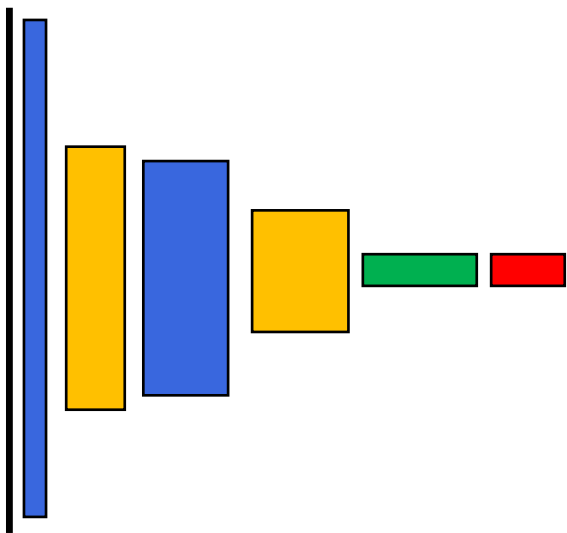


Resnet

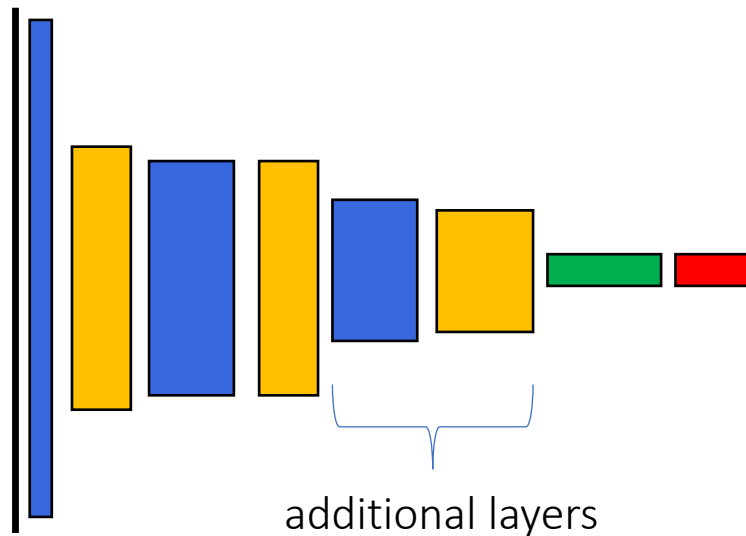
Resnet

Problem Description

- Problem: train a computer vision model to solve a more complicated task
- Solution: add more layers



Original Network

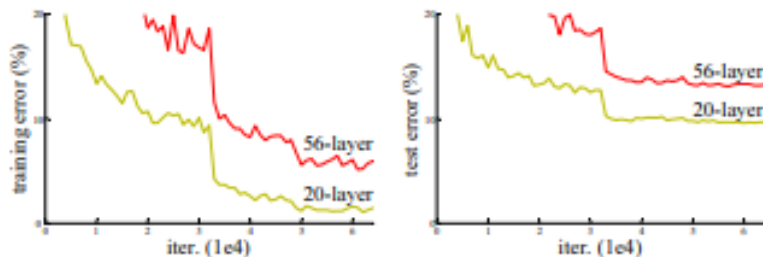


Adapted Network with more layers

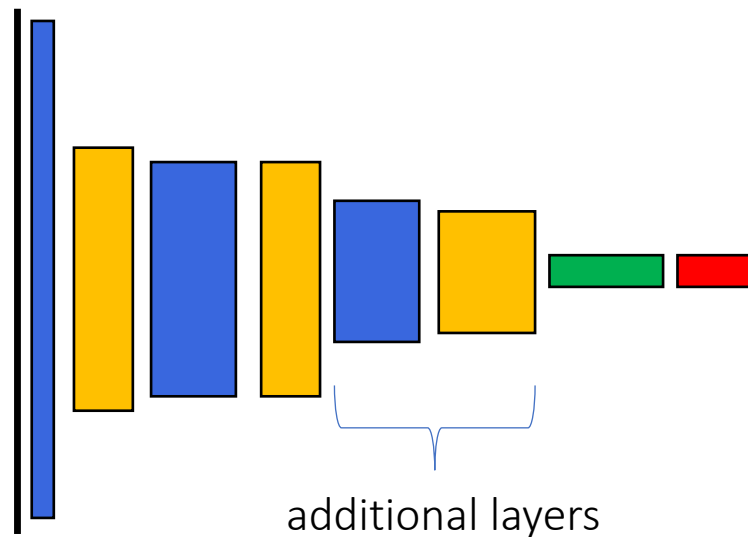
Resnet

Impact of Deeper Networks

- Expectation: more layers, more parameters, improved performance
- Reality:
 - deeper networks harder to train
 - reduced performance (degradation problem)



