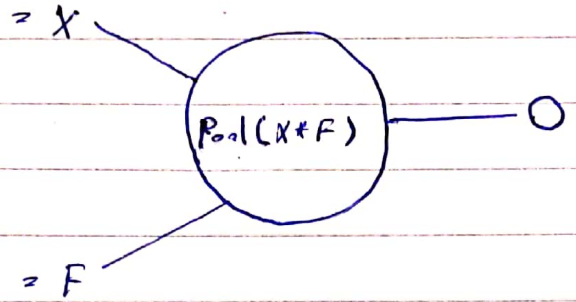
با کمک از وبسایت معرفی شده :

3	4	5
2	1	-3
4	-2	0

$= X$



2	0
-3	1

$= F$

* برای راحتی محاسبه، عملیات Global Average Pool را هم در همین سلول نشان دادم

$$O = \frac{1}{4}\left((X*F)_{11} + (X*F)_{12} + (X*F)_{21} + (X*F)_{22}\right)$$

$$O = \frac{1}{4}\left(X_{11}F_{11} + X_{12}F_{12} + X_{21}F_{21} + X_{22}F_{22} + X_{12}F_{11} + \dots\right)$$

از خانه های F فاکتور می گیریم

$$O = \frac{1}{4}\left(F_{11}(X_{11} + X_{12} + X_{21} + X_{22}) + F_{12}(X_{12} + X_{13} + X_{22} + X_{23}) + \dots\right)$$

حال مشتق گیری O نسبت به F ها راحت است.

$$\frac{\partial L}{\partial F_{11}} = \frac{\partial L}{\partial O} \cdot \frac{\partial O}{\partial F_{11}} \qquad \frac{\partial L}{\partial F_{12}} = \frac{\partial L}{\partial O} \cdot \frac{\partial O}{\partial F_{12}} \qquad \frac{\partial L}{\partial F_{21}} = \frac{\partial L}{\partial O} \cdot \frac{\partial O}{\partial F_{21}} \qquad \frac{\partial L}{\partial F_{22}} = \frac{\partial L}{\partial O} \cdot \frac{\partial O}{\partial F_{22}}$$

$$\left(\frac{\partial L}{\partial O} = 1\right)$$

$$\Rightarrow \frac{\partial L}{\partial F_{11}} = \frac{1}{4}(X_{11} + X_{12} + X_{21} + X_{22}) = \frac{10}{4}$$

$$\frac{\partial L}{\partial F_{12}} = \frac{1}{4}(X_{12} + X_{13} + X_{22} + X_{23}) = \frac{7}{4}$$

$$\frac{\partial L}{\partial F_{21}} = \frac{1}{4}(X_{21} + X_{22} + X_{31} + X_{32}) = \frac{5}{4}$$

$$\frac{\partial L}{\partial F_{22}} = \frac{1}{4}(X_{22} + X_{23} + X_{32} + X_{33}) = -1$$