Learning Report From SEP. TO OCT.

authors: Tianma Shen

University of Shanghai for Science and Technology

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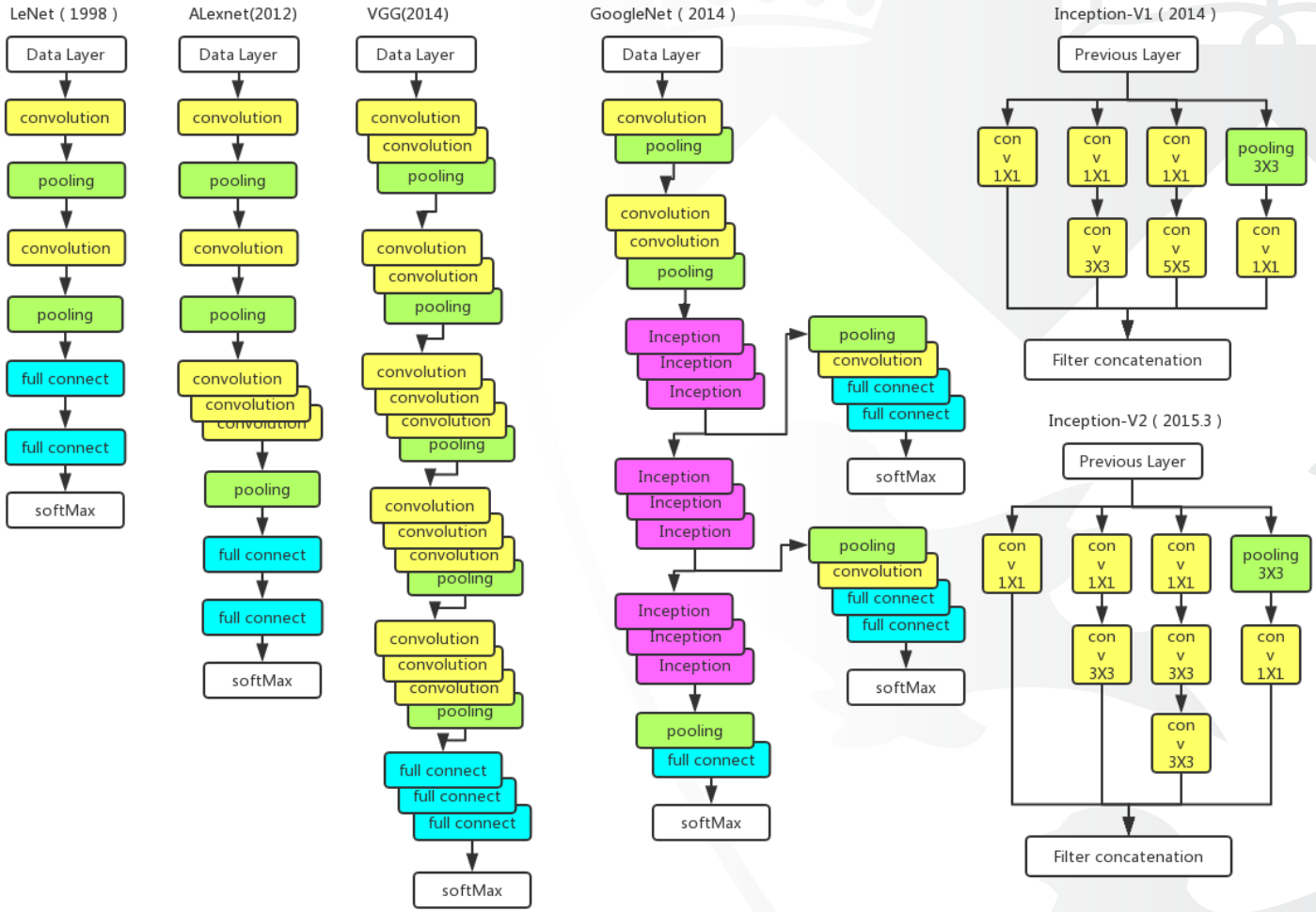
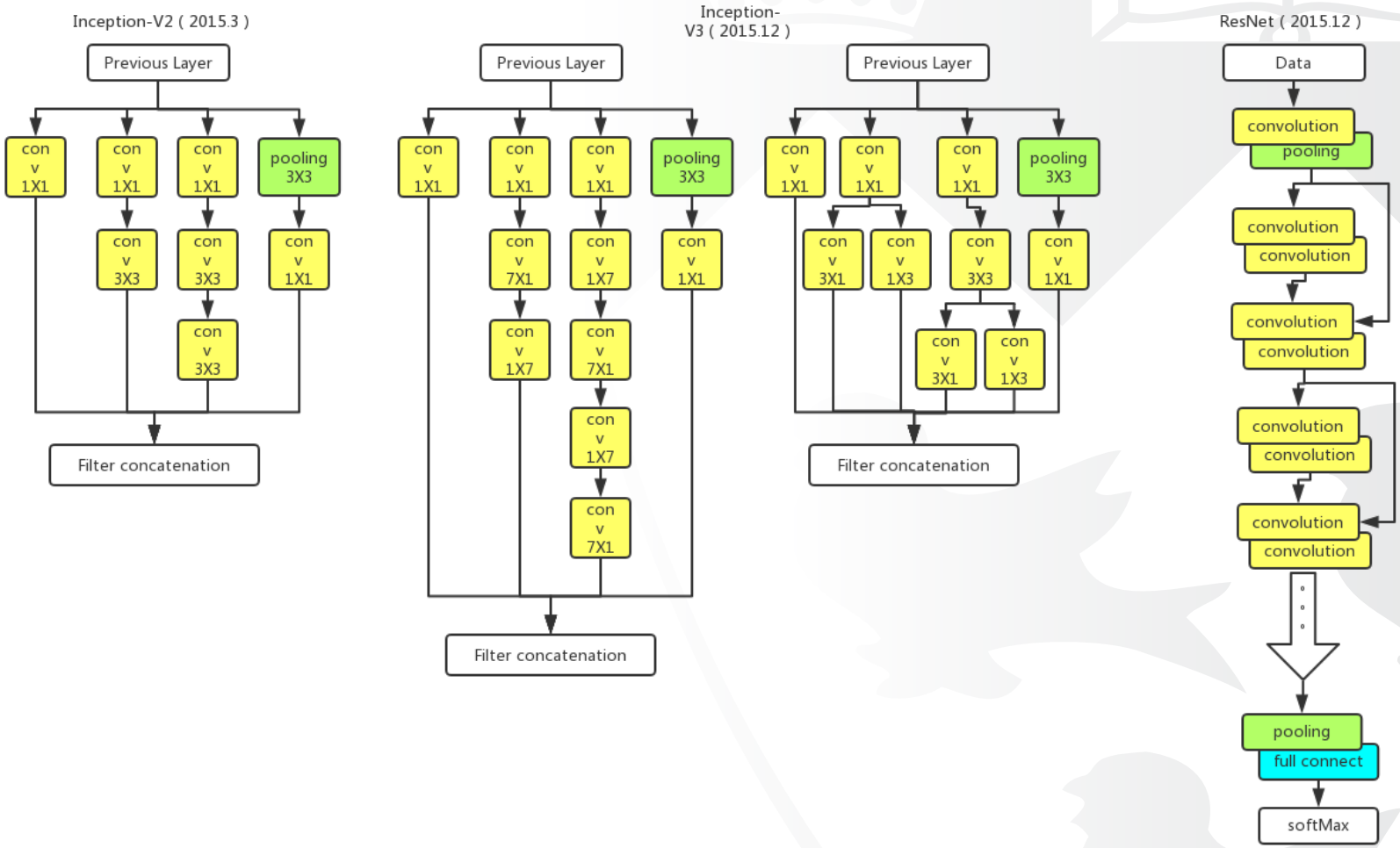
Outline

