
UNIBEAM
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Redes Convolucionales

Aplicado a la ROBÓTICA

UNIVERSIDAD NACIONAL DE SAN ANTONIO ABAD DEL CUSCO
EP: ING. INFORMÁTICA Y DE SISTEMAS

Redes Convolucionales

1 **Redes neuronales**

¿Cómo funcionan la redes neuronales?

2 **Redes convoluciones**

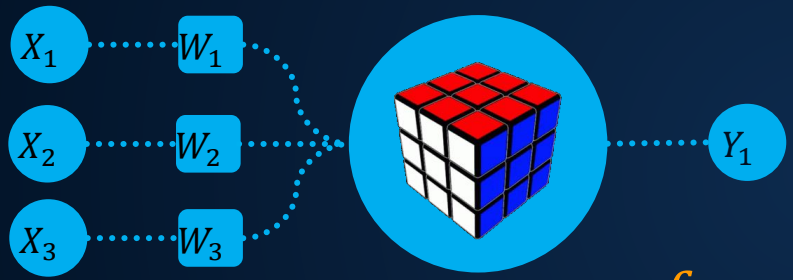
Reconocimiento visual usando patrones de filtros

01.

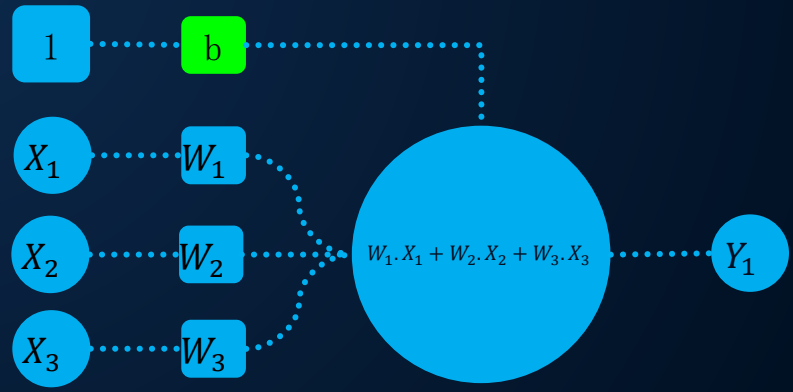
Redes neuronales

Son modelos simples del funcionamiento del sistema nervioso. Las unidades básicas son las neuronas, que generalmente se organizan en capas

¿Cómo funciona una red neuronal?



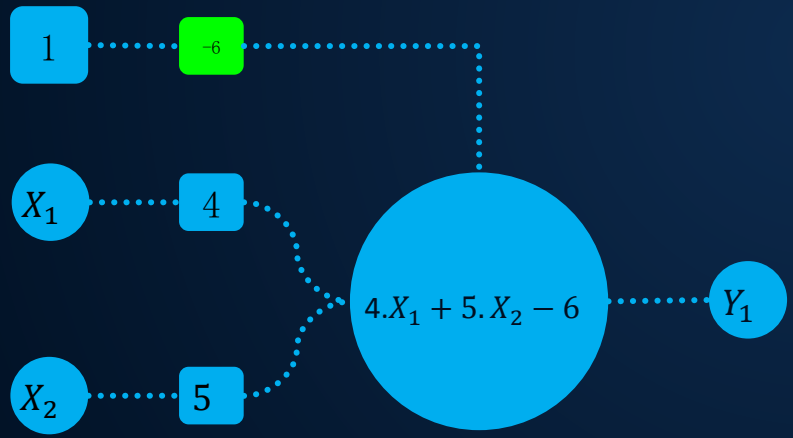
$$y = W_1.X_1 + W_2.X_2 + W_3.X_3 + b$$

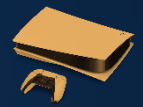
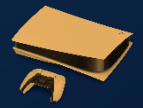


