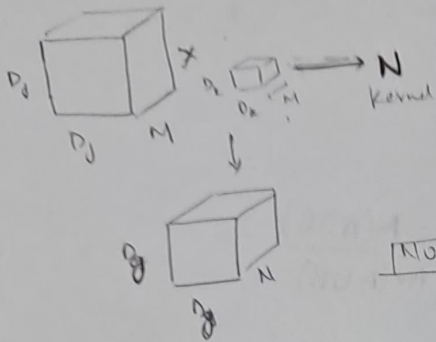


Booker

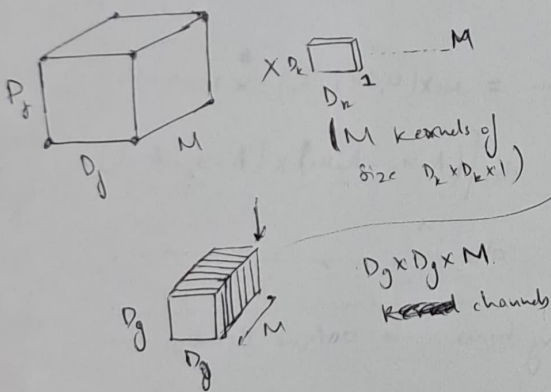
Mobile Nets

↓
→ Depthwise separable convolution

↓
standard convolution is factorized into 2. Depthwise convolution
⊕
Pointwise conv.



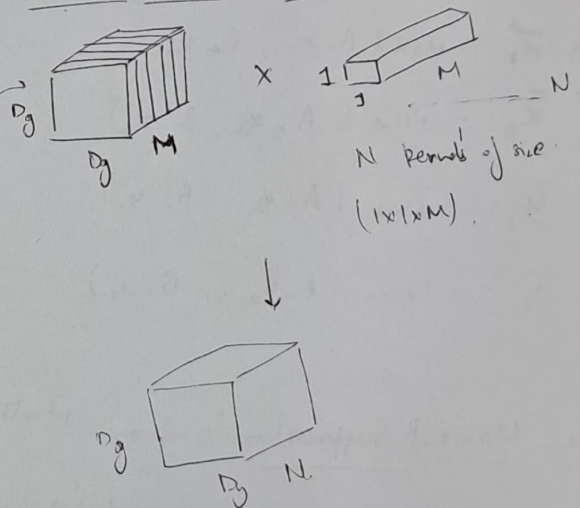
Depthwise convolution



Depthwise convolution only filters channels & doesn't combine to create new features.

No. of operations: $D_k \cdot D_k \cdot M \cdot D_f \cdot D_f$

Point-Wise convolution



No. of operation = $1 \times 1 \times M \times N \times D_f \times D_f$

Pointwise convolution computes linear combination of the output of depth convolution to create new features.

Combine #ops. Hence the total computation is lesser than standard convolution.

Operation ratio =
$$\frac{D_k \cdot D_k \cdot M \cdot D_f \cdot D_f + M \cdot N \cdot D_f \cdot D_f}{D_k \cdot D_k \cdot M \cdot D_f \cdot D_f \cdot N} = \boxed{\frac{1}{N} + \frac{1}{D_k^2}}$$

Input size: 12 X 12 X3 Thus, kernel size is: 5x5x3 and there are 256 kernels
Output size: 8 X 8 X 256

$D_f = 12$

$M = 3$

$N = 256$

$D_k = 5$

No of operations in normal conv = $D_k^2 * D_f^2 * M * N = 2764800$

No of operations in depth wise seperable = $D_f^2 * M(D_k^2 + N) = 121392$

Ratio = $2764800 / 121392 = 22.75$