Source: Kaiming He, Xiangyu Zhang, Shaoqing Ren, Jian Sun
„Deep Residual Learning for Image Recognition“
<https://arxiv.org/pdf/1512.03385.pdf>

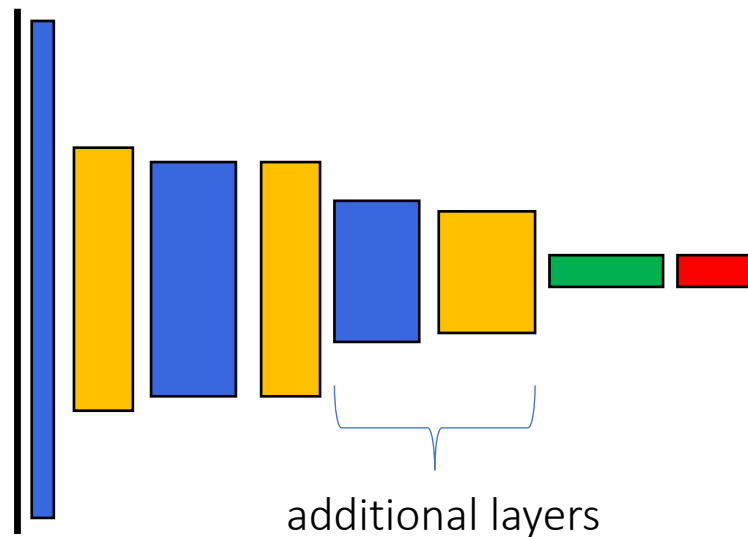


Adapted Network with more layers

Resnet

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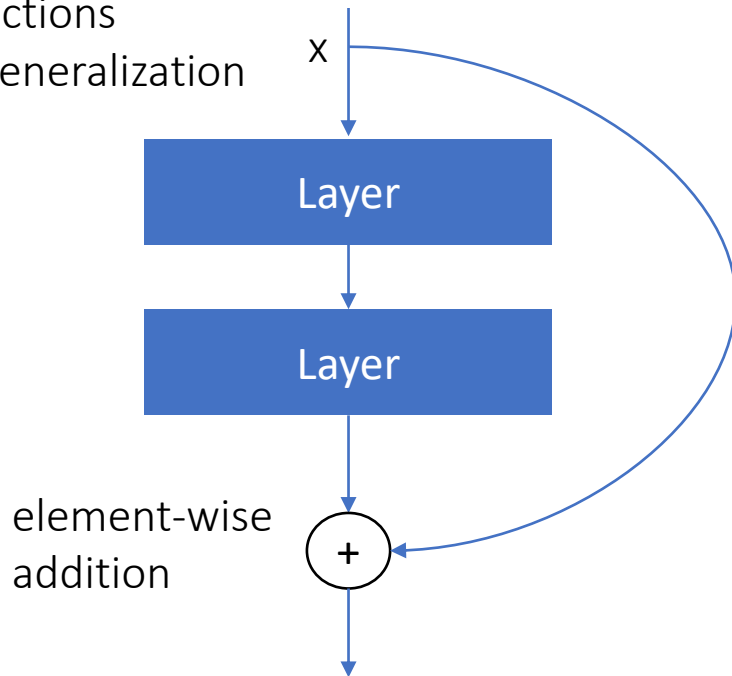