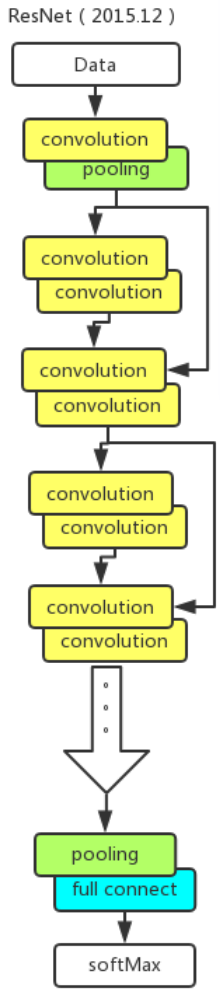
CNN Architecture 1998-2014

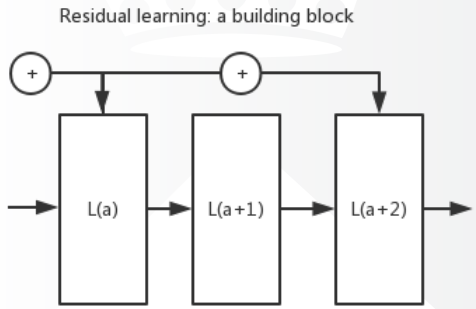


Inception


Inception-V2 (2015.3)
Previous Layer
con v 1X1
con v 1X1
con v 1X1
pooling 3X3
con v 3X3
con v 3X3
con v 1X1
con v 3X3
Filter concatenation
Inception-V3 (2015.12)
Previous Layer
con v 1X1
con v 1X1
con v 1X1
pooling 3X3
con v 7X1
con v 1X7
con v 1X1
con v 1X7
con v 7X1
con v 1X7
con v 7X1
Filter concatenation
Previous Layer
con v 1X1
con v 1X1
con v 1X1
pooling 3X3
con v 3X1
con v 1X3
con v 3X3
con v 1X1
con v 3X1
con v 1X3
Filter concatenation
ResNet (2015.12)
Data
convolution
pooling
convolution
convolution
convolution
convolution
convolution
convolution
convolution
convolution
pooling
full connect
softMax

