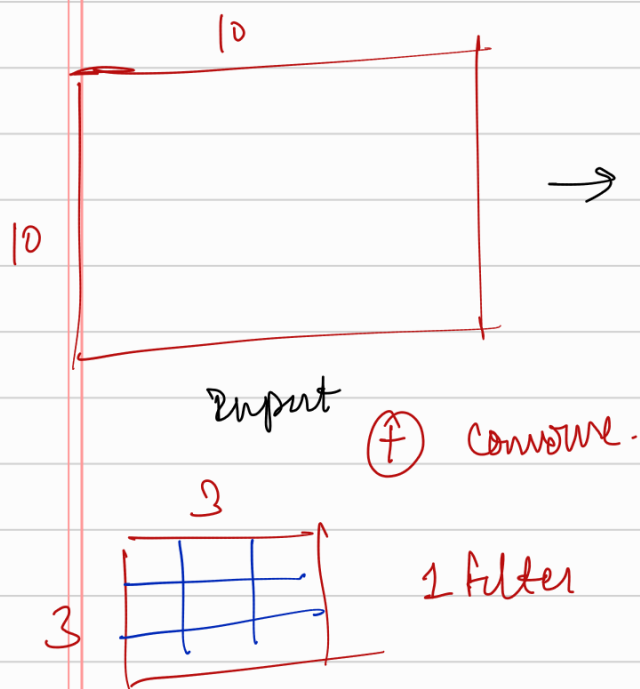


```

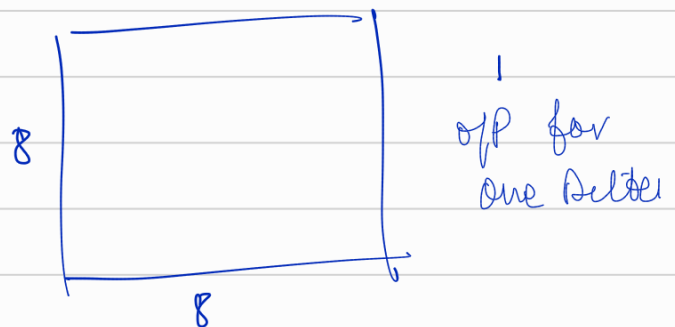
1 my_input = Input(shape = (10, 10, 1))
2 my_output = Convolution2D(5, 3)(my_input)
3 my_output = Activation('sigmoid')(my_output)
4 my_output = Convolution2D(2, 3)(my_output)
5 my_output = Activation('sigmoid')(my_output)
6 model = Model(my_input, my_output)

```

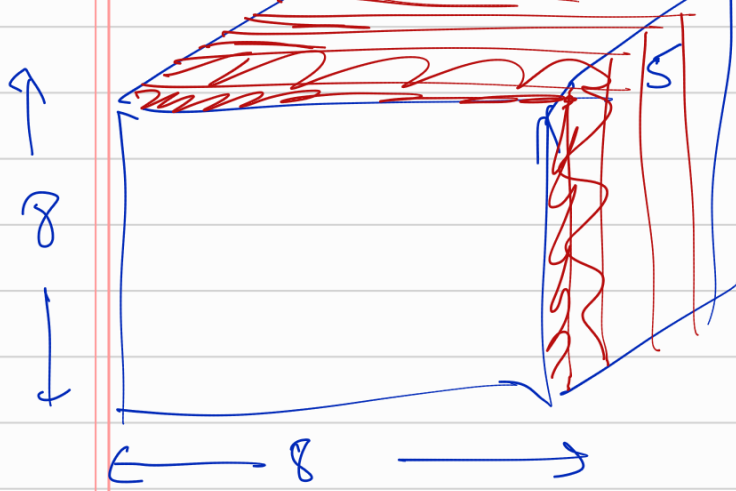
| Layer      | Input shape | o/p shape | Params |
|------------|-------------|-----------|--------|
| Input      | (10, 10, 1) | —         | —      |
| C2D        | (10, 10, 1) | (8, 8, 5) | 50     |
| Activation | (8, 8, 5)   | (8, 8, 5) | —      |
| conv 2D    | (8, 8, 5)   | (6, 6, 2) | 92     |
| Act        | (6, 6, 2)   | (6, 6, 2) | —      |



conv 2D (5, 3) means 5 filters of shape (3, 3)



weights per filter =  $(3 \times 3 + 1) = 10$  weights  
 $\times 5 = 50$



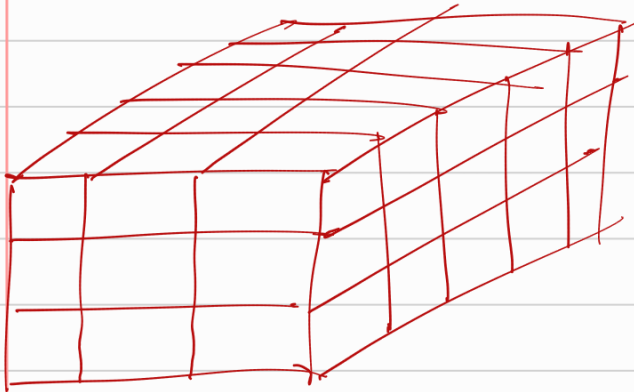
5 sheets of  $(8, 8)$  stacked together



$(2, 3) \equiv$  2 filters of size  $(3, 3)$

To convolve with a cube from above  $\rightarrow (8, 8, 5)$

The filter should be a 3-D as well.



