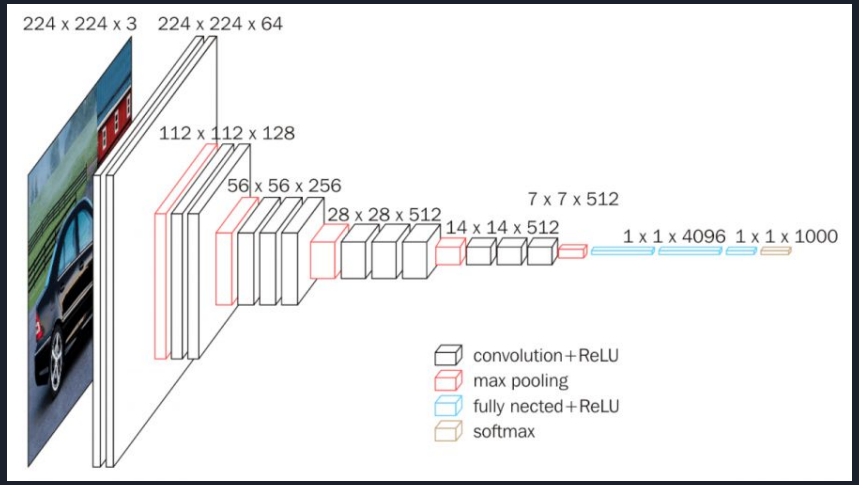
Residuals

Residuals: Motivations

- Deeper NNs not improving?



Residuals: What are they?

- Skip-Connections
- Numerical-Analysis Source
- Error Propagation Intuition

Loosely speaking, a **residual** is the error in a result.[1] To be precise, suppose we want to find x such that

$$f(x) = b.$$

Given an approximation x_0 of x, the residual is

$$b - f(x_0)$$

whereas the error is

$$x - x_0$$

If the exact value of x is not known, the residual can be computed, whereas the error cannot.

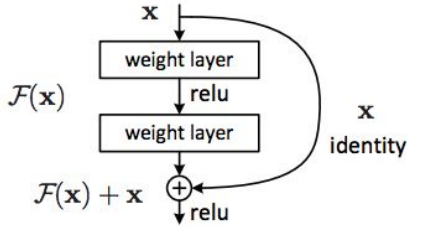
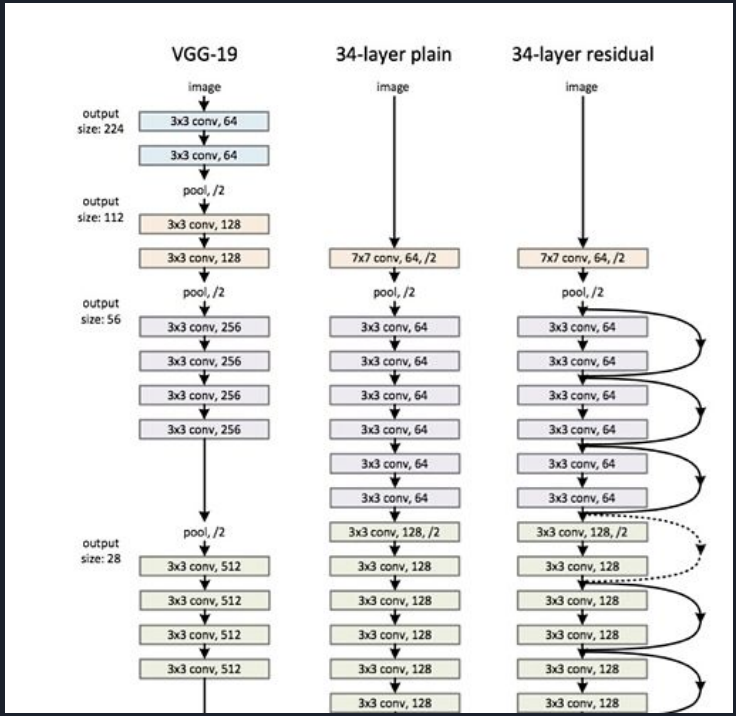


Figure 2. Residual learning: a building block.

Residuals: Performance



- >60k citations
- 1st place ILSVRC 2015 classification task
- Go-to backbone
  - Transfer Learning
  - Object Detection
  - Feature Detector