ResNet


ResNet (2015.12)
Data
convolution
pooling
convolution
convolution
convolution
convolution
convolution
convolution
convolution
convolution
pooling
full connect
softMax


Residual learning: a building block
+
+
L(a)
L(a+1)
L(a+2)

ResNet

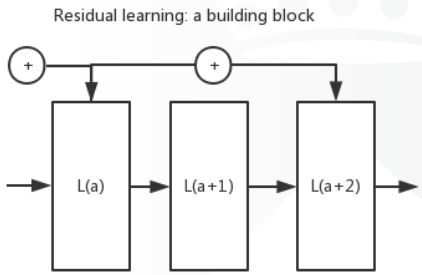


Figure: a building block

$$L(a+1) = f(W \cdot L(a) + b) \quad (1)$$

$$L(a+2) = f(W \cdot L(a+1) + b + L(a)) \quad (2)$$

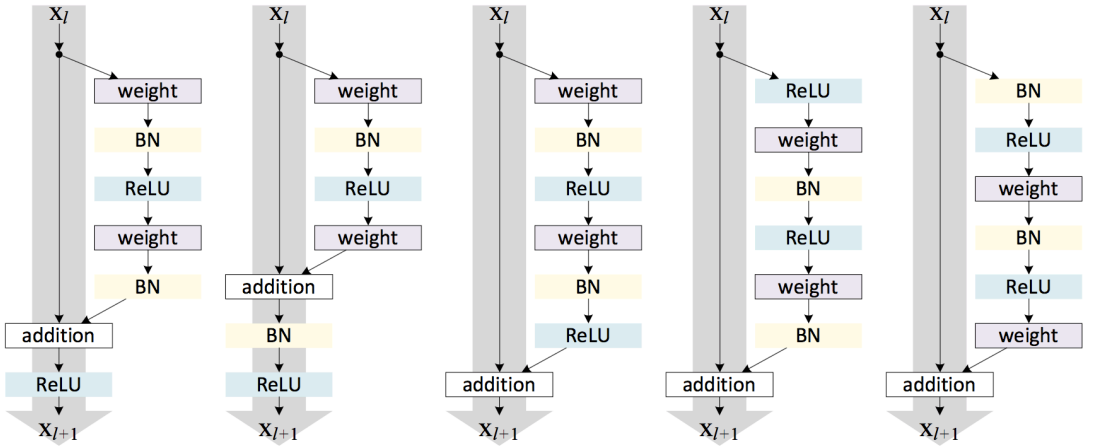
$$W := W - \alpha . \frac{\partial J}{\partial w} \quad (3)$$

$$\frac{\partial J}{\partial w} = \frac{\partial J}{\partial W_1} . \frac{\partial W_1}{\partial W_2} . \frac{\partial W_2}{\partial W_3} \cdots . \frac{\partial W_{n-1}}{\partial W_n} \quad (4)$$

