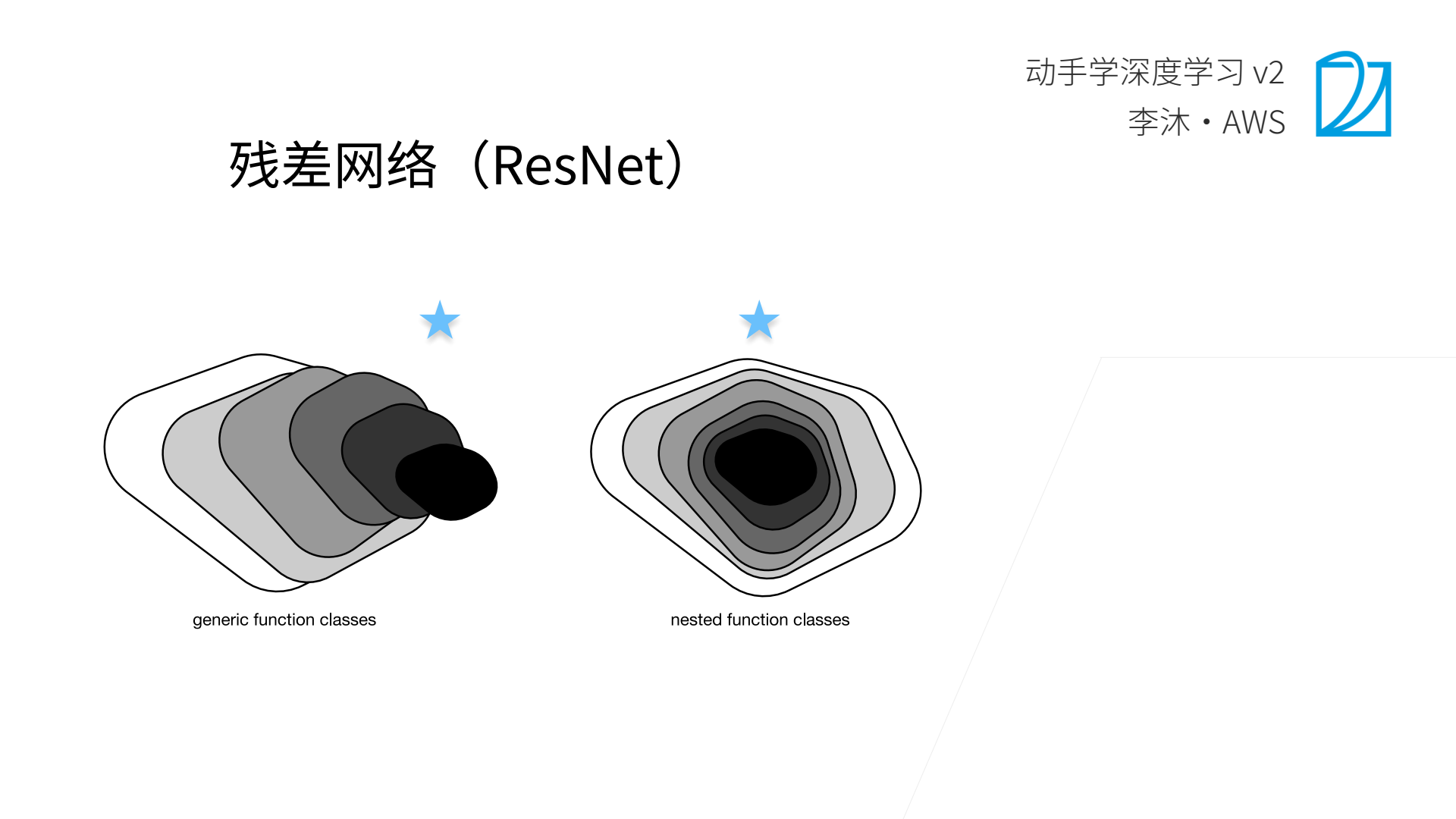
