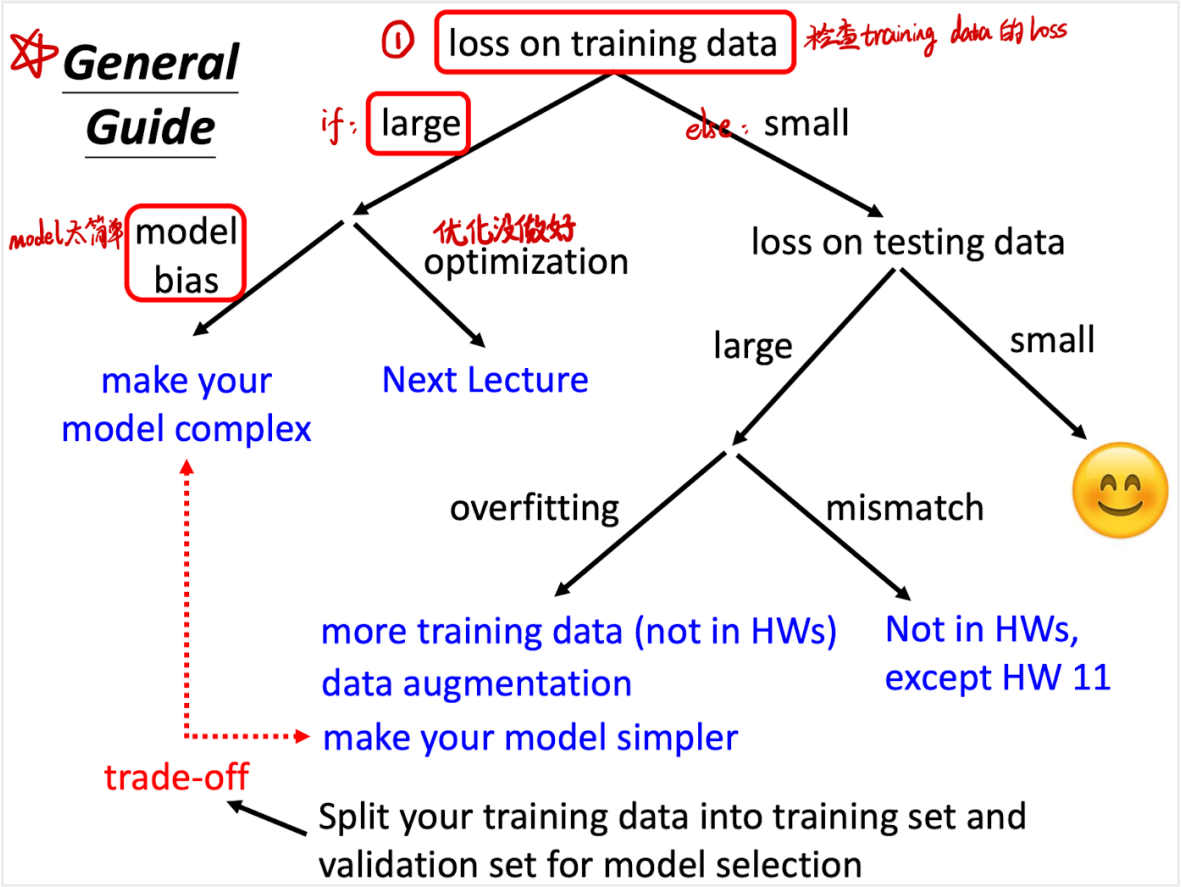
2.1 General Guidance

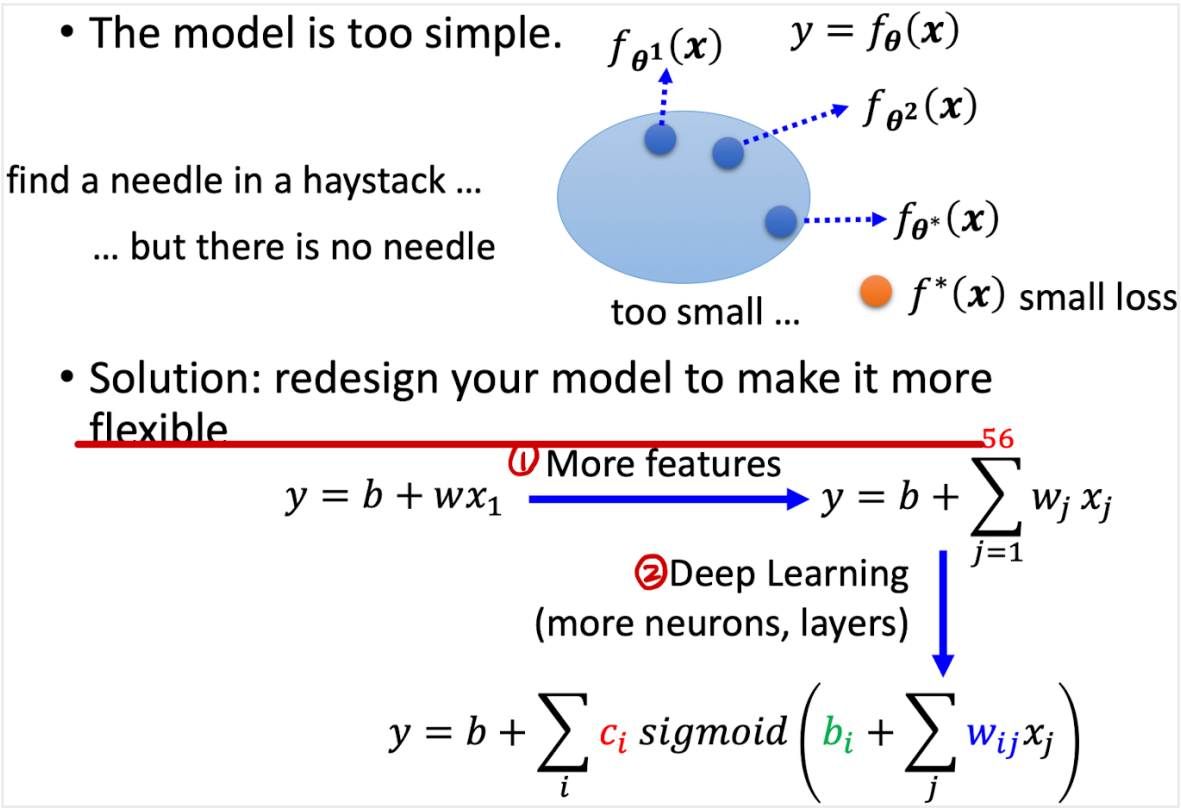
- model bias
- Model Bias v.s. Optimization Issue
- Overfitting
- Bias-Complexity Trade-off
- cross Validation