Modelo binario

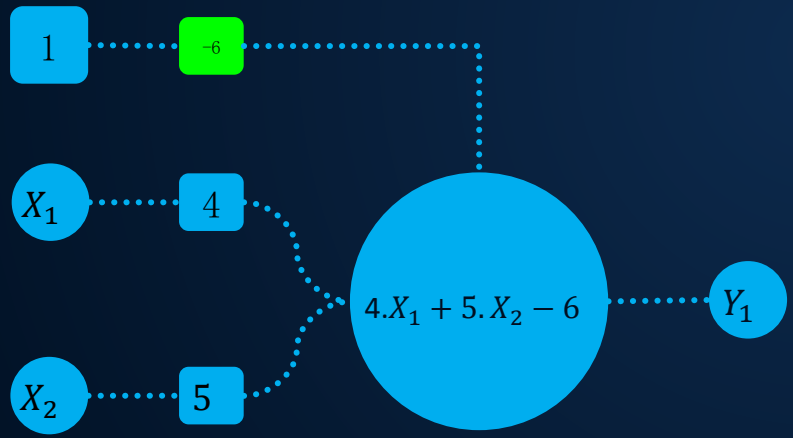
	1	0	Y_1
X_1			 1
X_2			 0

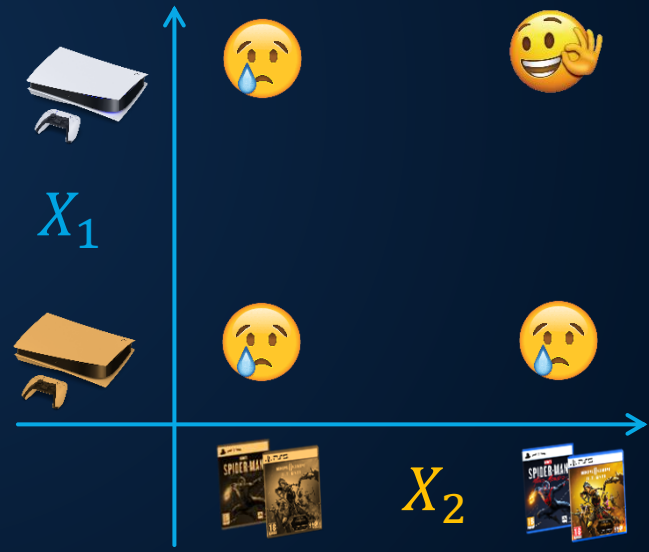
Modelo binario



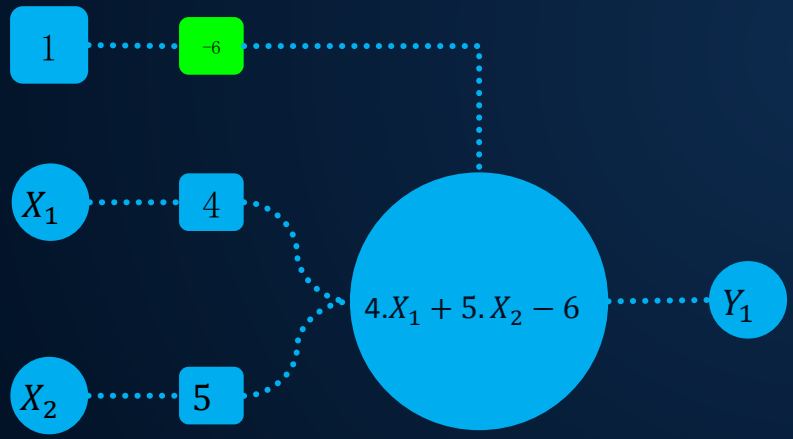
X_1	X_2	Target	Y_1
			-6
			-2
			-1
			3