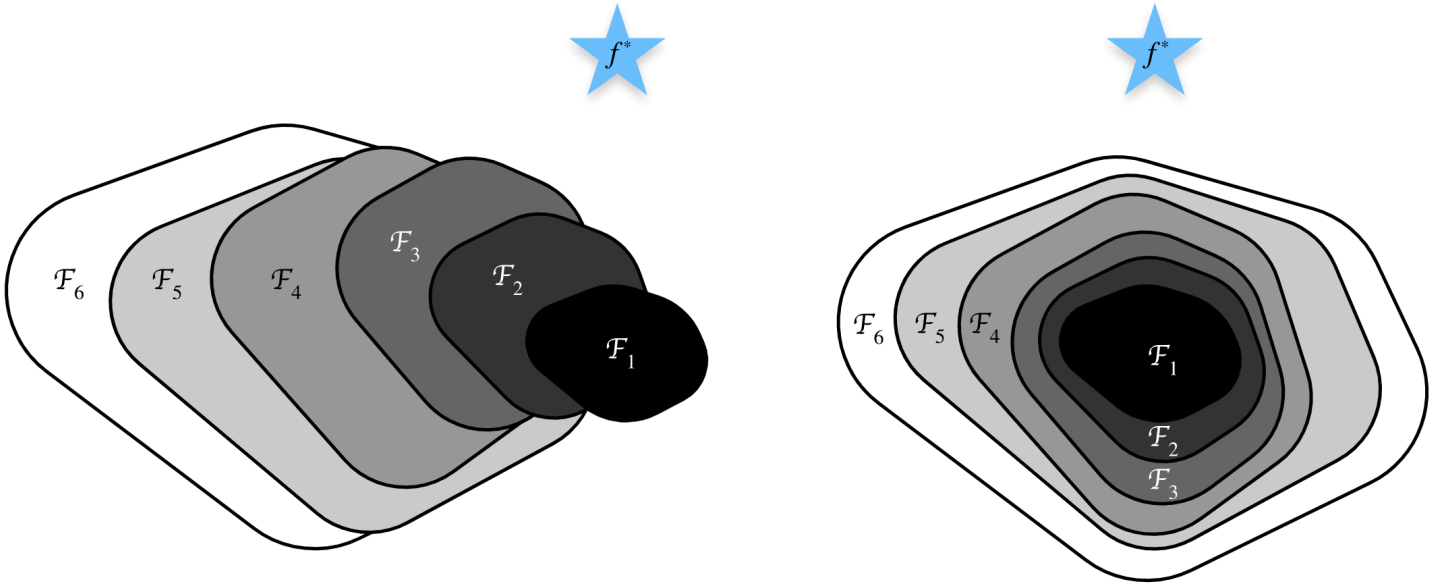


