

P.246 예1

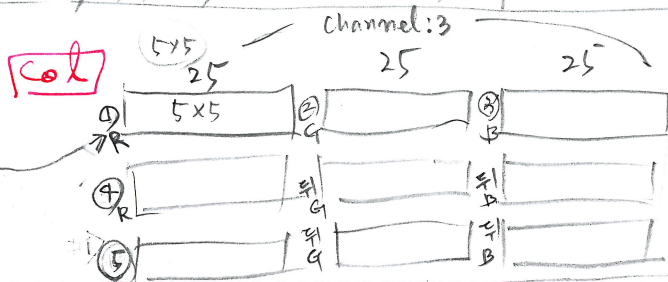
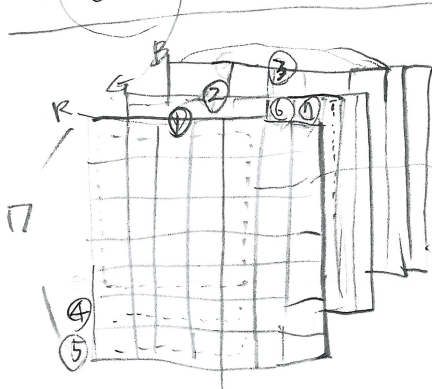
channel 3

<skk-simple-convolution-p.246

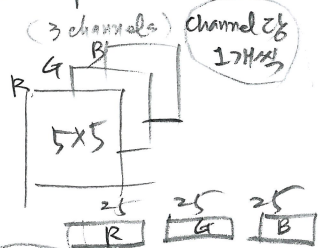
참고

$\rightarrow X = \text{np.random.rand}(10, 3, 1, 1)$  # data 10개

$\rightarrow \text{Col} = \text{im2col}(X, 5, 5, \text{stride}=1, \text{pad}=0)$

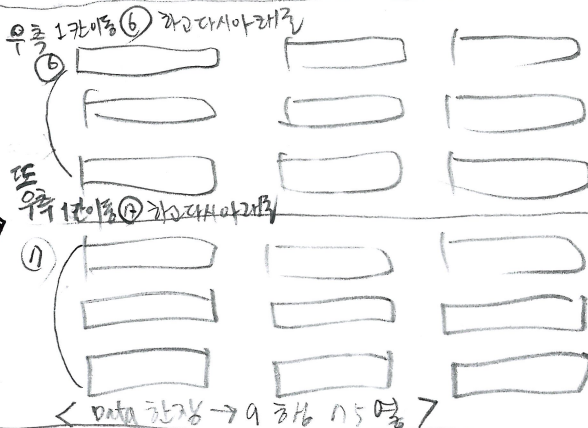


Filters



<Input Data 3x3>

<skk-simple-convolution-p.246-1-data.py>



Filter 3개씩 13x15

Input data 1개씩 3x3

<input Data 10개> col = 90개 150개

125x3=375

$W = \text{np.random.rand}(5, 3, 5, 5)$  # Filters.

$\rightarrow \text{col}_w = \text{self.w.reshape}(FN, -1).T$   
 $= W.reshape(5, -1).T$

$(5, 3, 5, 5) \rightarrow 375 \Rightarrow (5, -1) = 315$

Filter 1개씩 3x3  
 $(90, 15) * (15, 1)$

Filter 개수 5개씩  
 $(5, 15)^T$

$(90, 15) * (15, 5)$

$\rightarrow \text{out} = \text{np.dot}(\text{col}, \text{col}_w) + \text{self.b}$   
 $(90, 15) * (15, 5) = (90, 5)$

$\rightarrow \text{out} = \text{out.reshape}(N, \text{out\_h}, \text{out\_w}, -1).transpose(0, 3, 1, 2)$

