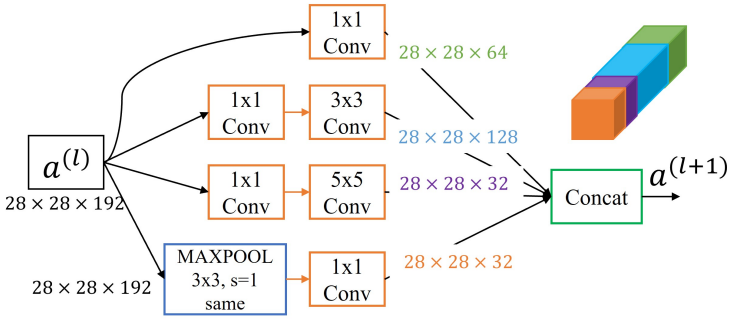
Popular CNNs and Novel Concepts

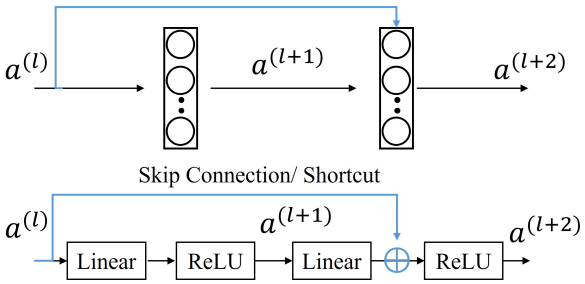
AlexNet (2012) and VGG (2014):
AlexNet has 8 layers with 60M parameters. Alexnet has used ReLU activations and local response normalization technique. VGG-16 is designed to use the deeper network with 16 layers and 138M parameters.

Inception-v1 (2014):
Inception-v1 has introduced 1×1 convolutional layer to decrease the depth size of the feature map which significantly reduces the computational time. Auxiliary classifiers are also used to increase the gradient signal in the backpropagation stage. Inception modules, having 1×1, 3×3, and 5×5 parallel filters, are used to learn global and area specific features from the input.

ResNet (2015):
ResNet has introduced the concept of skip connections in order to address the issue of vanishing gradient in deep neural networks. It also uses batch normalization to solve the internal covariate shift problem.

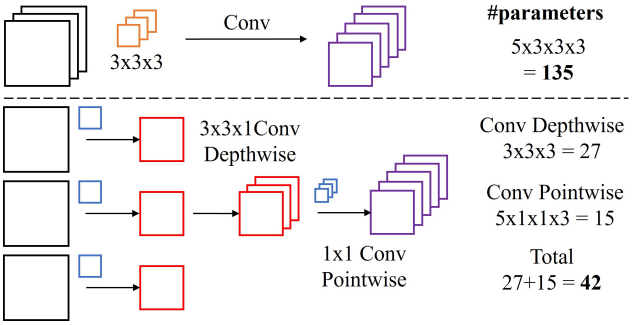


(a) Inception module

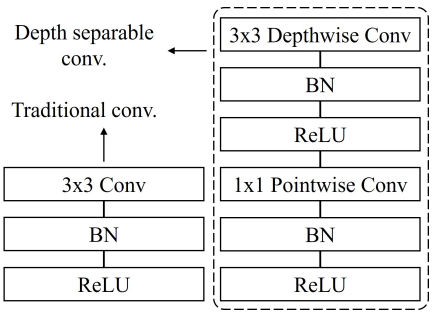


(b) ResNet residual module

MobileNet(2017):
MobileNet has utilized the concept of depthwise separable convolution(depthwise convolution + 1×1 pointwise convolution) to replace the traditional convolution technique. It greatly reduces network parameters and makes MobilenNet, a lightweight and efficient network.



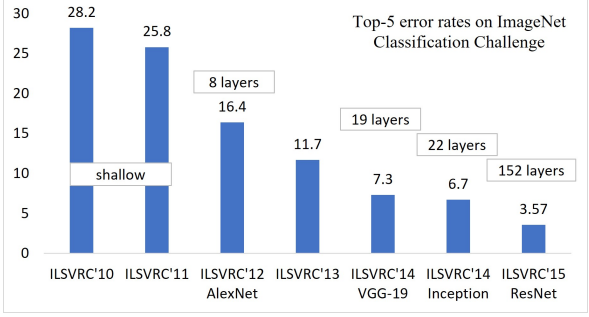
(a) Traditional and depth separable convolution parameters



(b) Difference in convolutions

Summary:

CNN Architecture	#Layers	#Weights	Activation Function	New Concepts
AlexNet	8	60M	ReLU	Local Response Normalization
VGG-16	16	138M	ReLU	Deep network
Inception-v1	22	7M	ReLU	Inception Modules and auxiliary classifiers
ResNet-50	50	26M	ReLU	Residual Blocks and Batch Normalization
MobileNet-v1	28	4.2M	ReLU	Depth wise separable Convolution



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