ResNet

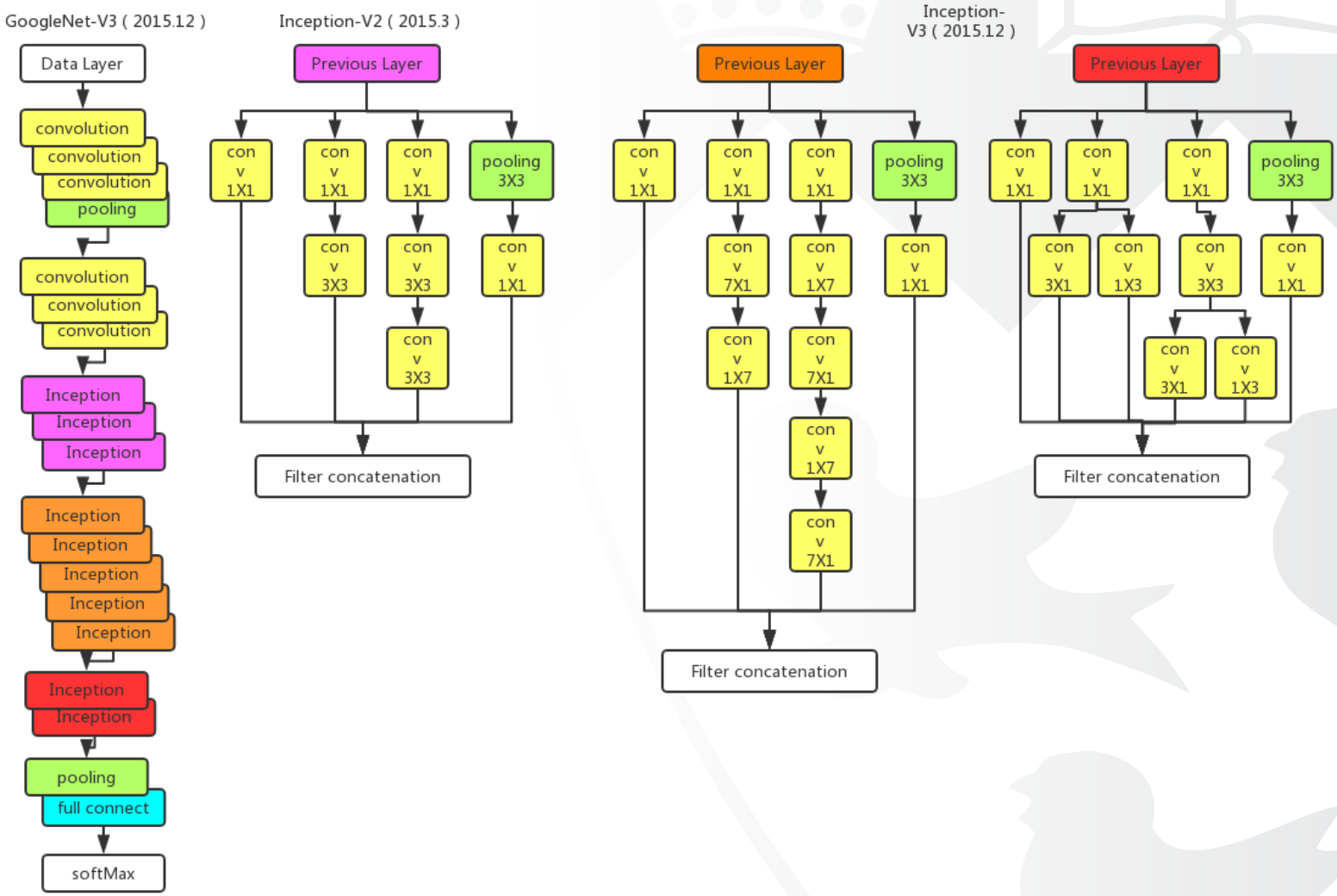
Table 2. Classification error (%) on the CIFAR-10 test set using different activation functions.

case	Fig.	ResNet-110	ResNet-164
original Residual Unit [1]	Fig. 4(a)	6.61	5.93
BN after addition	Fig. 4(b)	8.17	6.50
ReLU before addition	Fig. 4(c)	7.84	6.14
ReLU-only pre-activation	Fig. 4(d)	6.71	5.91
full pre-activation	Fig. 4(e)	**6.37**	**5.46**

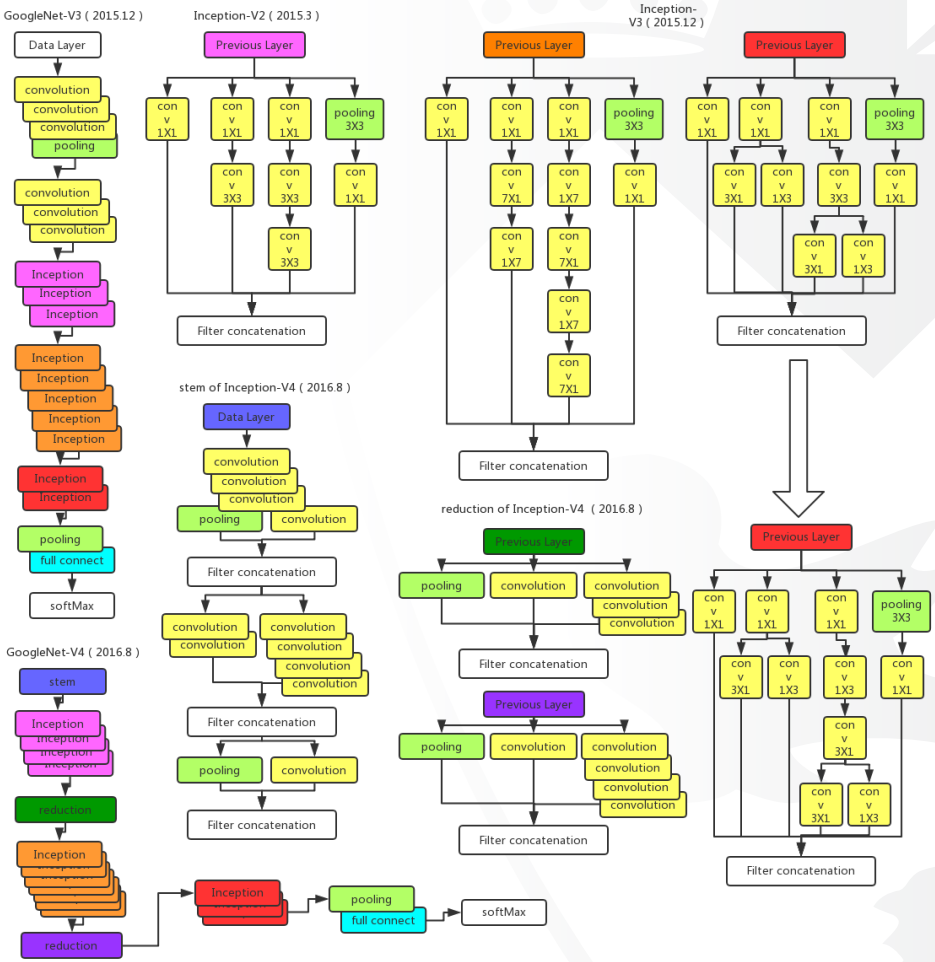


(a) original (b) BN after addition (c) ReLU before addition (d) ReLU-only pre-activation (e) **full pre-activation**

