



温州大學
WENZHOU UNIVERSITY

深度学习-第八章-深度卷积神经网络

黄海广 副教授

2021年04月

- 01** 经典网络
- 02** 深度残差网络
- 03** 谷歌**Inception** 网络
- 04** 卷积神经网络使用技巧

1.经典网络

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01 经典网络

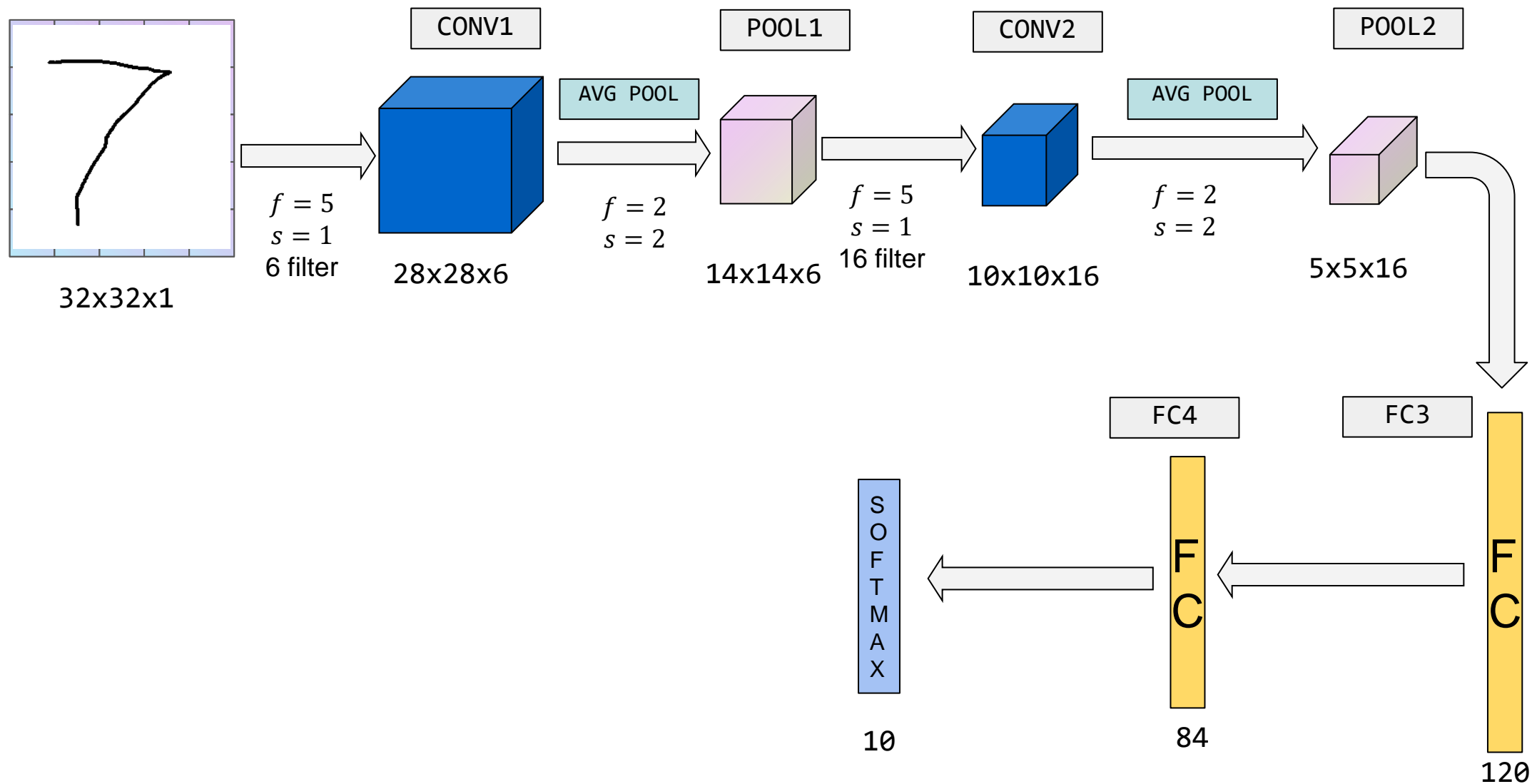
02 深度残差网络

