

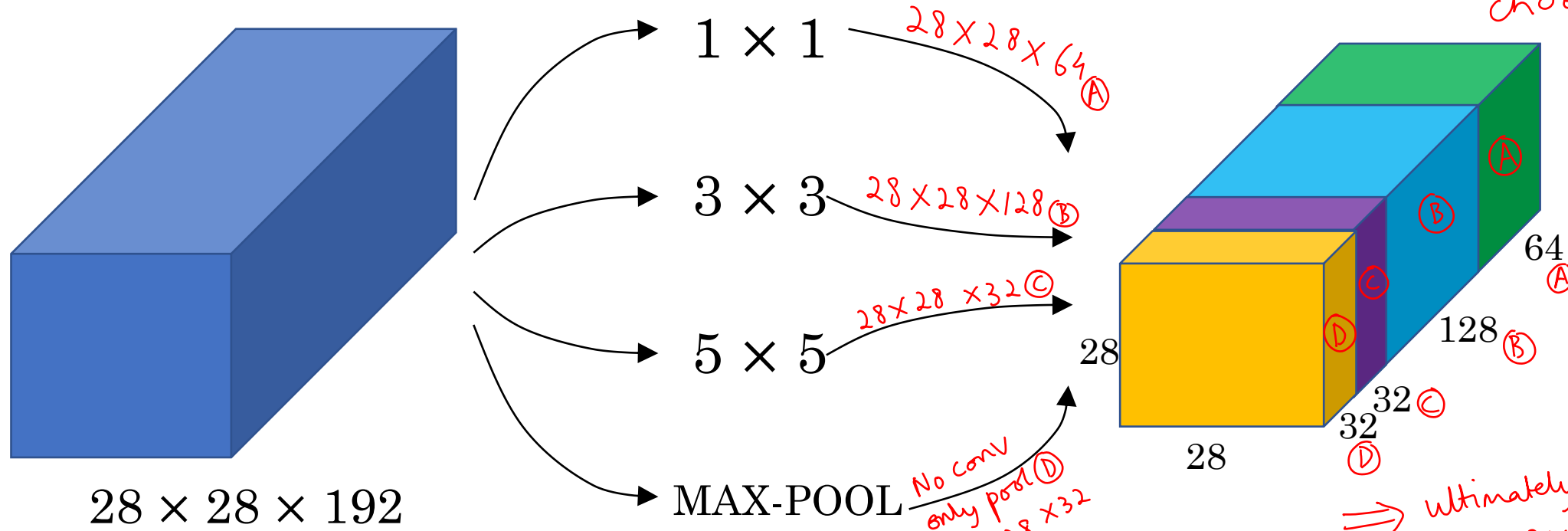


deeplearning.ai

Case Studies

Inception network motivation

Motivation for inception network



- You don't know which convolution works best (3x3 v/s 5x5 v/s others)
 \therefore you Apply all of them & stack their outputs one over another

No conv only pool (D)
 $28 \times 28 \times 32$
 This is achieved by using padding & stride = 1

When designing CNN you need to pick conv filter dim (3x3) v/s (5x5), you need to choose whether to do maxpool etc.

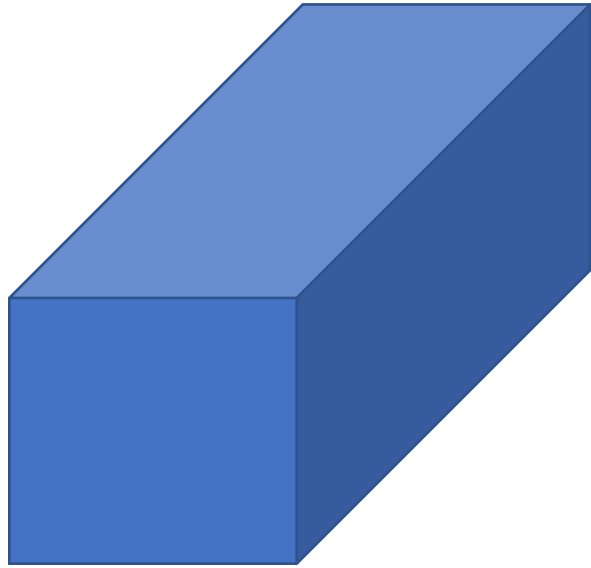
- Inception N/w helps collapse all this in 1 step (Applying all filters for you)

\Rightarrow ultimately, we had an i/p of $28 \times 28 \times 192$ & got an o/p of $28 \times 28 \times \underline{256}$
 $(32+32+128+64)$

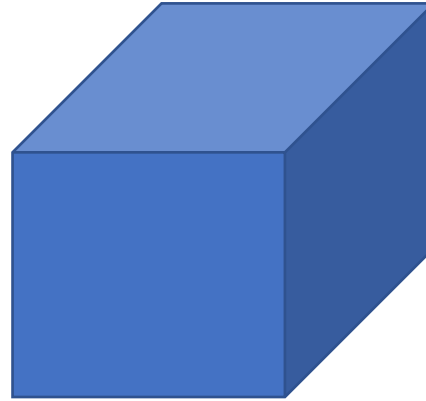
\therefore The idea is that instead of you specifying what conv filter to use, you use all & let the N/w decide which convolutions it finds useful

The problem of computational cost

- There is a problem w/ the computational cost if we use the model described before
- Lets see what it is -
- consider the purple block on the last page ($28 \times 28 \times 32$)



CONV
 5×5 ,
same,
32



$28 \times 28 \times 32$

$28 \times 28 \times 192$

How much will it cost to get the o/p
of $28 \times 28 \times 32$

Lets see

- we have $5 \times 5 \times 192$ (1 filter) $\times 32$ filters

- We need to o/p $28 \times 28 \times 32$ numbers

For each of these numbers, we need to
do $5 \times 5 \times 192$ convolution operations
(Take 1 block of $5 \times 5 \times 192$ From Input, do
convolution w/ $5 \times 5 \times 192$ Filter & do Relu)

\Rightarrow # operations
on the order
of $28 \times 28 \times 32$
 $\times (5 \times 5 \times 192)$
 $= 120 \text{ M}$

How to \downarrow this,
use 1×1 convolutions

Using 1×1 convolution