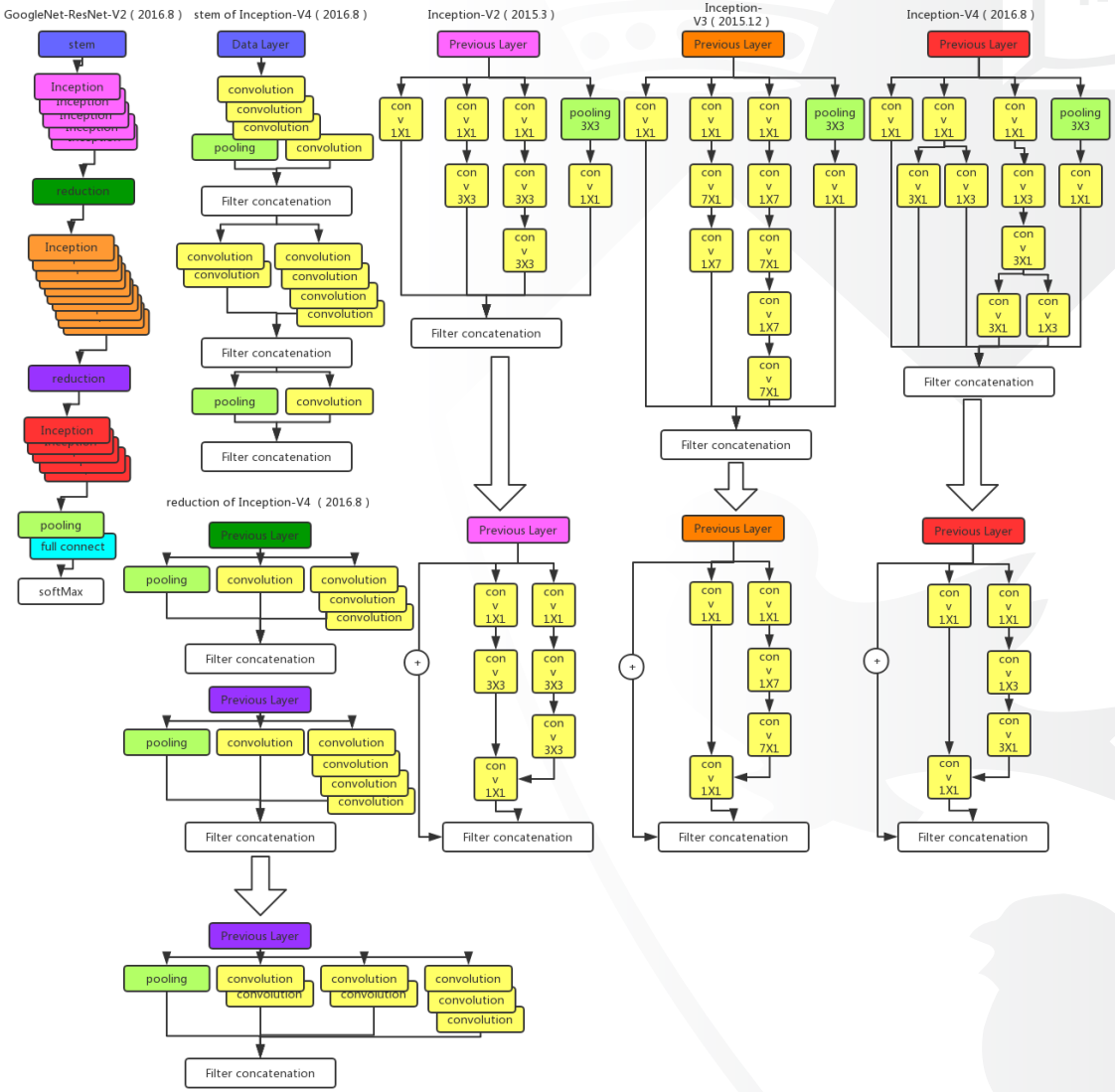
Inception-V3



Inception-V4



Inception-ResNet-V2