03 谷歌**Inception** 网络

04 卷积神经网络使用技巧

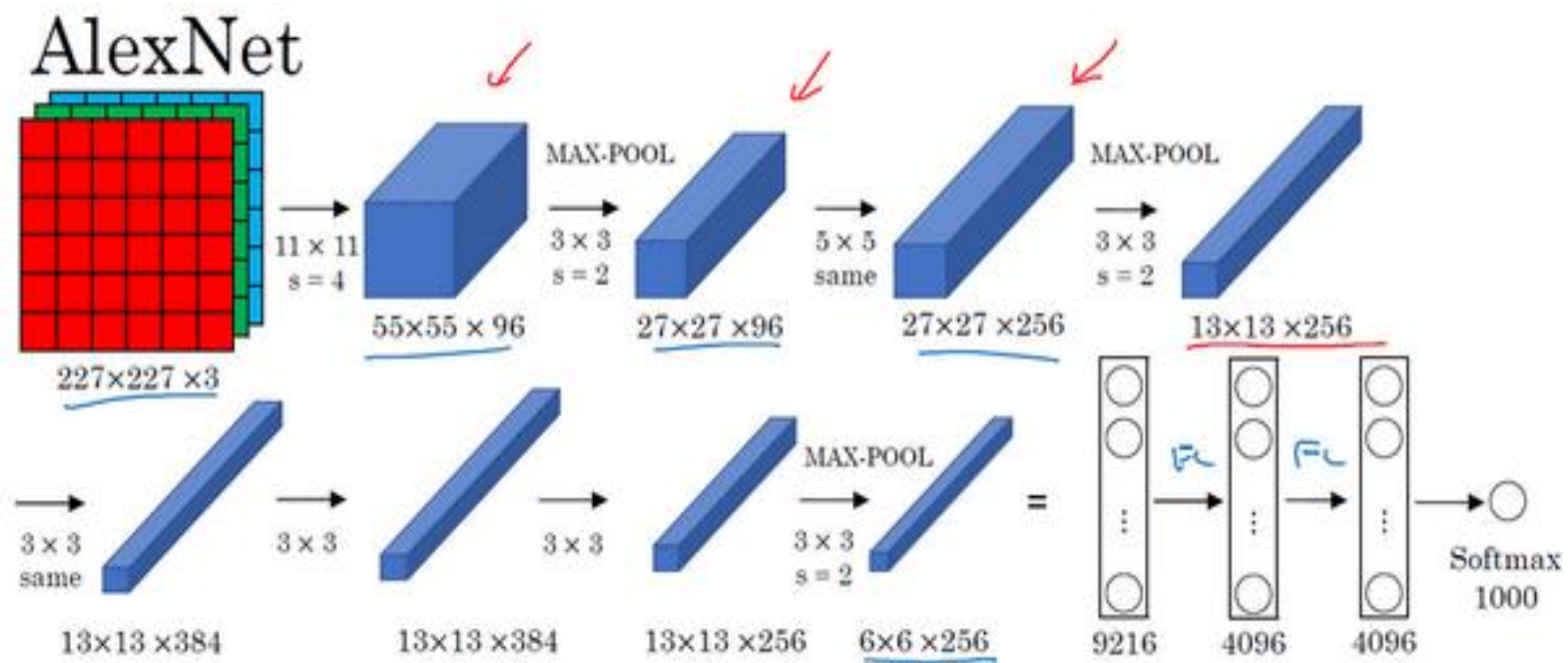
经典网络-LeNet-5

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经典网络

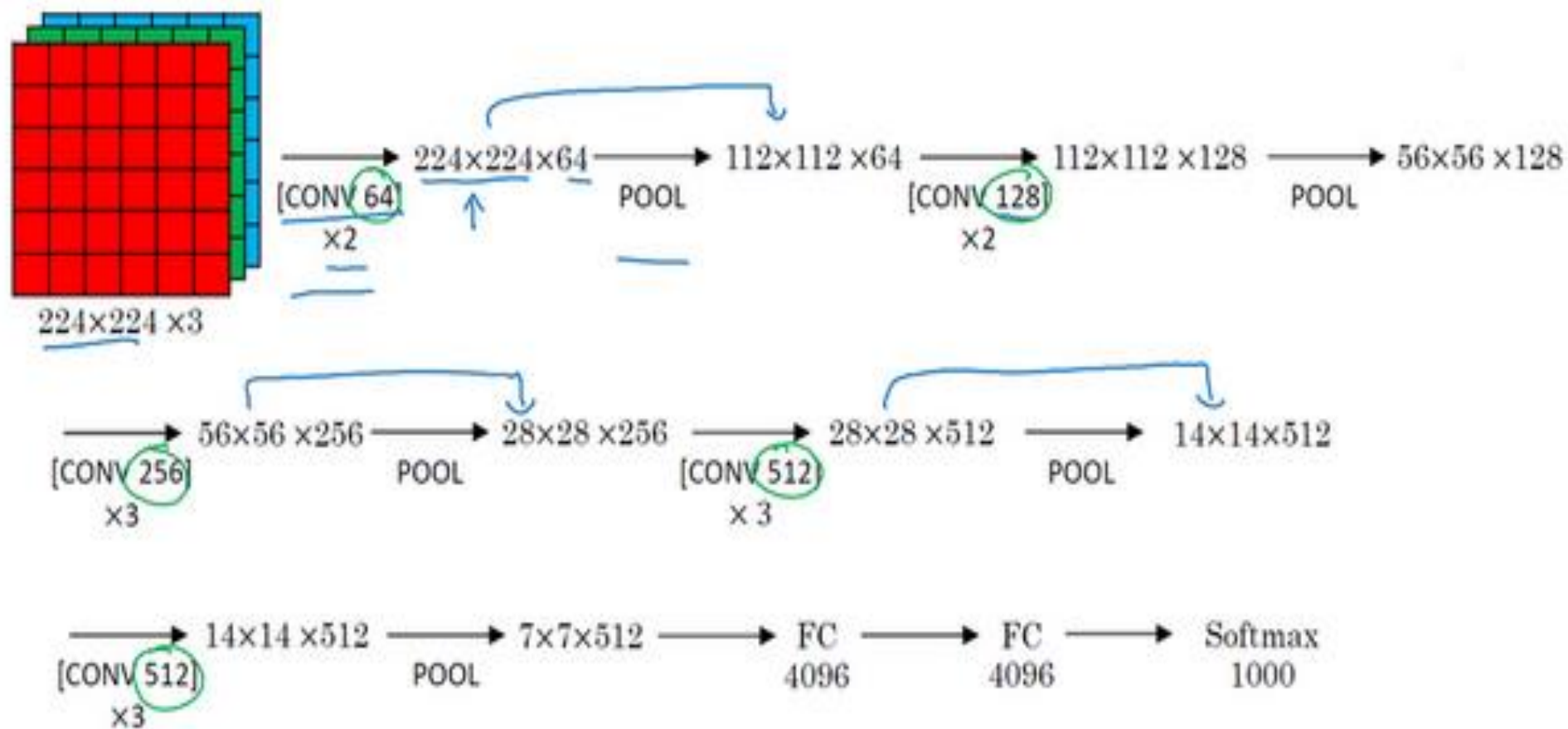
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经典网络