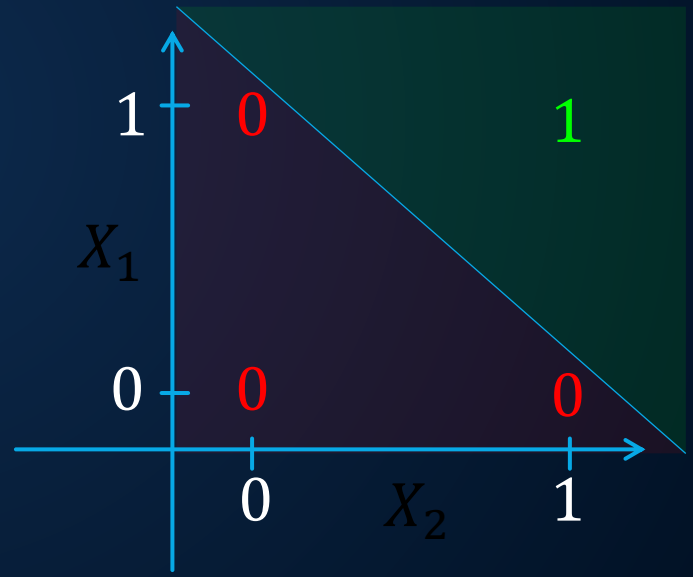
Modelo binario



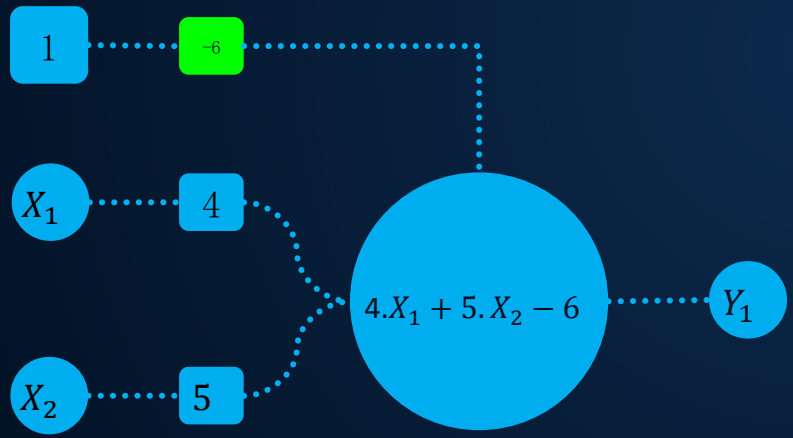


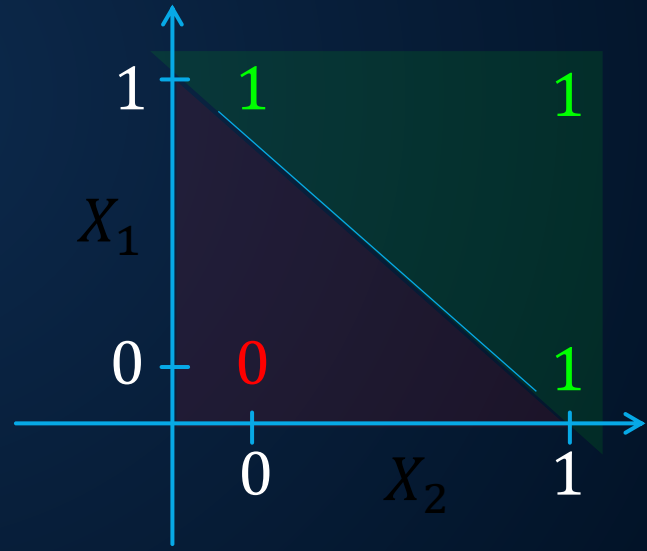
AND



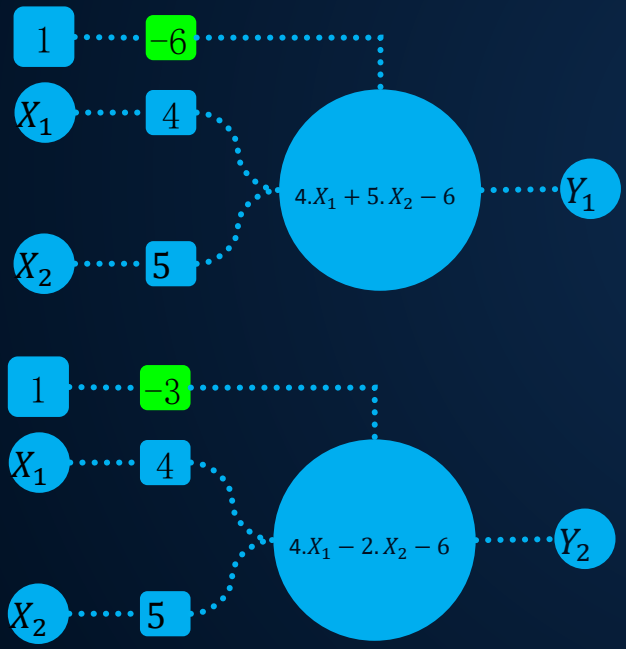


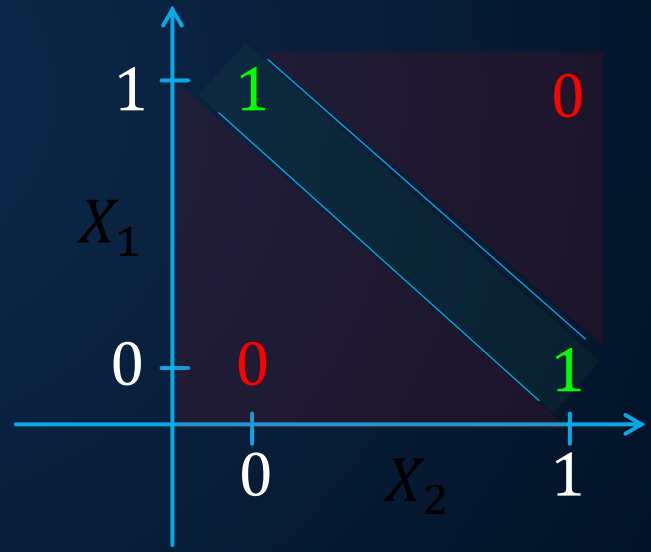
OR





XOR





02.

REDES CONVOLUCIONALES

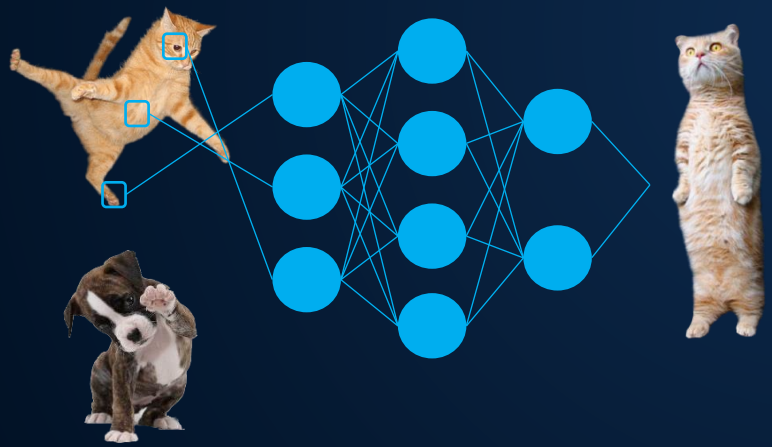
Son un tipo de redes neuronales artificiales donde las «neuronas» corresponden a campos receptivos de una manera muy similar a las neuronas en la corteza visual.

¿Cómo funciona?

INPUT

HIDDEN

OUTPUT



ESTRUCTURA

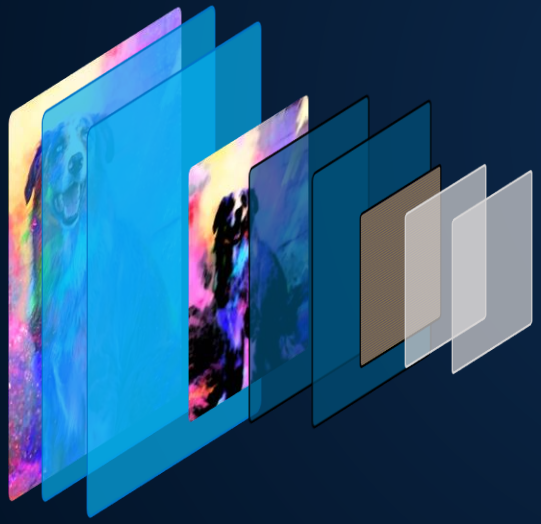
Fully connected and local conected neural net

