^2 + \beta_3 x^3 + \cdots + \beta_n x^n + \varepsilon.$$

Model Capacity

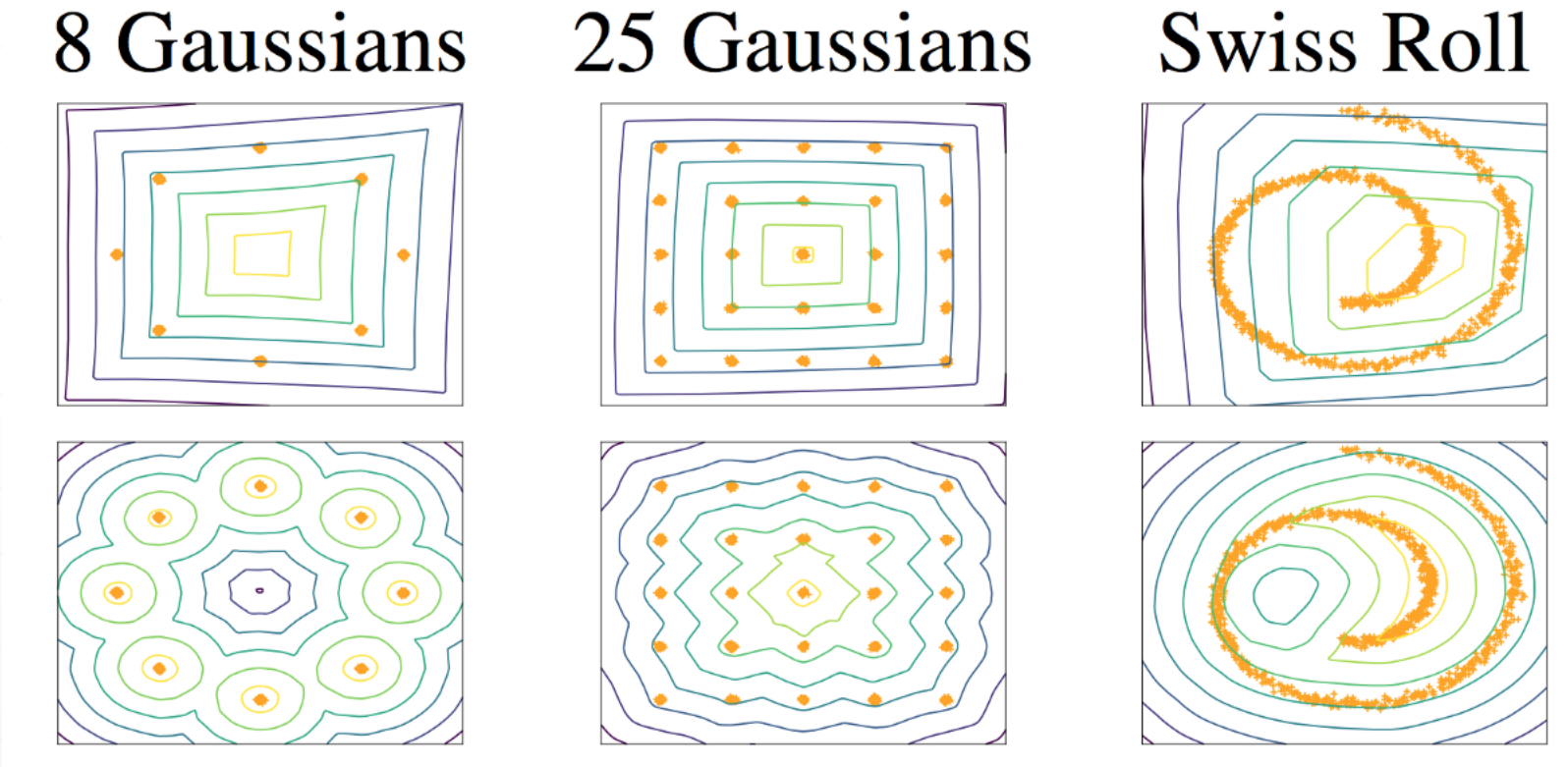


Case1: Estimated < Ground-truth

under-fitting



For example: WGAN

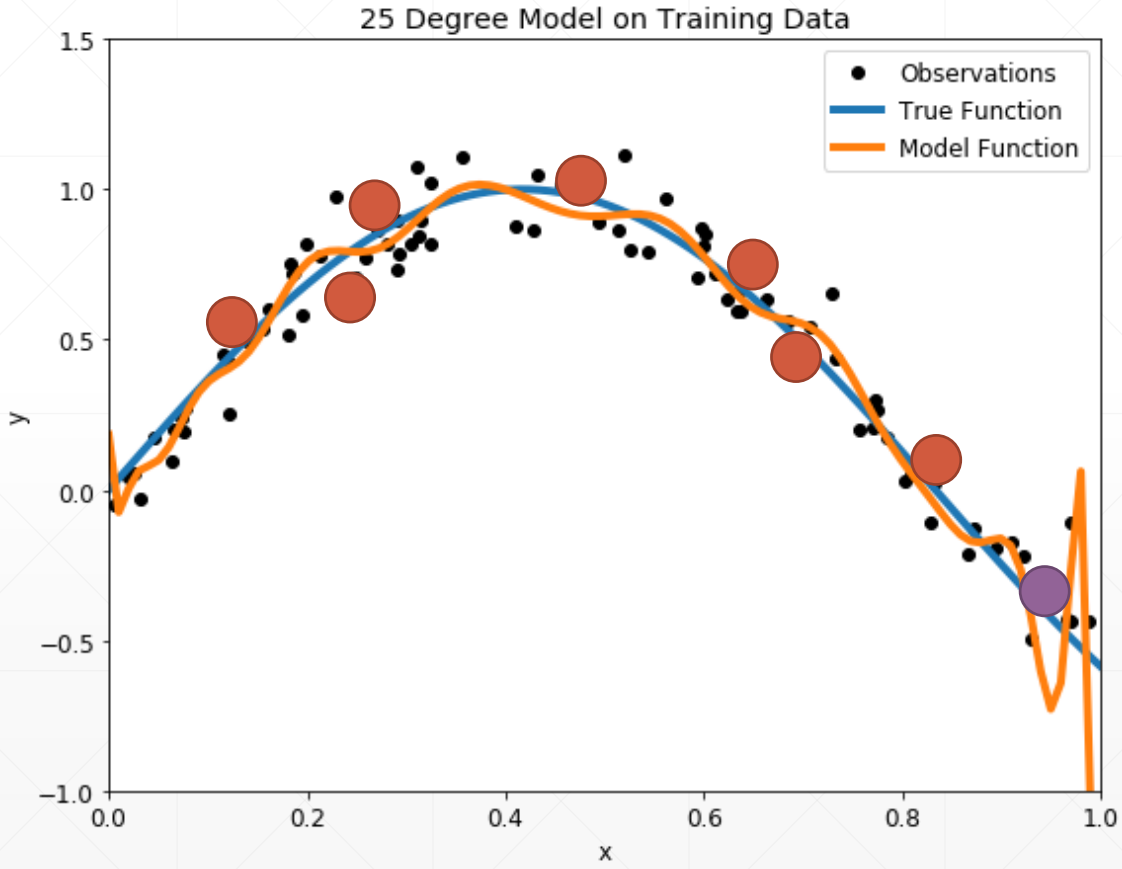


Underfitting

- train acc. is bad
- test acc. is bad as well