Inception-ResNet-V2

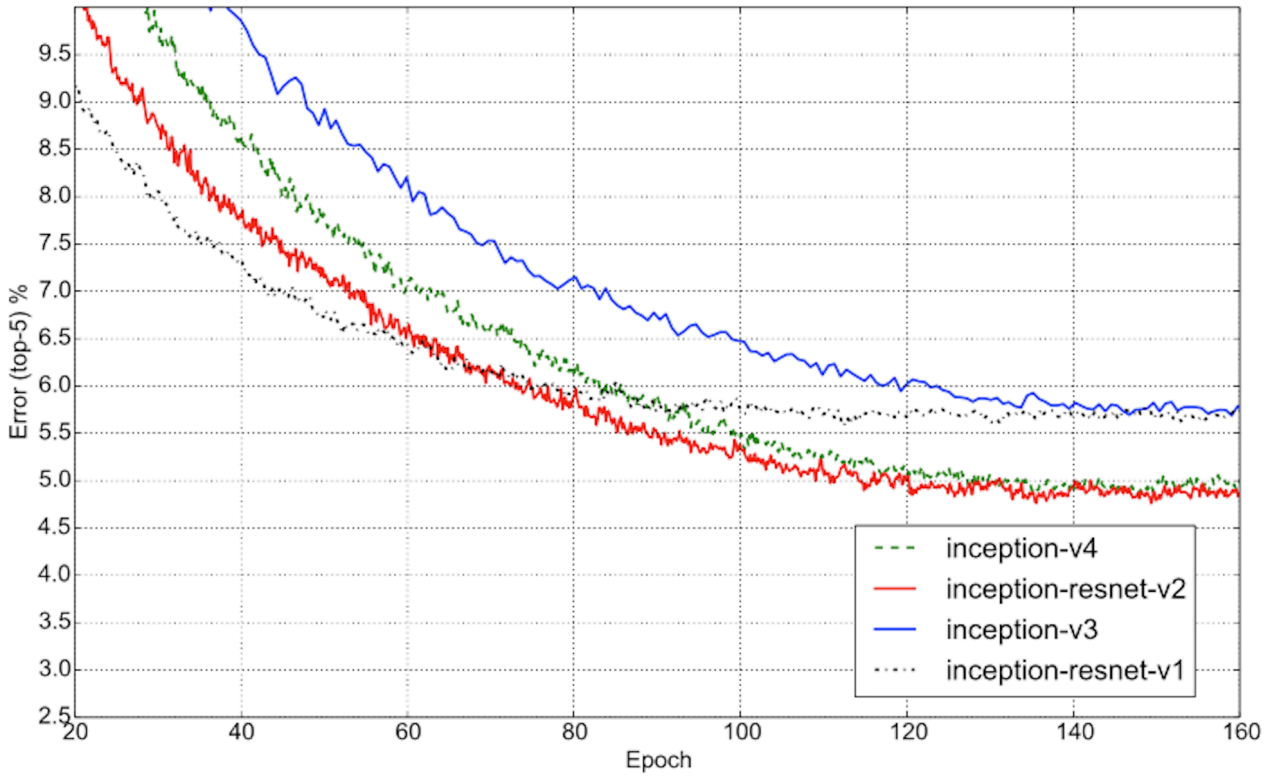
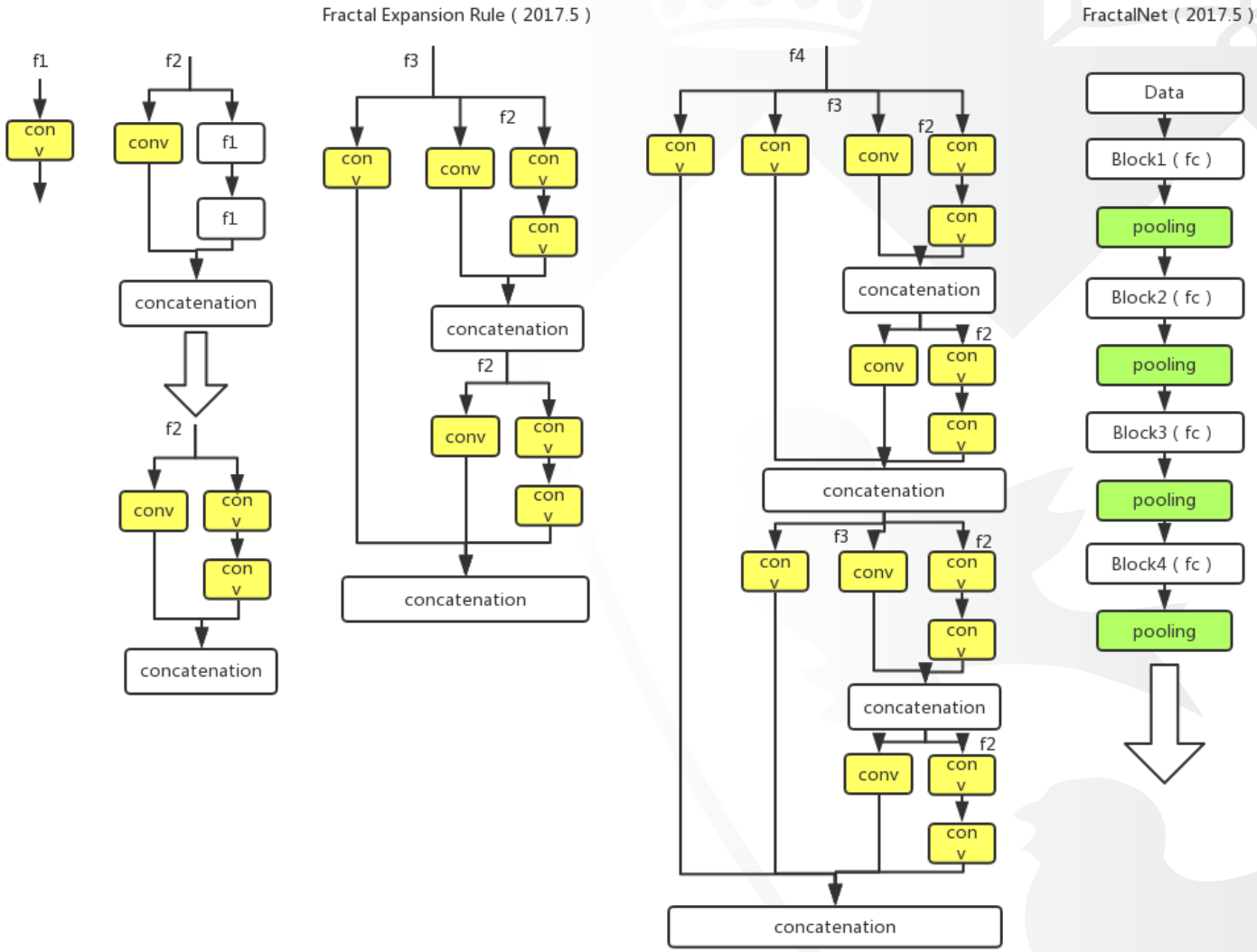