model bias

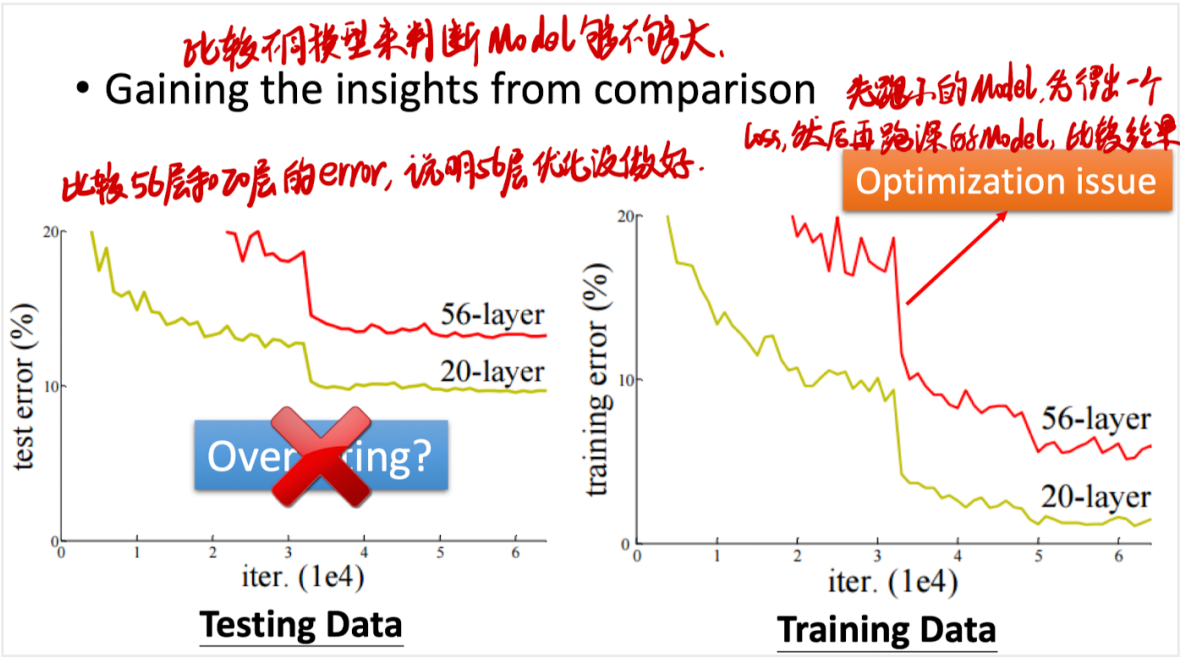
模型过于简单

- 增加特征
- 复杂的神经网络



Model Bias v.s. Optimization Issue

20层的model在training data上跑的错误率比56层的错误率低，说明56层的优化没做好



- Gaining the insights from comparison
- Start from shallower networks (or other models), which are easier to optimize.
- If deeper networks do not obtain smaller loss on **training data**, then there is optimization issue.

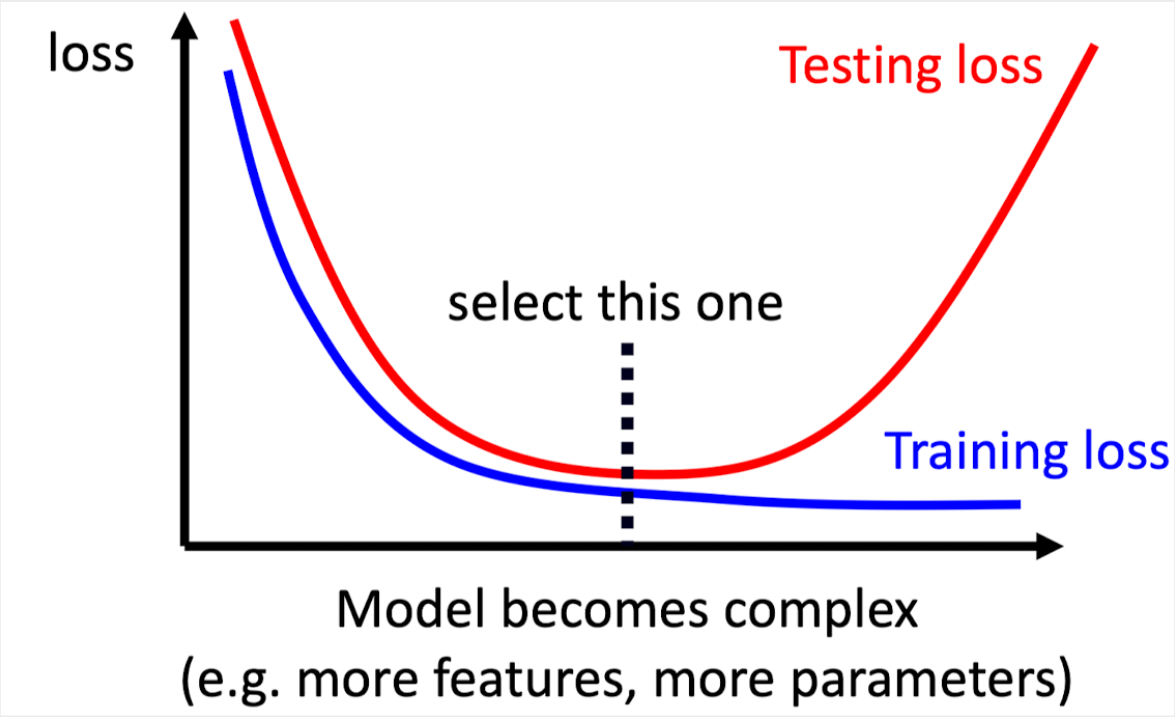
	1 layer	2 layer	3 layer	4 layer	5 layer
2017 – 2020	0.28k	0.18k	0.14k	0.10k	0.34k