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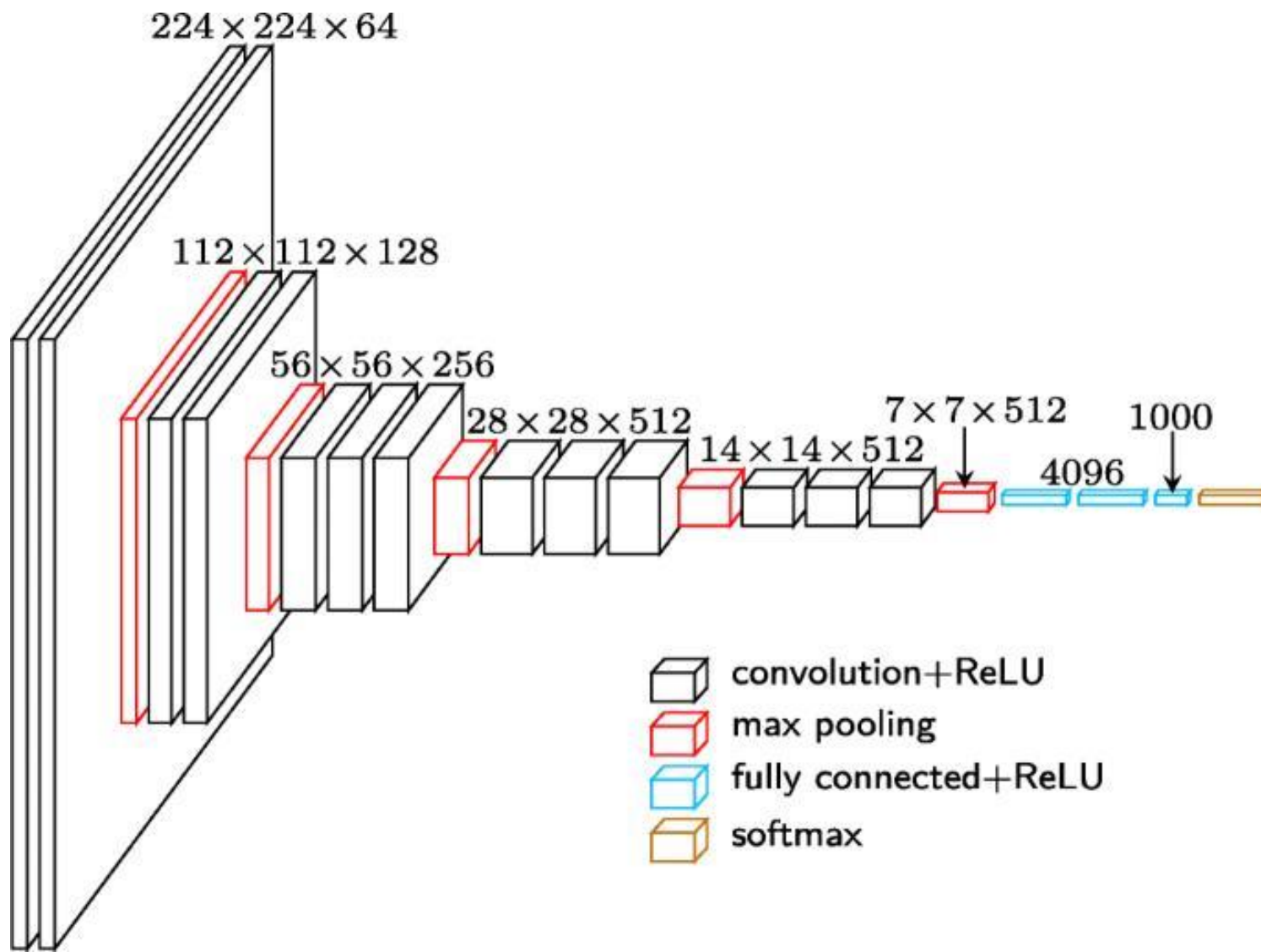
VGG16



经典网络

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VGG16



2.深度残差网络

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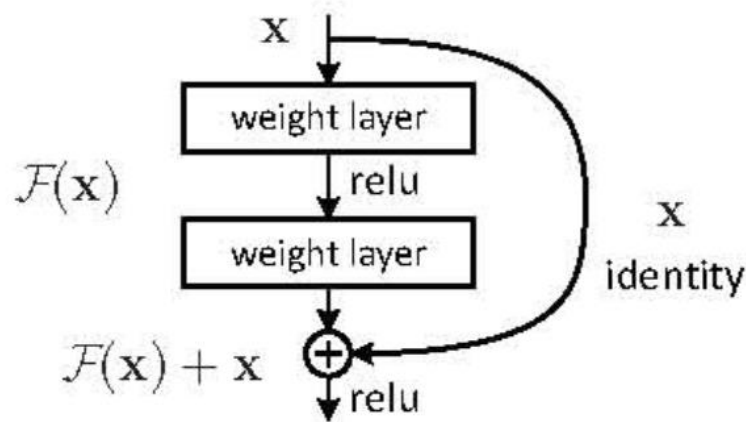
01 经典网络

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04 卷积神经网络使用技巧

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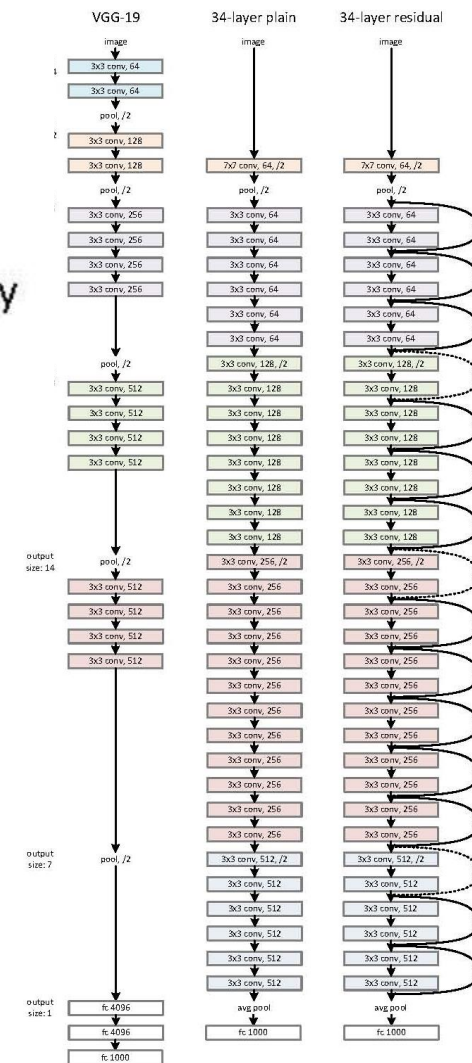
The diagram illustrates the difference between a standard function $F(x)$ and a residual block $F(x) + x$.