EJEMPLO: 1000x1000 image, 1M hidden units

10^12 parameters

FILTER SIZE: 10x10, 100M paremeters

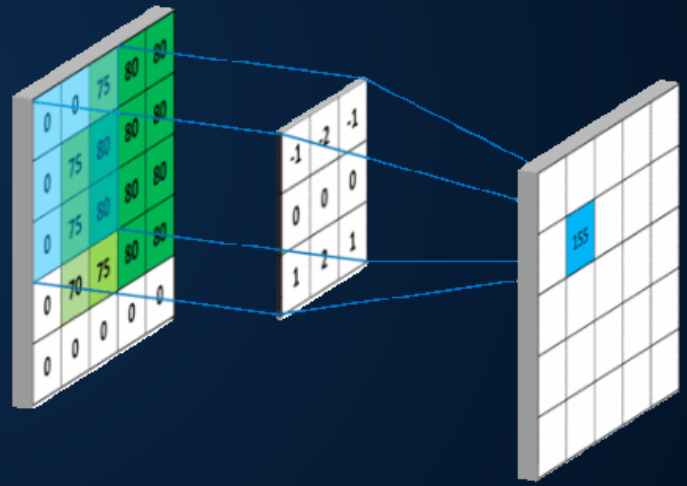
Convolution by linear filter



+

(4x0)
(0x0)
(0x0)
(0x0)
(0x1)
(0x1)
(0x0)
(0x1)
(-4x2)