- Solution: More powerful optimization technology (next lecture)

Overfitting

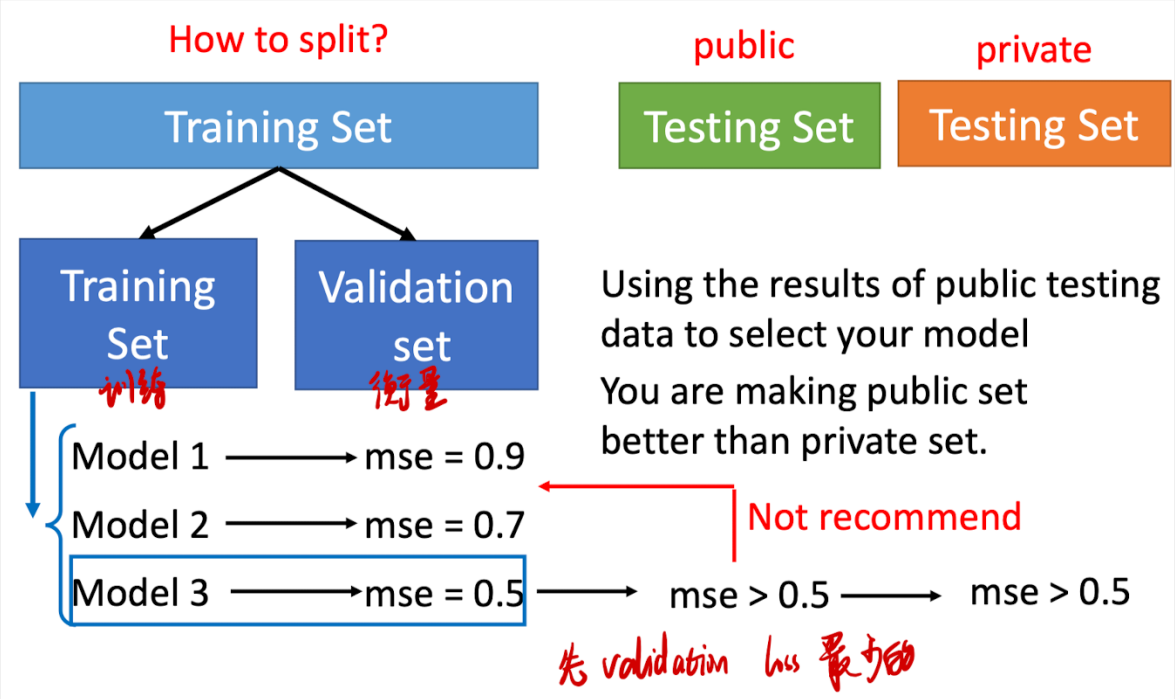
- 增加训练数据
  - data augmentation（比如左右翻转图像，具体取决于对资料的理解）
- 给模型加限制（constrained model）
  - Less Parameters, sharing parameters
  - Less features
  - Early stopping
  - Regularization
  - Dropout

Bias-Complexity Trade-off



Cross Validation

合理的选择Model的方法：把training资料分成training set和validation set，根据validation set的结果来挑选model，然后再用test set测试结果。



把训练资料切成N等份，拿一份当validation set，剩下n-1份当training set，重复n次。把m个模型在这n个setting下都跑一次，然后把n次的结果平均起来，看谁的结果最好。

N-fold Cross Validation

切训练资料为N等份，其中一份为validation set，另N份为training set，重复3次。