残差网络（ResNet）

generic function classes

nested function classes

加更多的层总是改进精度吗?



Non-nested function classes

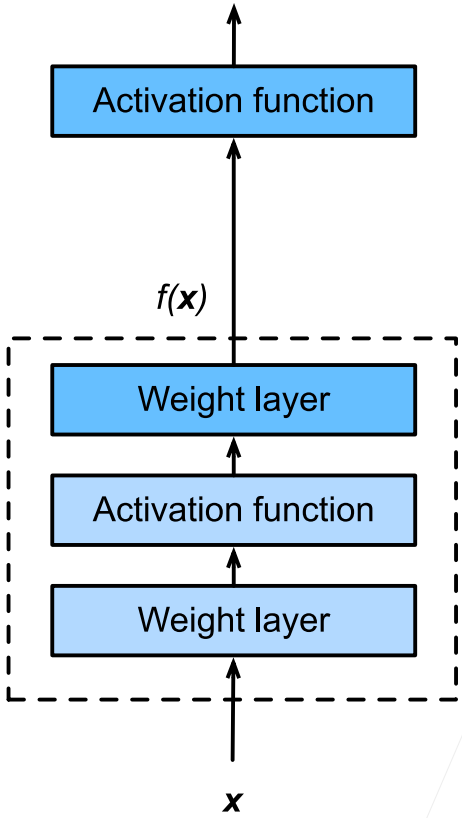
Nested function classes

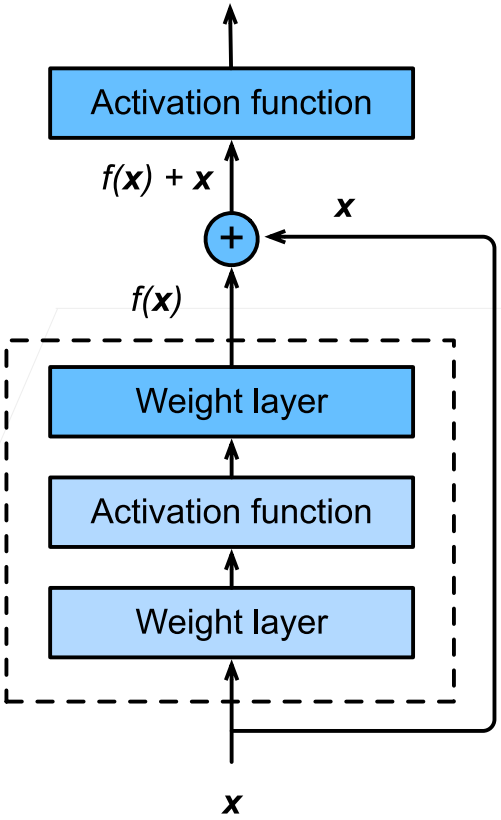
?