Left Diagram (Standard Function):

- A gray box labeled "Previous input" outputs x to a pink box labeled "Stacked layers".
- The "Stacked layers" box outputs $y = F(x)$.

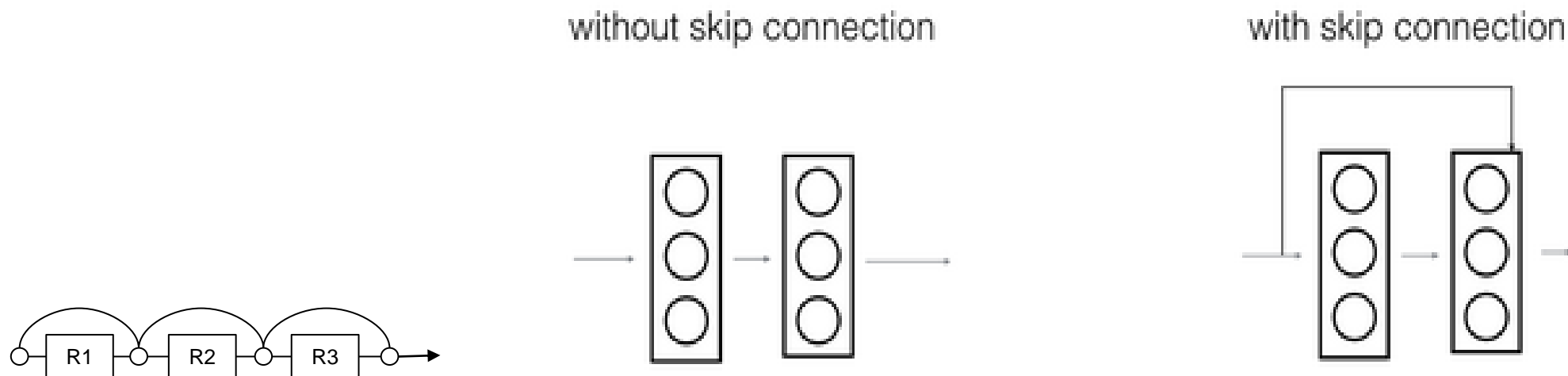
Right Diagram (Residual Block):

- A gray box labeled "Previous input" outputs x to a pink box labeled "Stacked layers".
- The "Stacked layers" box outputs $F(x)$ to a circle with a plus sign ($+$).
- The input x is also branched off and labeled "x identity", then added to $F(x)$ at the plus sign.
- The final output is $y = F(x) + x$.