5 layers of  $(3, 3)$  to convolve and give  $\square$  single digit 0/10

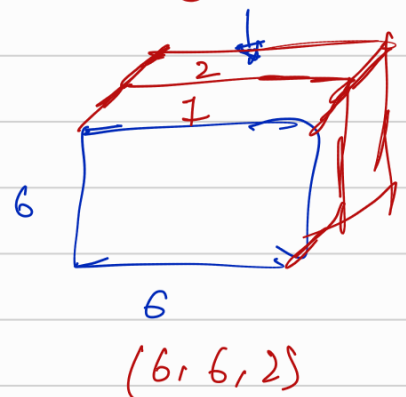
weights =  $3 \times 3 \times 5 = (15 + 1) = 16$   $\rightarrow$  bias

2 filters =  $16 \times 2 = 32$

$(8, 8, 5)$

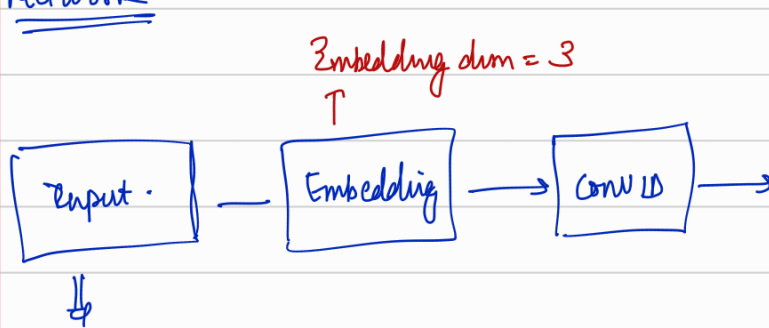


2 filters  $(3, 3)$



Embedding & conv-1D.

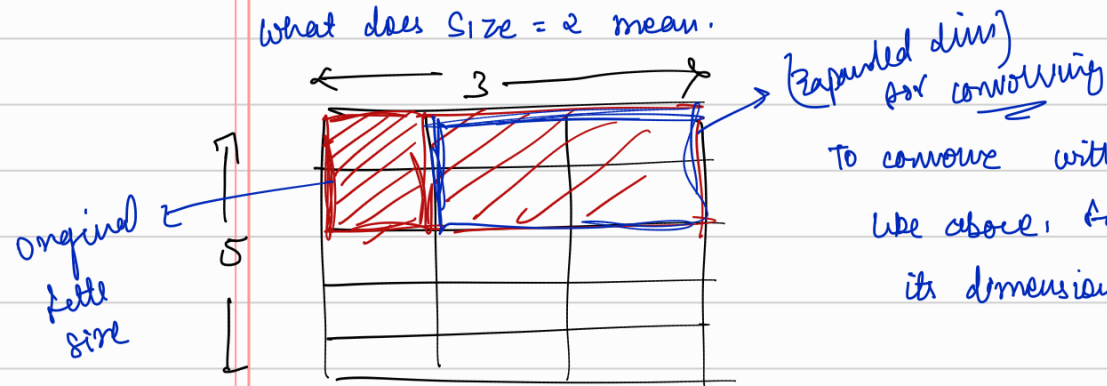
Networks



Sequence of length (5)

$\text{np.array}([1, 3, 5, 4, 6]) \rightarrow \text{np.array}([$   
 $\begin{bmatrix} -, -, - \\ -, -, - \\ -, -, - \\ -, -, - \\ -, -, - \end{bmatrix}, \rightarrow \text{convolve with 1 filter of size 2}$   
 $\left. \vphantom{\begin{bmatrix} -, -, - \\ -, -, - \\ -, -, - \\ -, -, - \\ -, -, - \end{bmatrix}} \right] \text{ (5x3 Embedding)}$

What does Size = 2 mean.



To convolve with a 1-D filter, Just like above, filter will have to expand its dimension

filter params:  $(2 \times 3) + 1$  (bias)

when Embedding layer of P =  $(3, 300)$

convolving with a (3) filter, Conv(10)

we get  $\rightarrow (3 \times 300 + 1) = 901$  weights of P =  $(31, 1)$

look how the second dim is gone completely.