✔

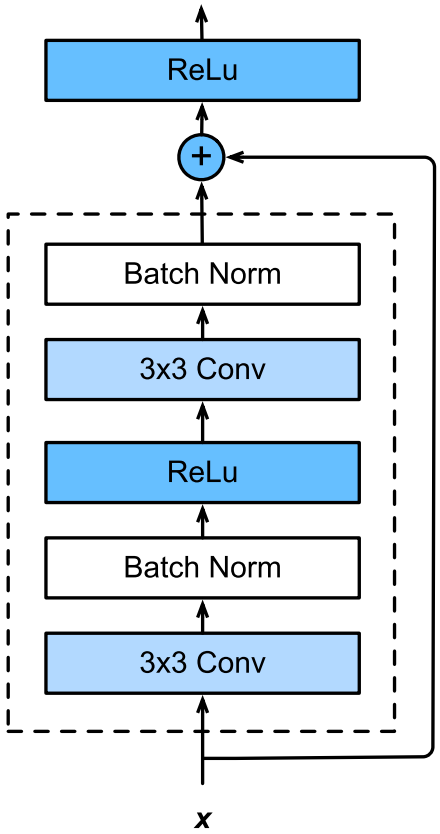
残差块

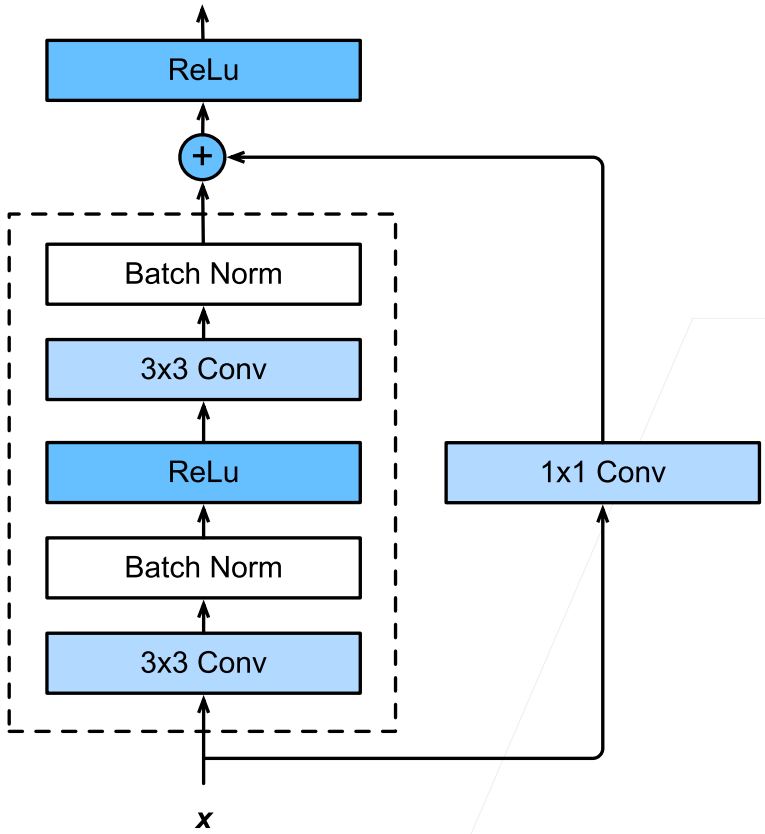
- 串联一个层改变函数类，我们希望能扩大函数类
- 残差块加入快速通道（右边）来得到 $f(x) = x + g(x)$ 的结构