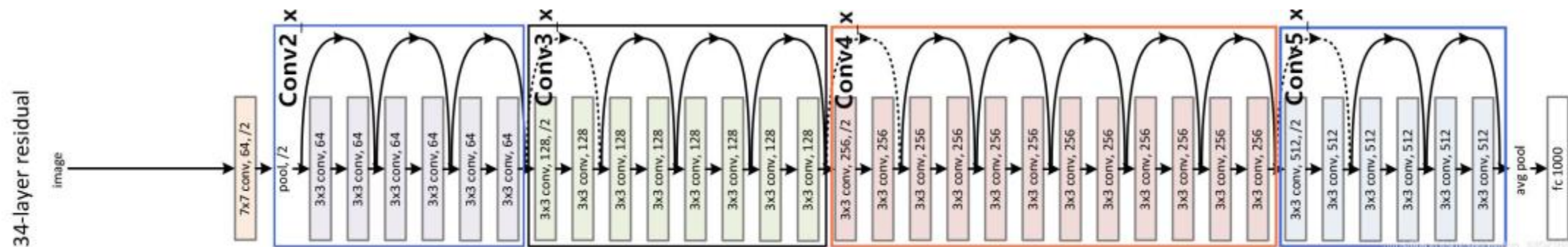


2.深度残差网络

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ResNets使用了许多same卷积



3.谷歌Inception网络

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01 经典网络

02 深度残差网络

03 谷歌Inception 网络

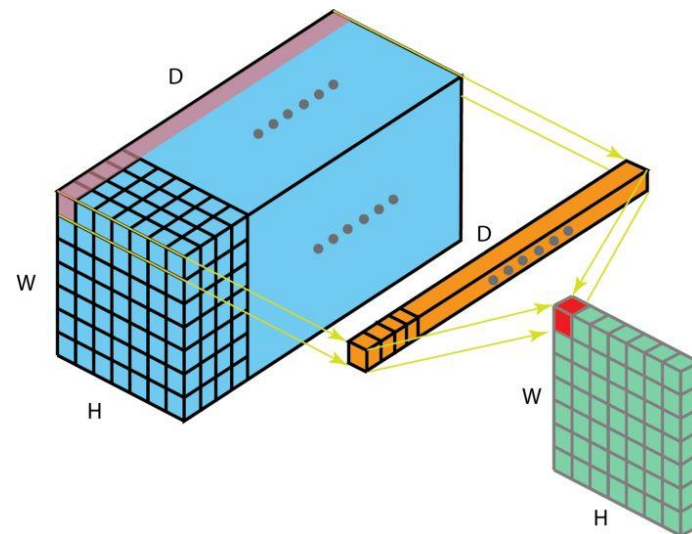
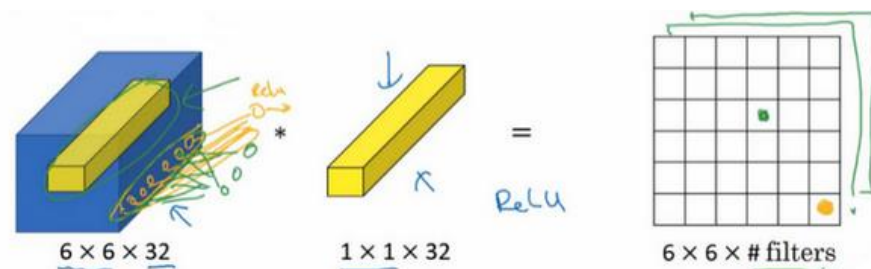
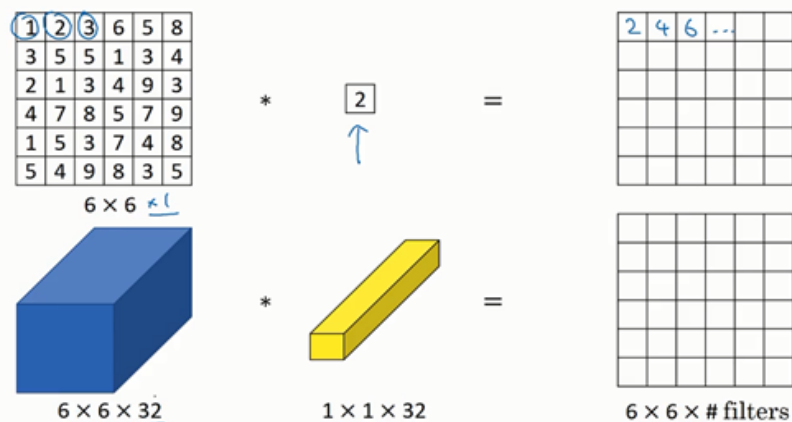
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3.谷歌Inception网络

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1×1 卷积 (Network in Network)

Why does a 1×1 convolution do?

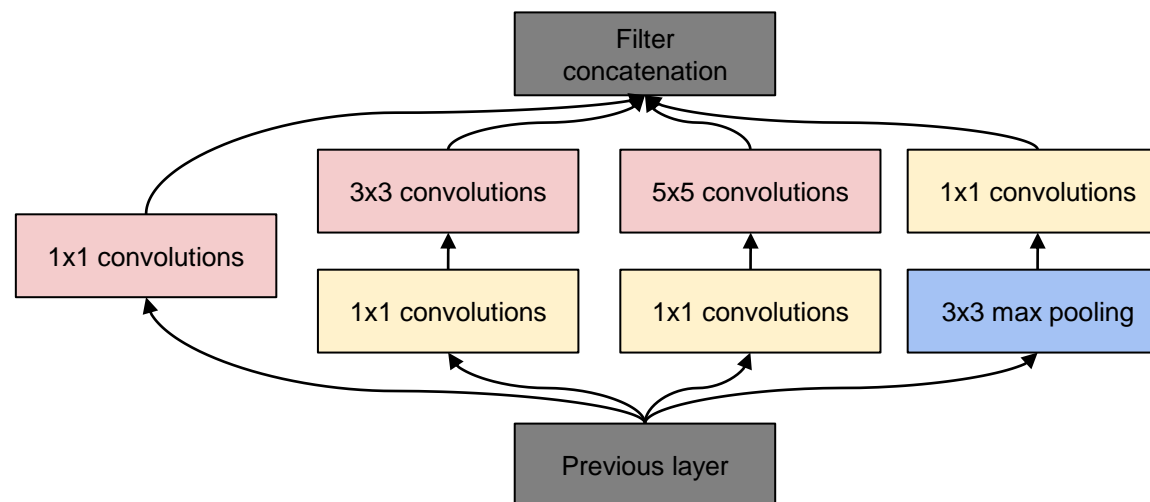
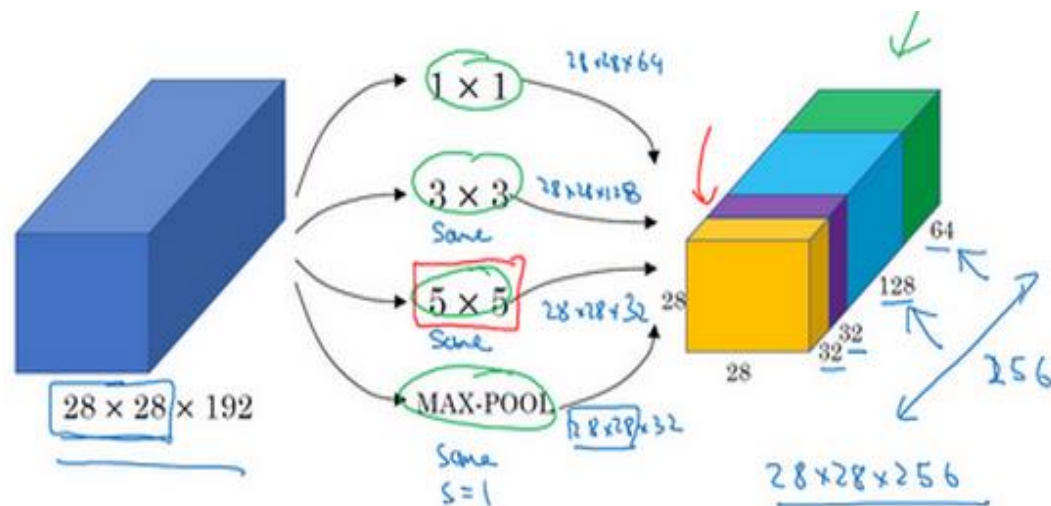