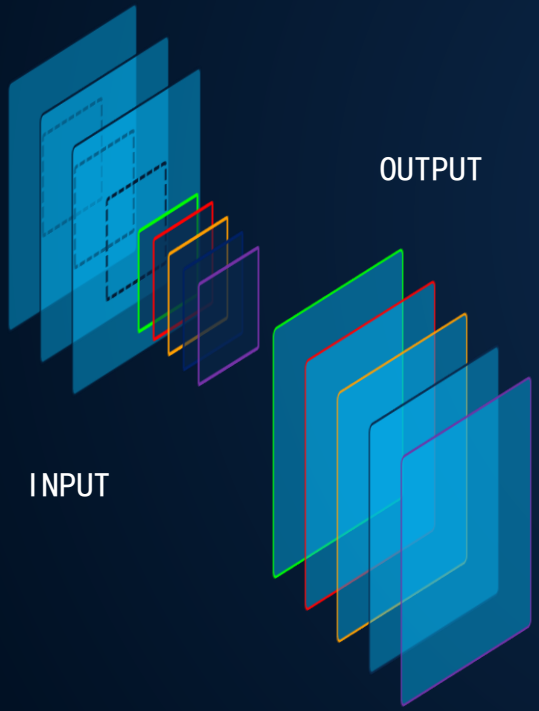
-8



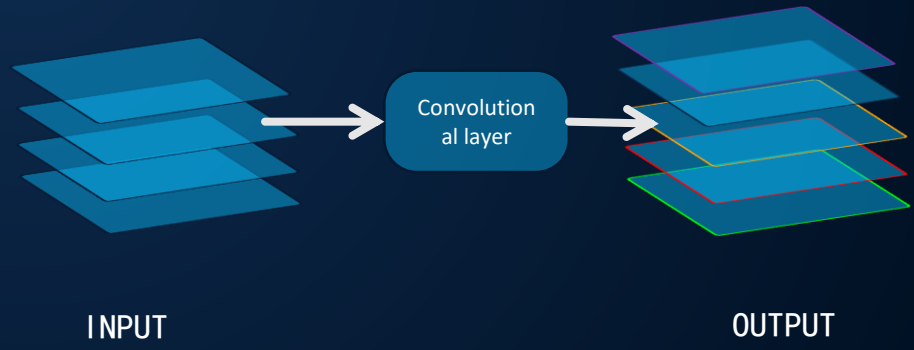
Convolution by linear filter

0	0	0	0	0
0	0	0	0	0
0	-1	1	0	0
0	0	0	0	0
0	0	0	0	0

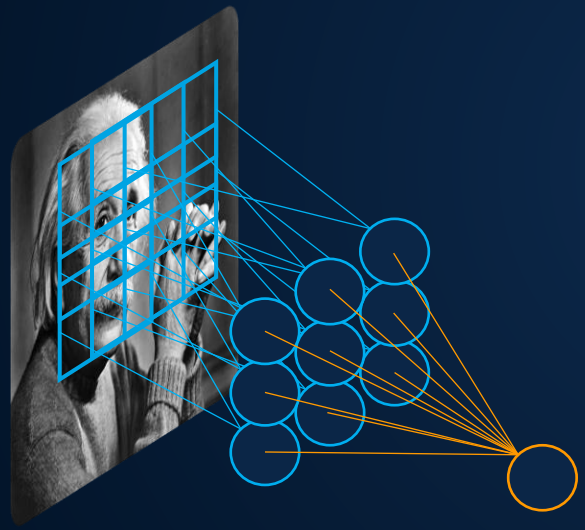
Convolutional layer



NOTE: the nr. Of output feature maps is usually large that the nr. of input feature maps

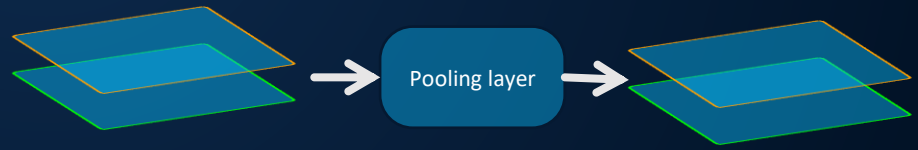


Pooling



By pooling (e.g., talking max) filter responses at diferente locations we again robusnes at diferente location we gain robustness to the exact spatial location of features

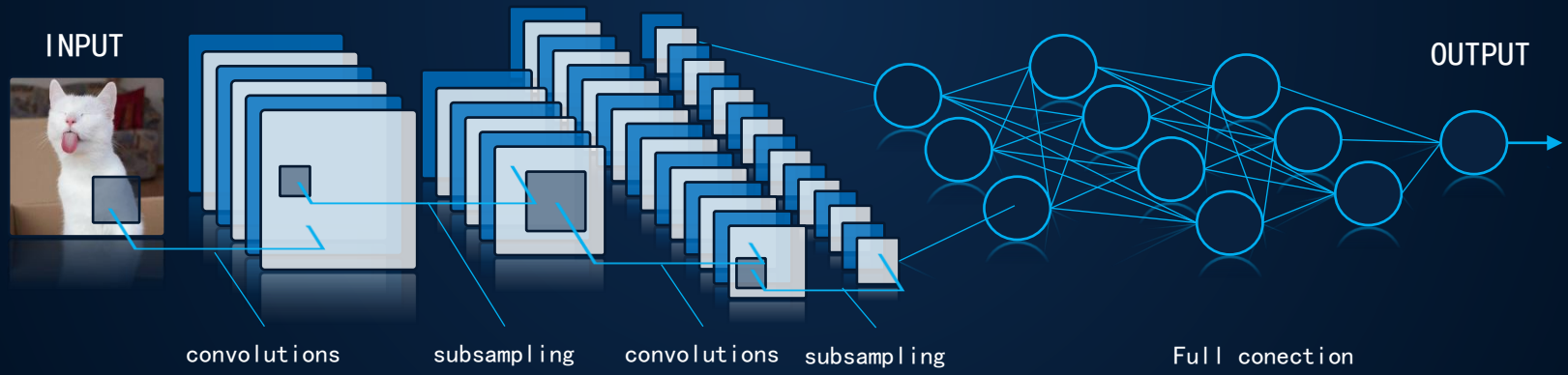
$$h_{i+1,x,y} = max_{(j,k)\in N(x,y)} h_{i,j,k}$$



INPUT

OUTPUT

Typical Architecture



fin

Pingüinos enojados ☺