Figure: Large Scale Visual Recognition Challenge 2012 (ILSVRC2012)

FractalNet


Fractal Expansion Rule (2017.5)
FractalNet (2017.5)
f1
f2
f3
f4
conv
concatenation
Data
Block1 (fc)
pooling
Block2 (fc)
Block3 (fc)
Block4 (fc)

FractalNet

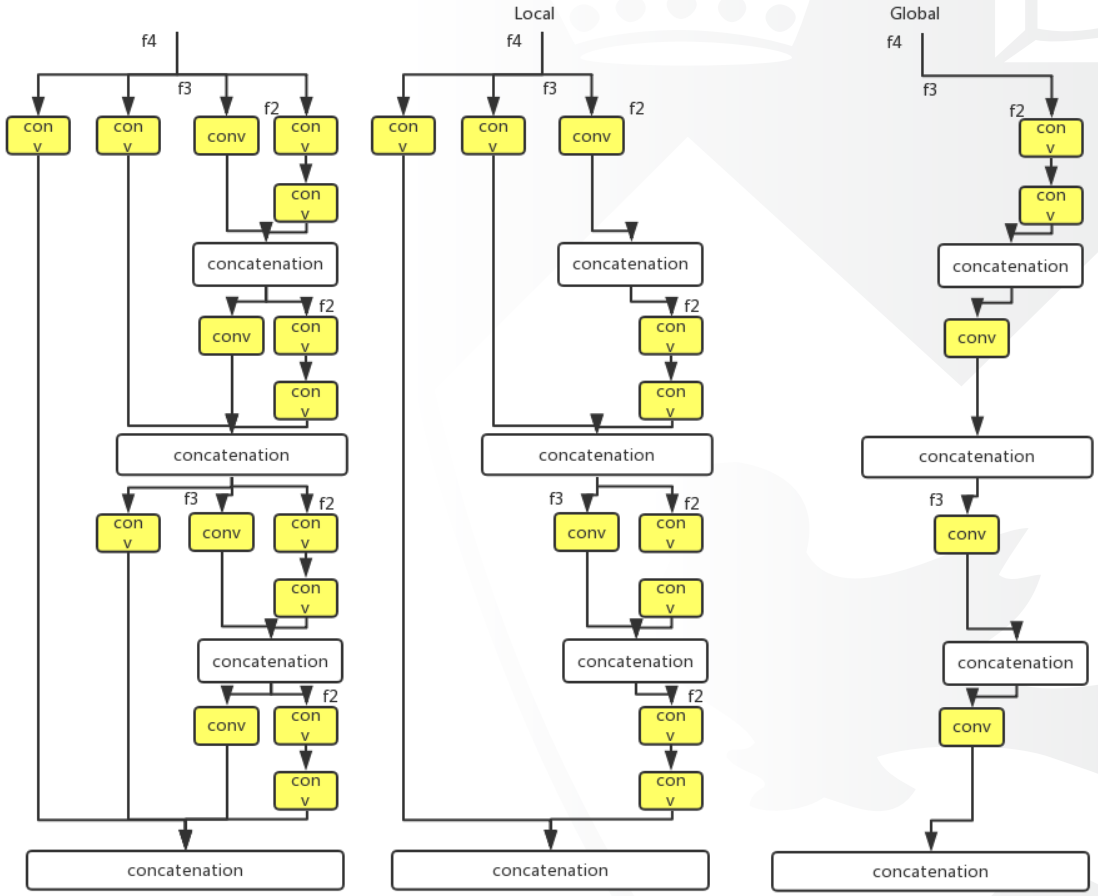


Figure: Drop-Path

DenseNet 2017.8

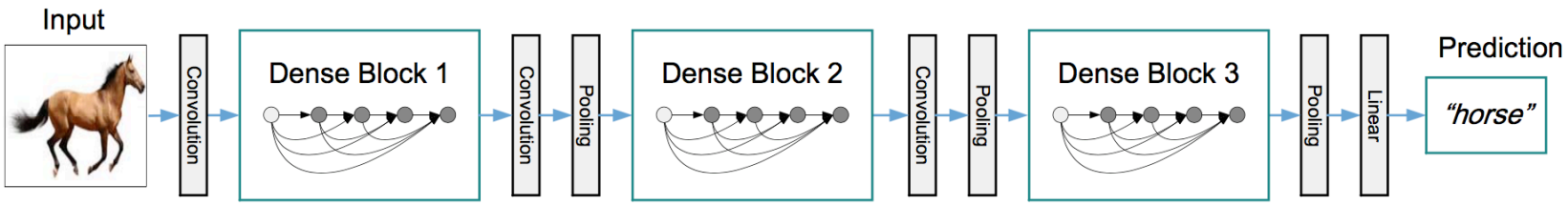