1×1 卷积层就是这样实现了一些重要功能的 (**doing something pretty non-trivial**)，它给神经网络添加了一个非线性函数，从而减少或保持输入层中的通道数量不变，当然如果你愿意，也可以增加通道数量。

3.谷歌Inception网络

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Inception模块

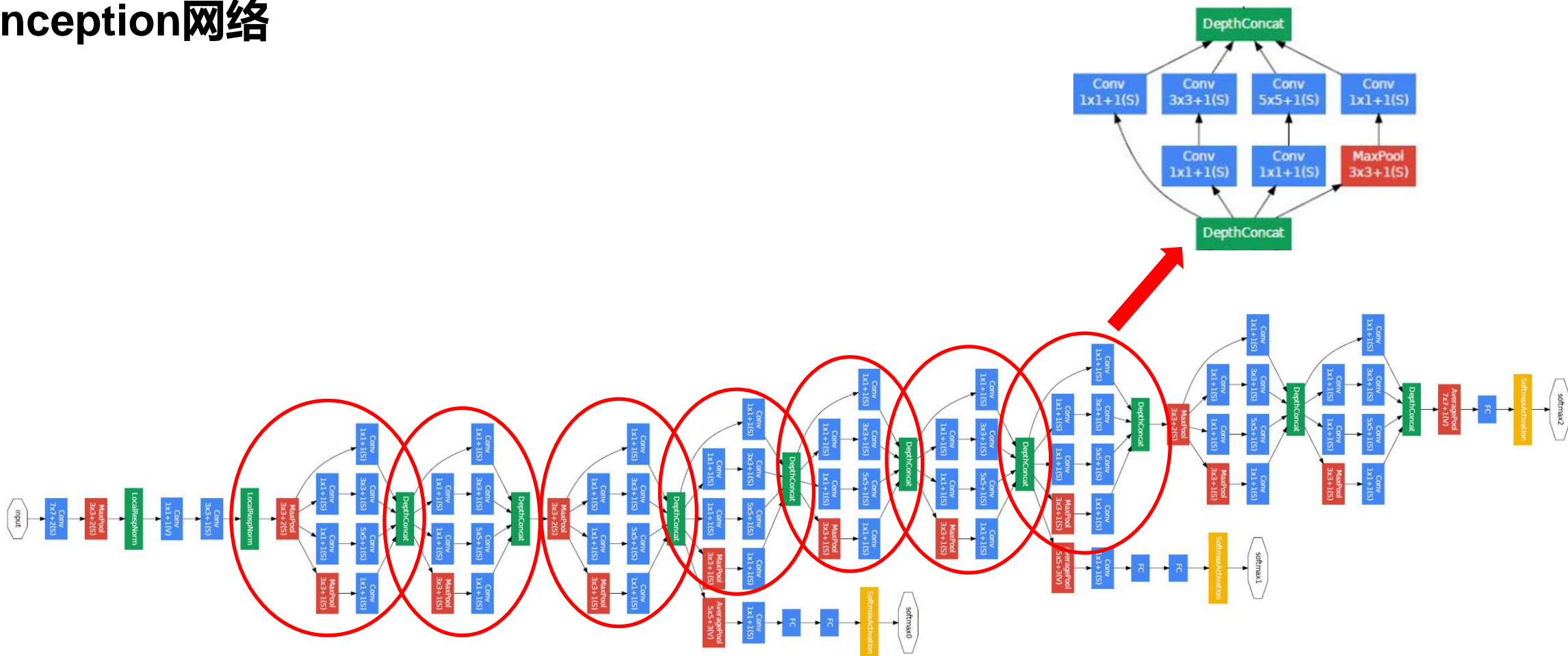


有了这样的**Inception**模块，你就可以输入某个量，因为它累加了所有数字，这里的最终输出为 $32+32+128+64=256$ 。**Inception**模块的输入为 $28 \times 28 \times 192$ ，输出为 $28 \times 28 \times 256$ 。