3개씩 3개씩 5개씩 10개씩 2개씩 2개씩 5개씩 10개씩

$(10, 5, 3, 3)$

3x3 자리를 5개씩 10개씩

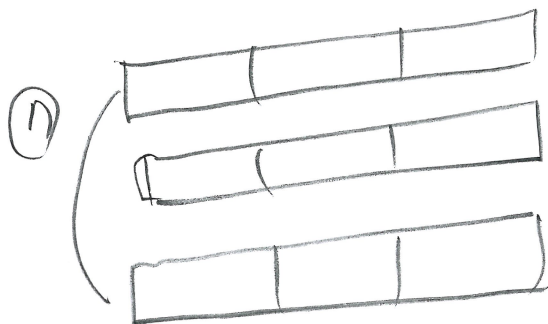
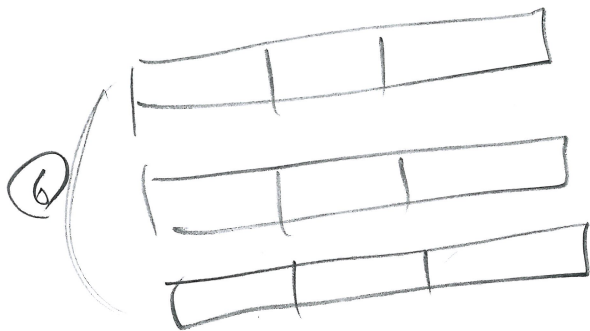
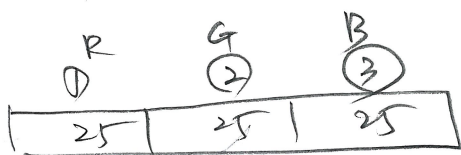
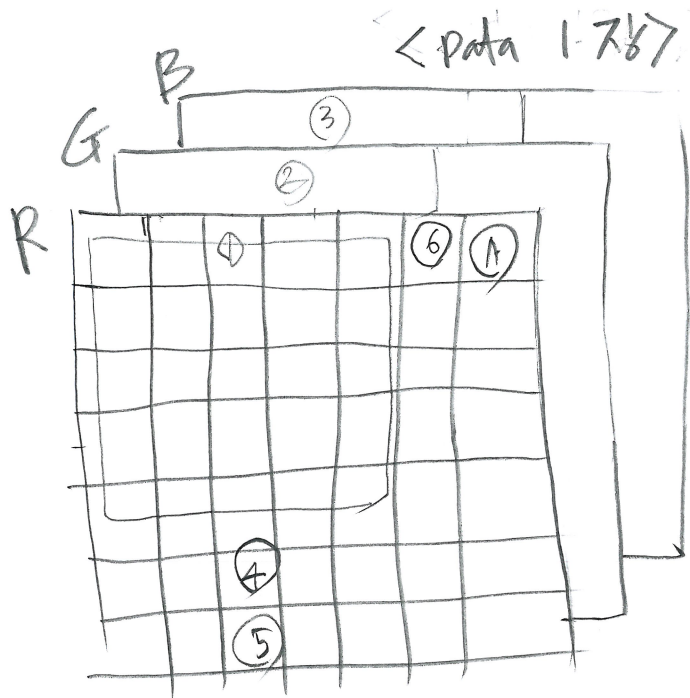


이런게 Total 10개  
 Filter 개수: 5

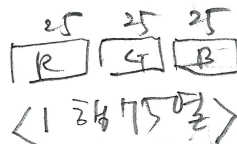
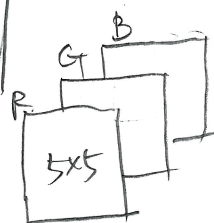
이런게 5개씩 10개씩

<Convolution Forward - I>

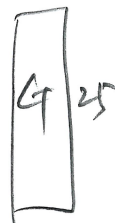
skk-simple-convolution Forward.py



<Filter 1st>

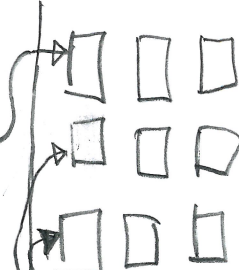


<TRANSPOSE>



\*

(1 3 4 1 5 6 7)<sup>T</sup>



9 3 4 1 5 6 7 \* 1 5 3 4 1 5 6 7

= 9 3 4 1 5 6 7

<Convolution Forward -2>