Figure 2: A deep DenseNet with three dense blocks. The layers between two adjacent blocks are referred to as transition layers and change feature-map sizes via convolution and pooling.

- Accuracy
- The number of parameters
- Overfitting or the optimization difficulties

Latex

Figure: http://www.latexstudio.net/

Latex

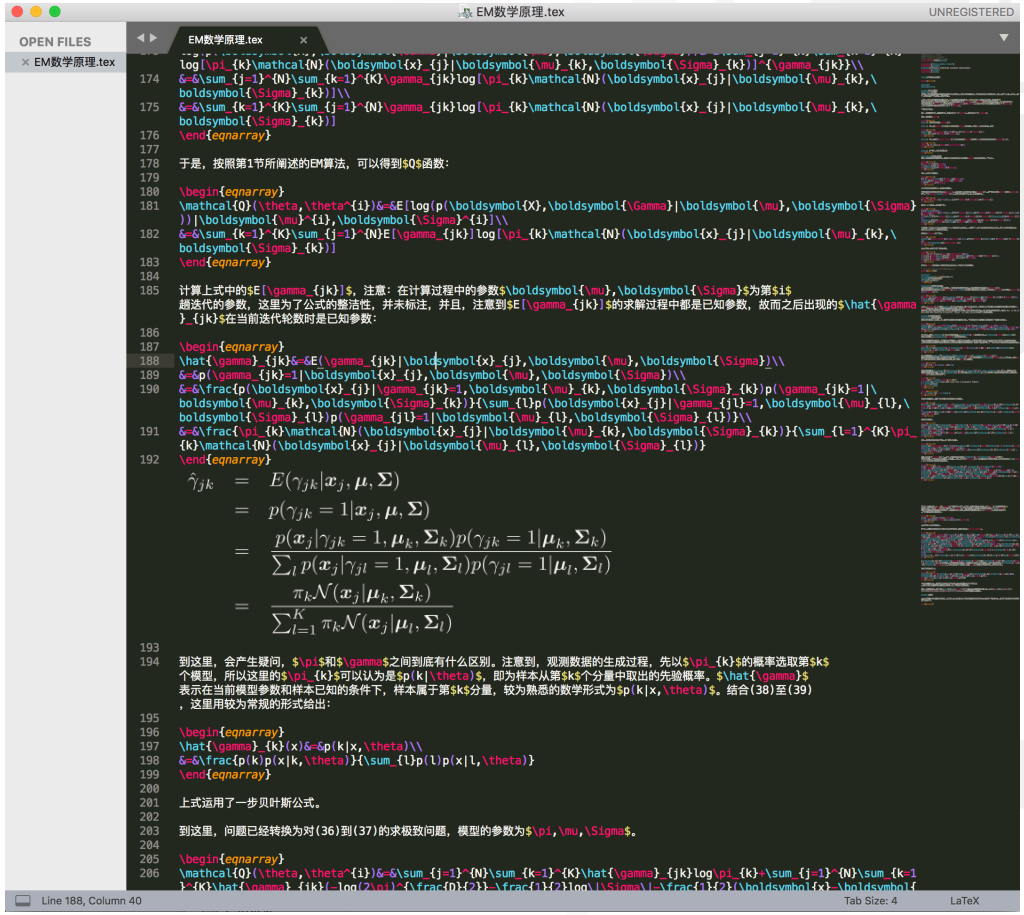


Figure: Sublime Text3