3.谷歌Inception网络

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Inception网络



4.卷积神经网络使用技巧

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01 经典网络

02 深度残差网络

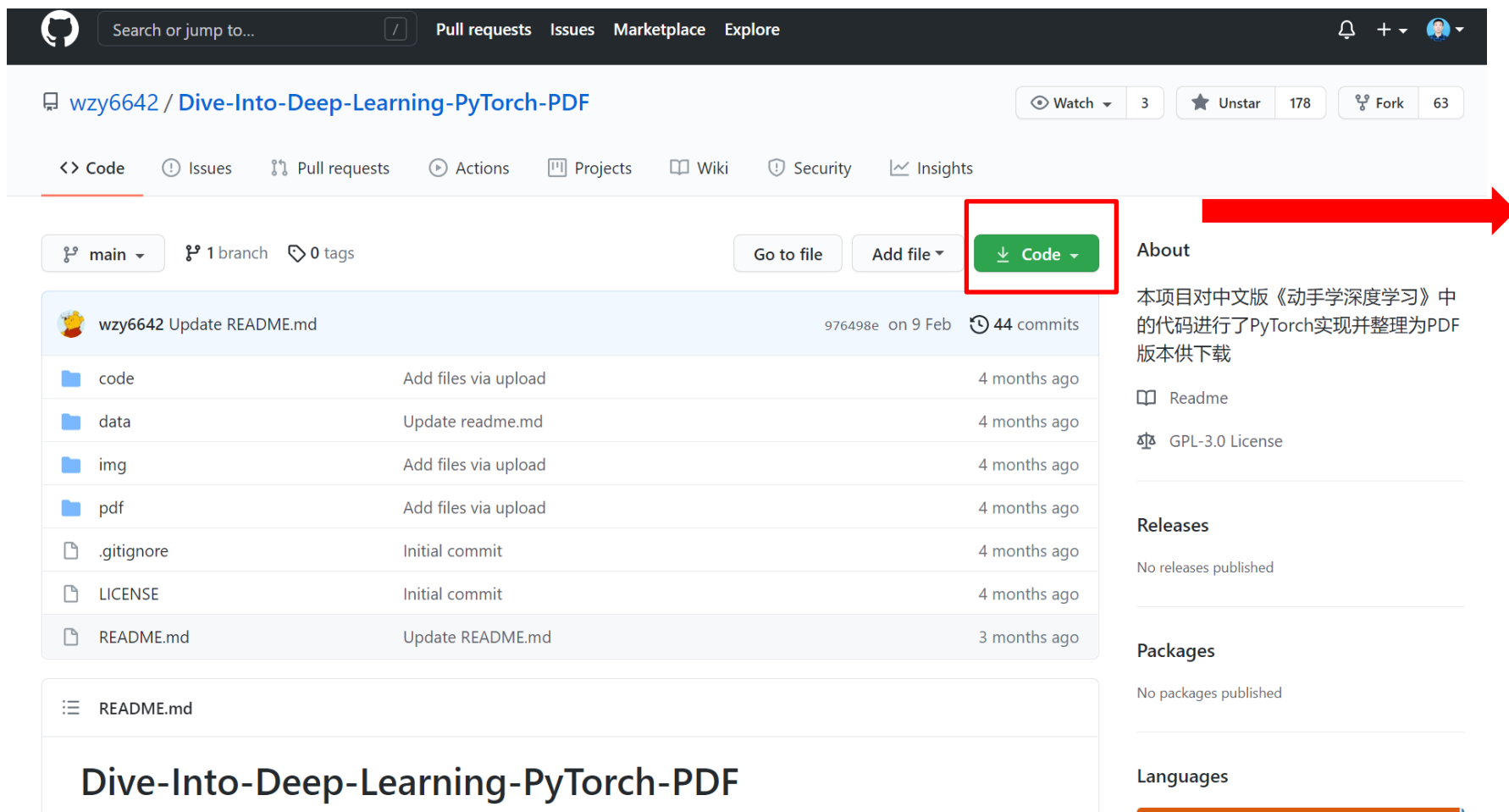
03 谷歌**Inception** 网络

04 卷积神经网络使用技巧

4.卷积神经网络使用技巧

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使用开源的方案



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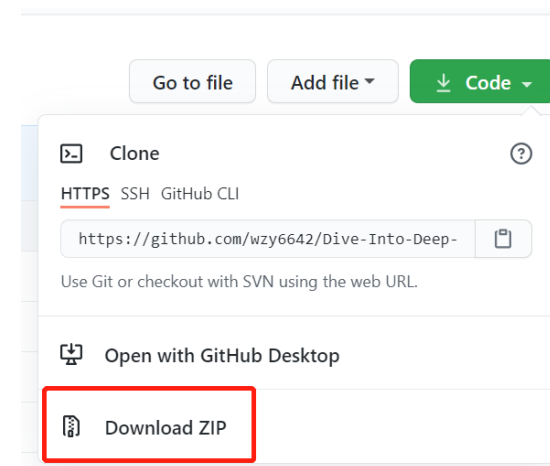
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wzy6642 Update README.md 976498e on 9 Feb 44 commits

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pdf	Add files via upload	4 months ago
.gitignore	Initial commit	4 months ago
LICENSE	Initial commit	4 months ago
README.md	Update README.md	3 months ago

README.md

Dive-Into-Deep-Learning-PyTorch-PDF



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Clone

HTTPS SSH GitHub CLI

https://github.com/wzy6642/Dive-Into-Deep-

Use Git or checkout with SVN using the web URL.

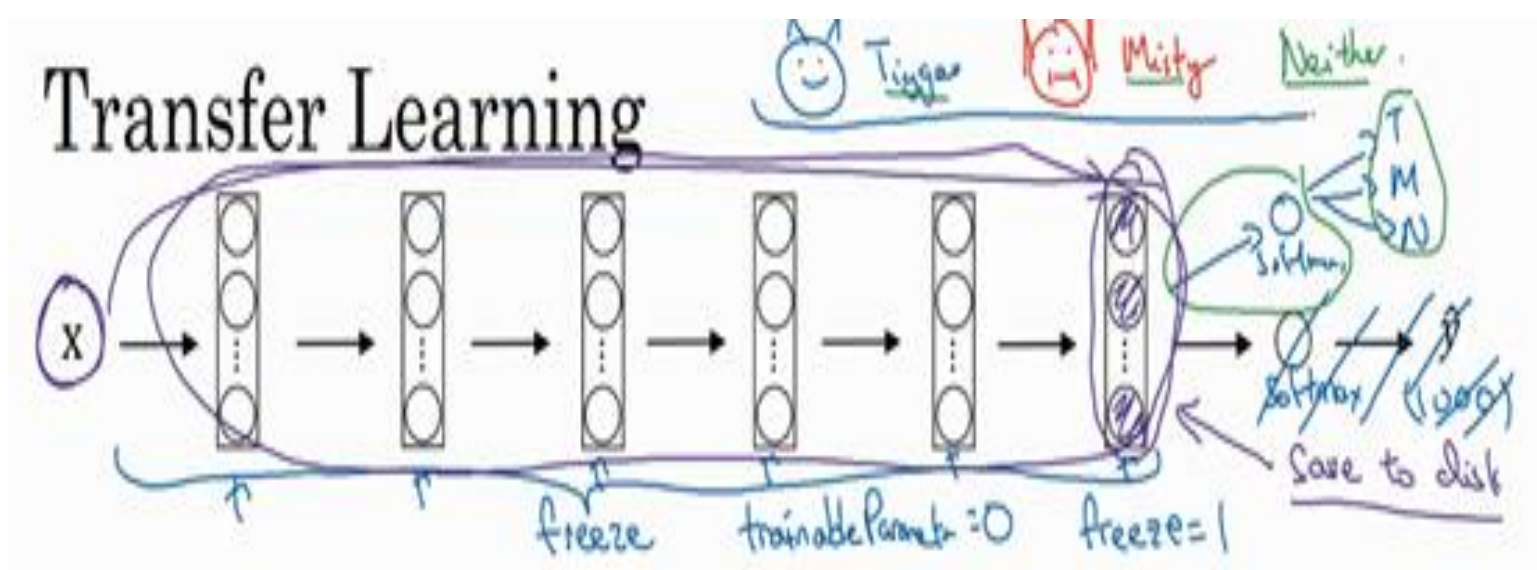
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4.卷积神经网络使用技巧