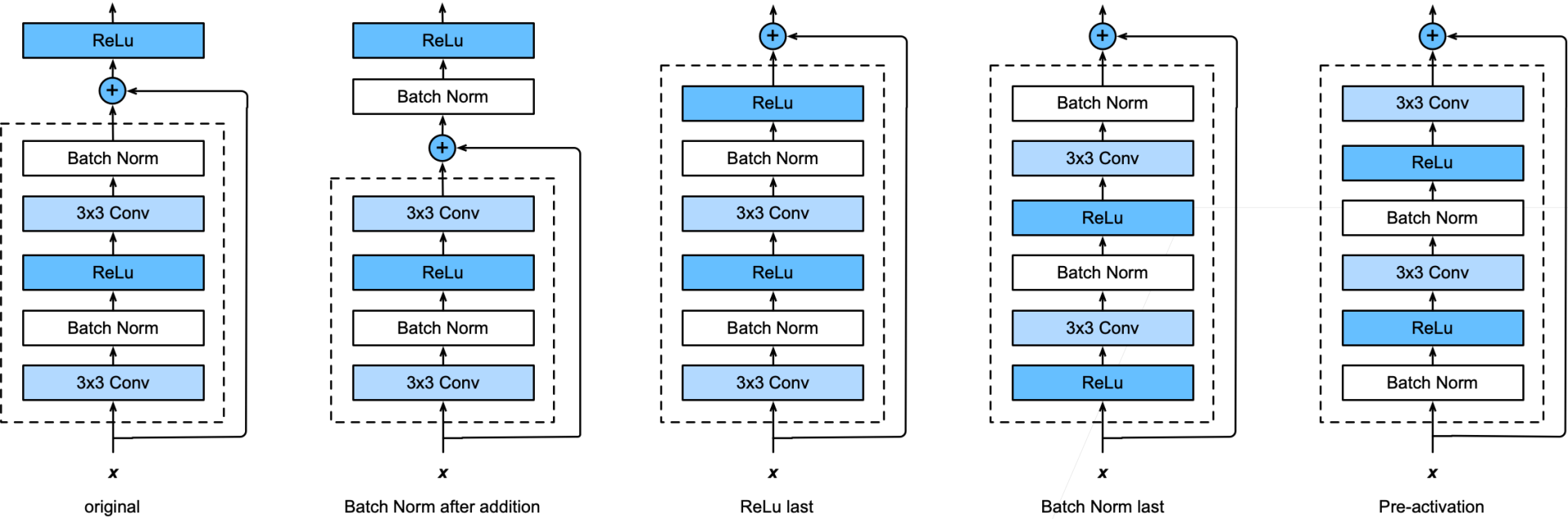


ResNet 块细节


ReLu
+
Batch Norm
3x3 Conv
ReLu
Batch Norm
3x3 Conv
x


ReLu
+
Batch Norm
3x3 Conv
ReLu
Batch Norm
3x3 Conv
1x1 Conv
x

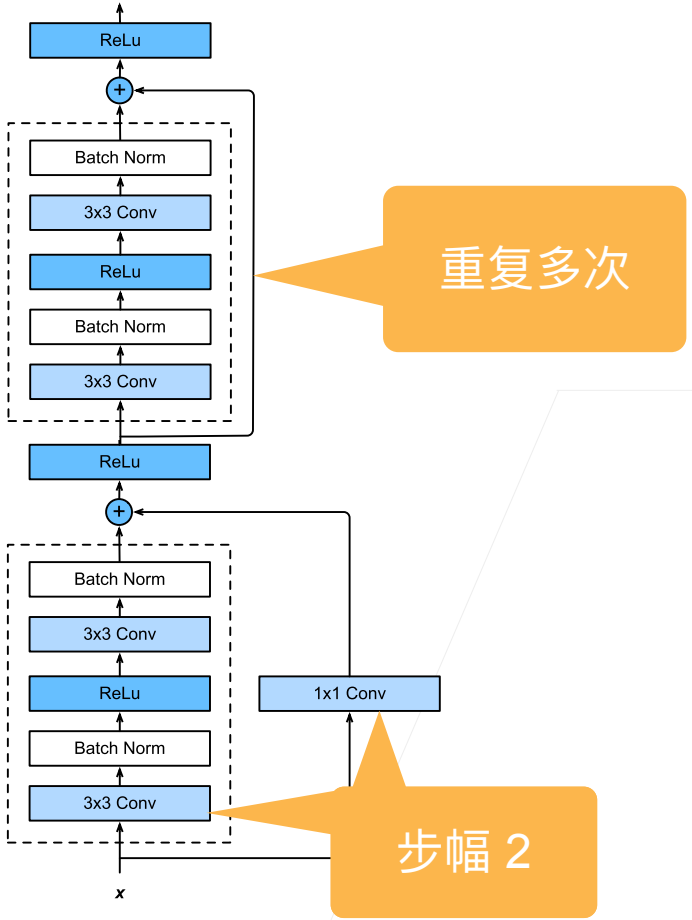
不同的残差块



试各种不同的组合

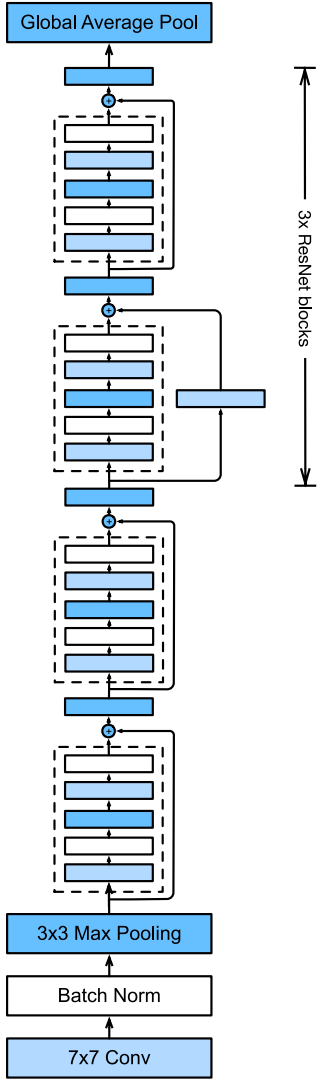
ResNet 块