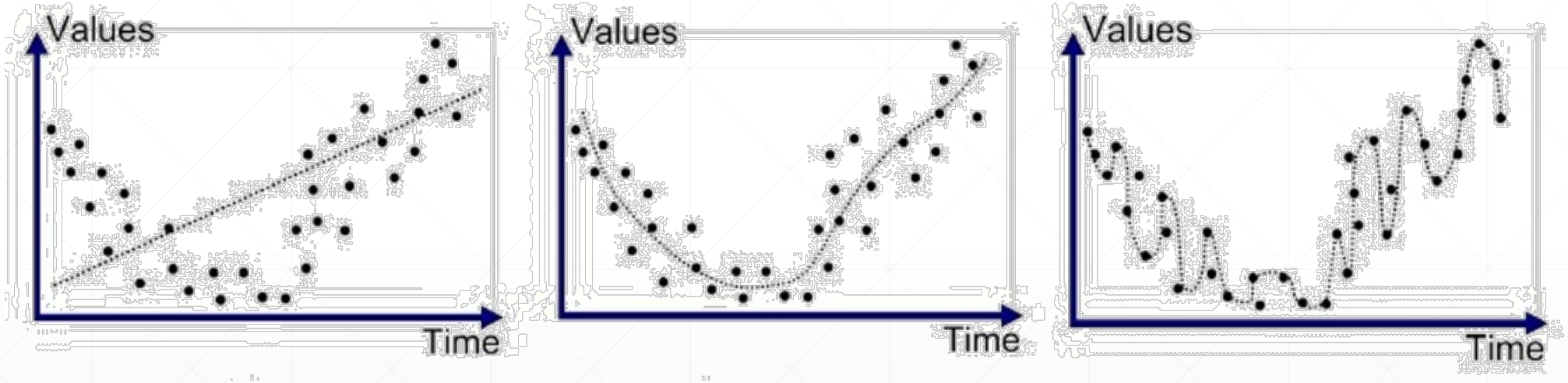
Case2: Ground-truth < Estimated

Over-fitting



Overfitting

- train loss and acc. is much better
- test acc. is worse
- → Generalization Performance



Underfitted

Good Fit/Robust

Overfitted

Overfitting !

- how to detect

- how to prevent

下一课时

交叉验证

Thank You.