Adapted Network with more layers

Resnet

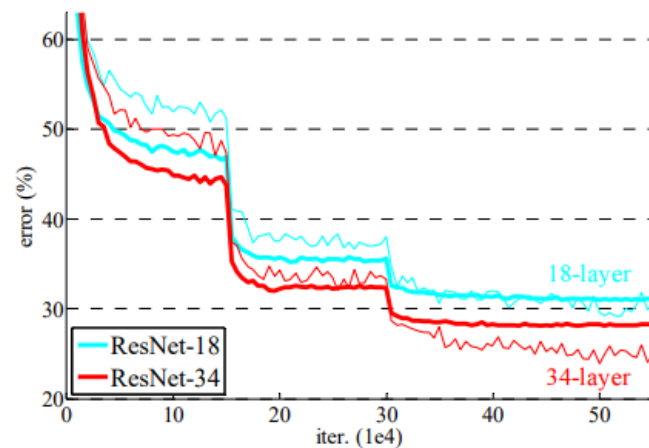
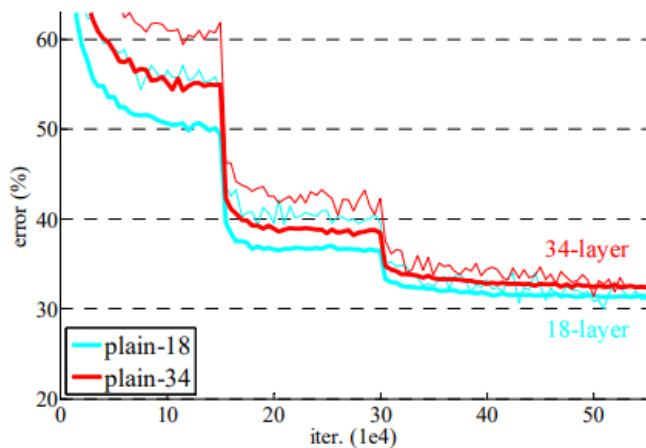
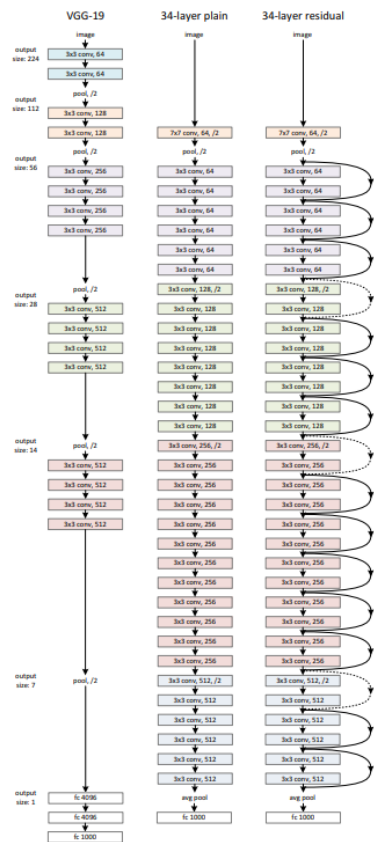
Skip Connections

- also called Shortcut Connections or residual connections
- useful technique for improving performance and generalization
- allow gradient signal to bypass one or more layers
- often used in networks with deep architectures
- purpose:
 - overcome vanishing gradient problem
 - overcome overfitting
 - help network learn more easily
 - improve performance
- useful in different applications
 - image classification
 - language translation
 - speech recognition



Resnet

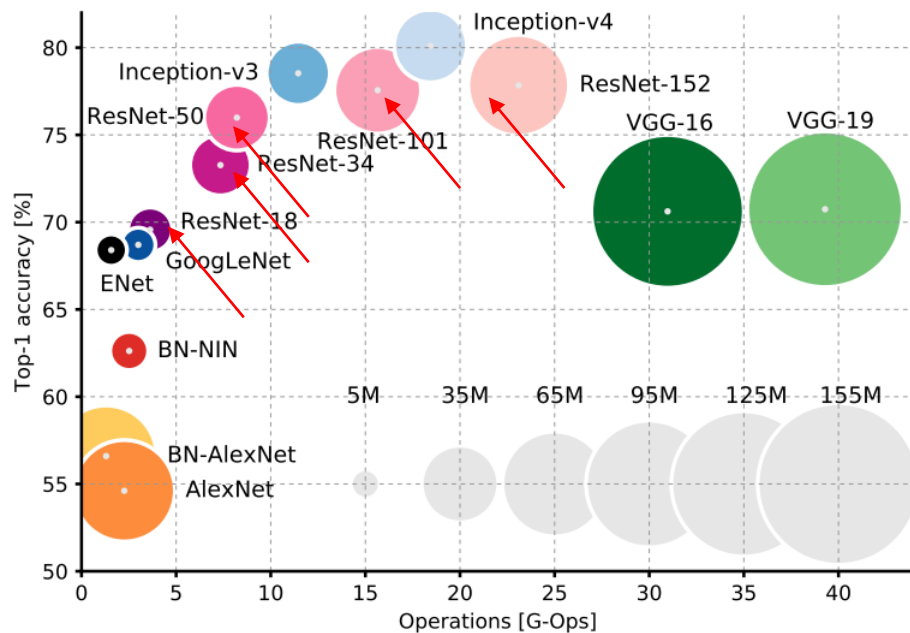
Impact on Performance



Source: Kaiming He, Xiangyu Zhang, Shaoqing Ren, Jian Sun
„Deep Residual Learning for Image Recognition“
<https://arxiv.org/pdf/1512.03385.pdf>

Resnet

Resnet in comparison to other models



diameter ~ number
of parameters

Source: Canziani, Culurciello, Paszke: „An Analysis of Deep Neural Network Models For Practical Applications“
<https://arxiv.org/pdf/1605.07678.pdf>