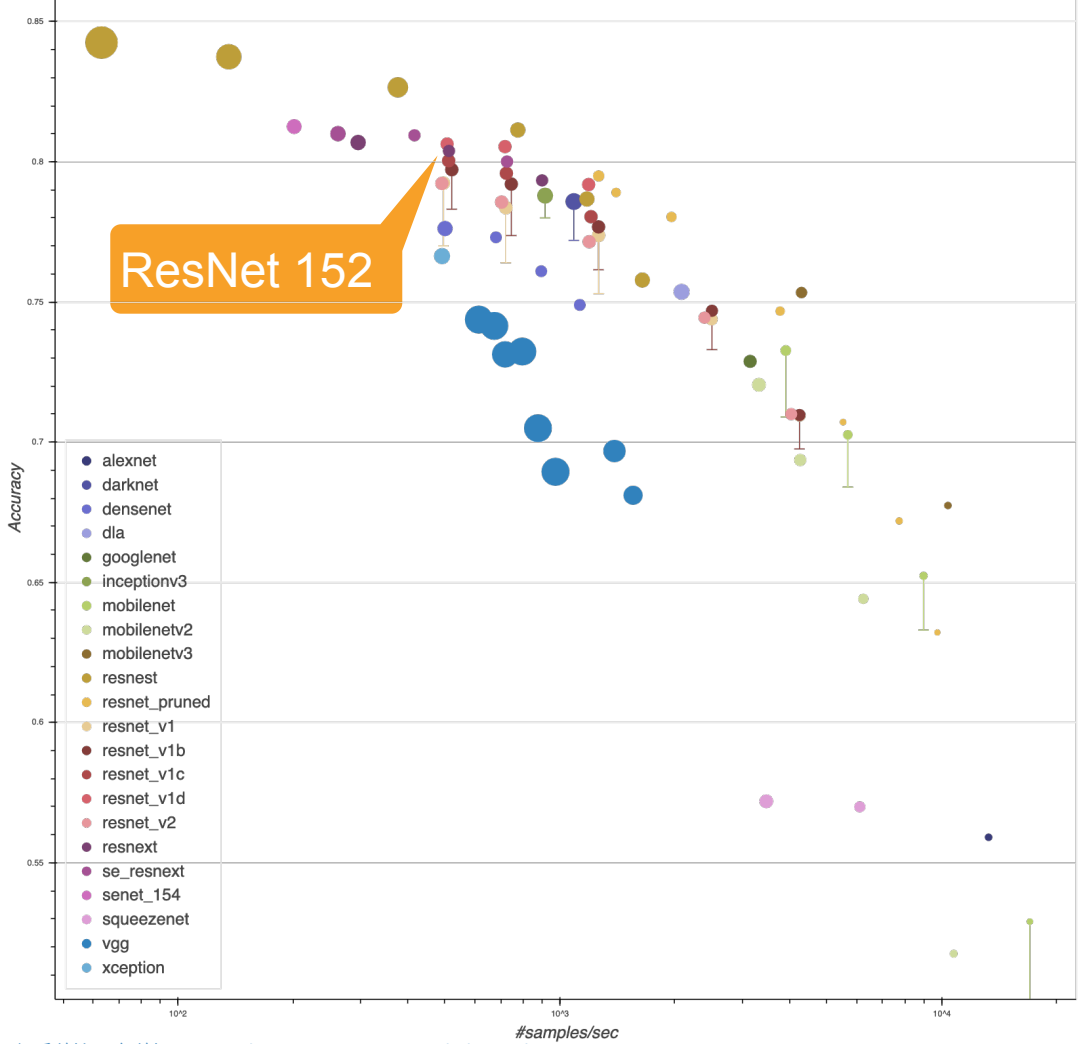
- 高宽减半ResNet块（步幅 2）
- 后接多个高宽不变ResNet块



ResNet 架构

- 类似 VGG 和 GoogleNet 的总体架构
- 但替换成了ResNet 块





GluonCV Model Zoo

https://cv.gluon.ai/model_zoo/classification.html

总结

- 残差块使得很深的网络更加容易训练
  - 甚至可以训练一千层的网络
- 残差网络对随后的深层神经网络设计产生了深远影响，无论是卷积类网络还是全连接类网络。