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迁移学习

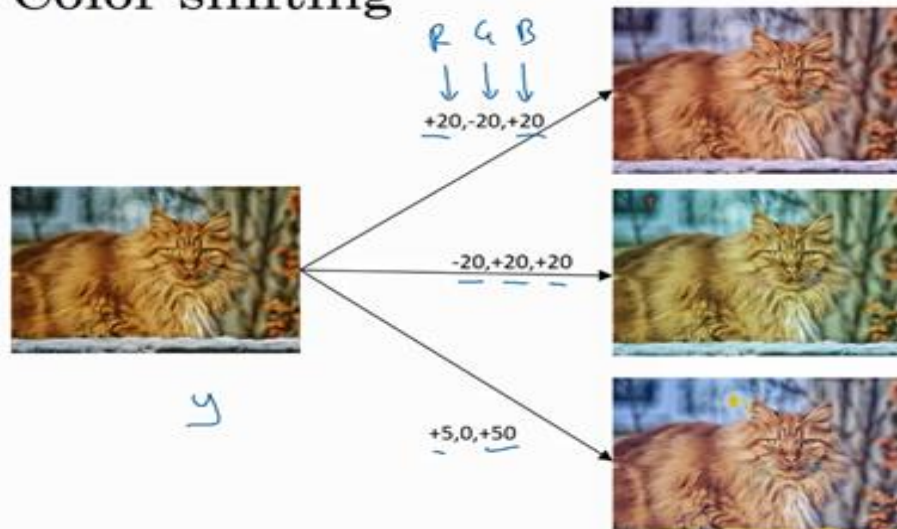


4.卷积神经网络使用技巧

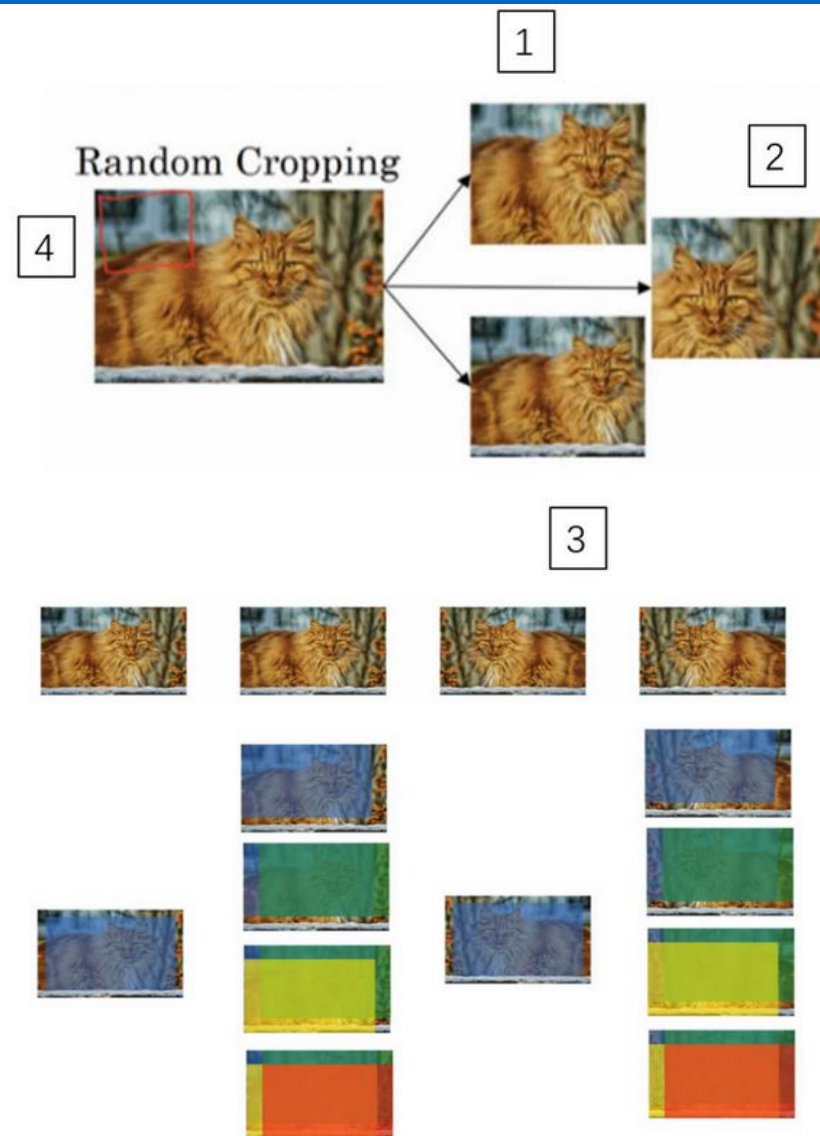
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数据增强

Color shifting



Advanced:
PCA
ml-class.org
AlexNet paper
"PCA color augmentation."
R B G



1. IAN GOODFELLOW等, 《深度学习》, 人民邮电出版社, 2017
2. Andrew Ng, <http://www.deeplearning.ai>

谢谢!

