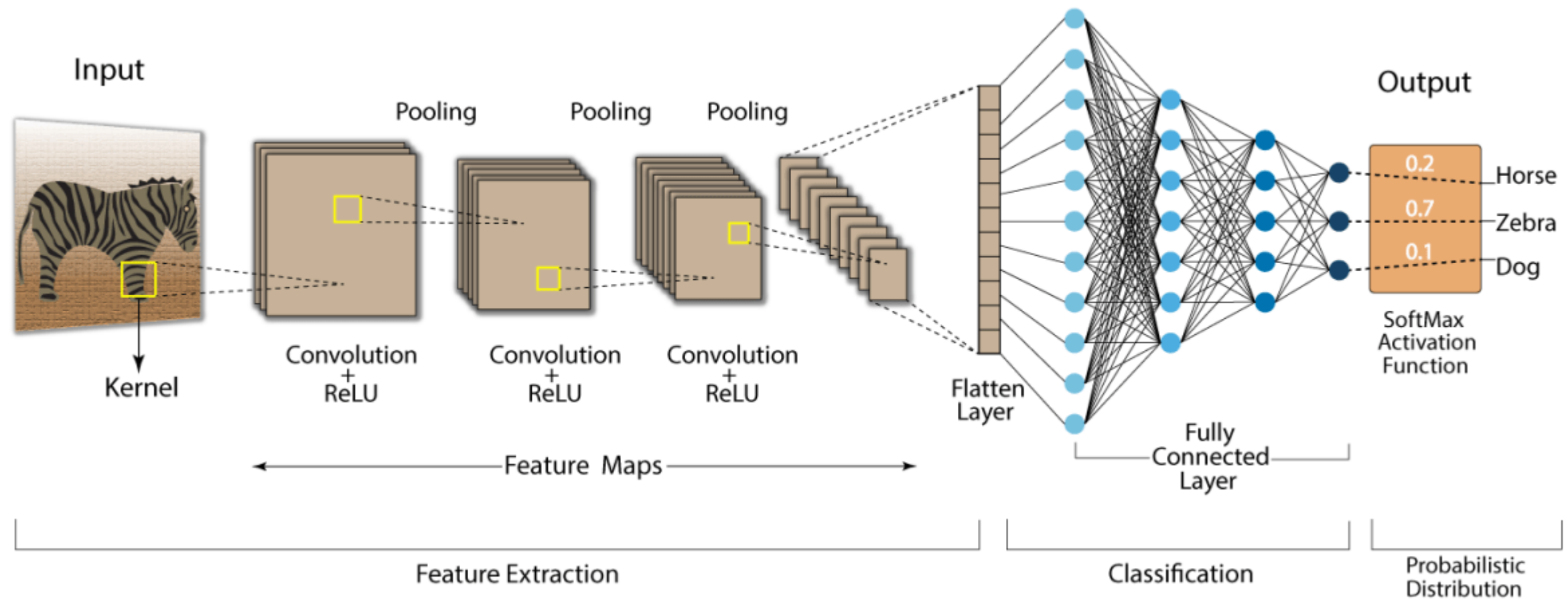


Redes Neuronales Convolucionales

Redes Neuronales Convolucionales

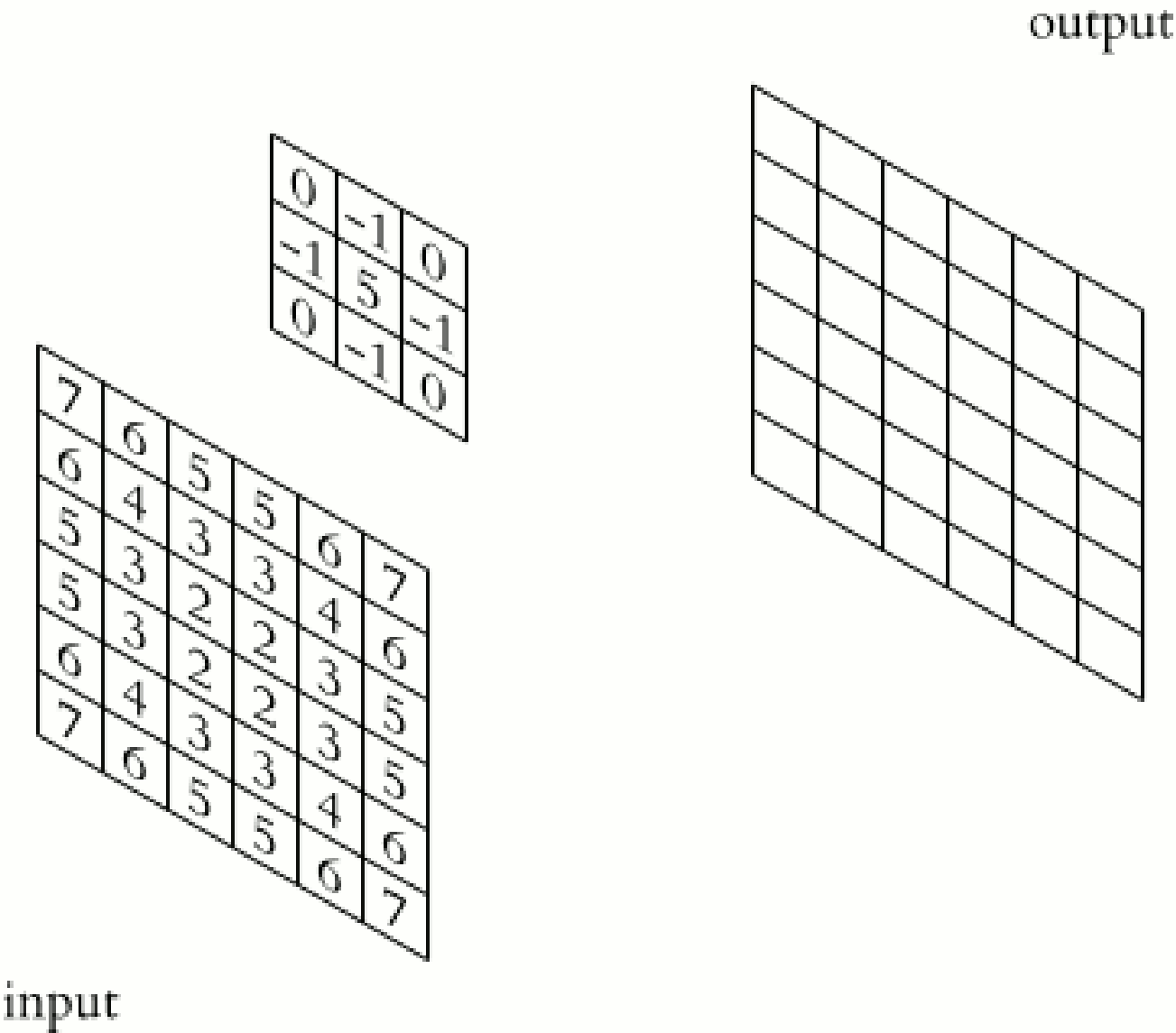


Redes Neuronales Convolucionales

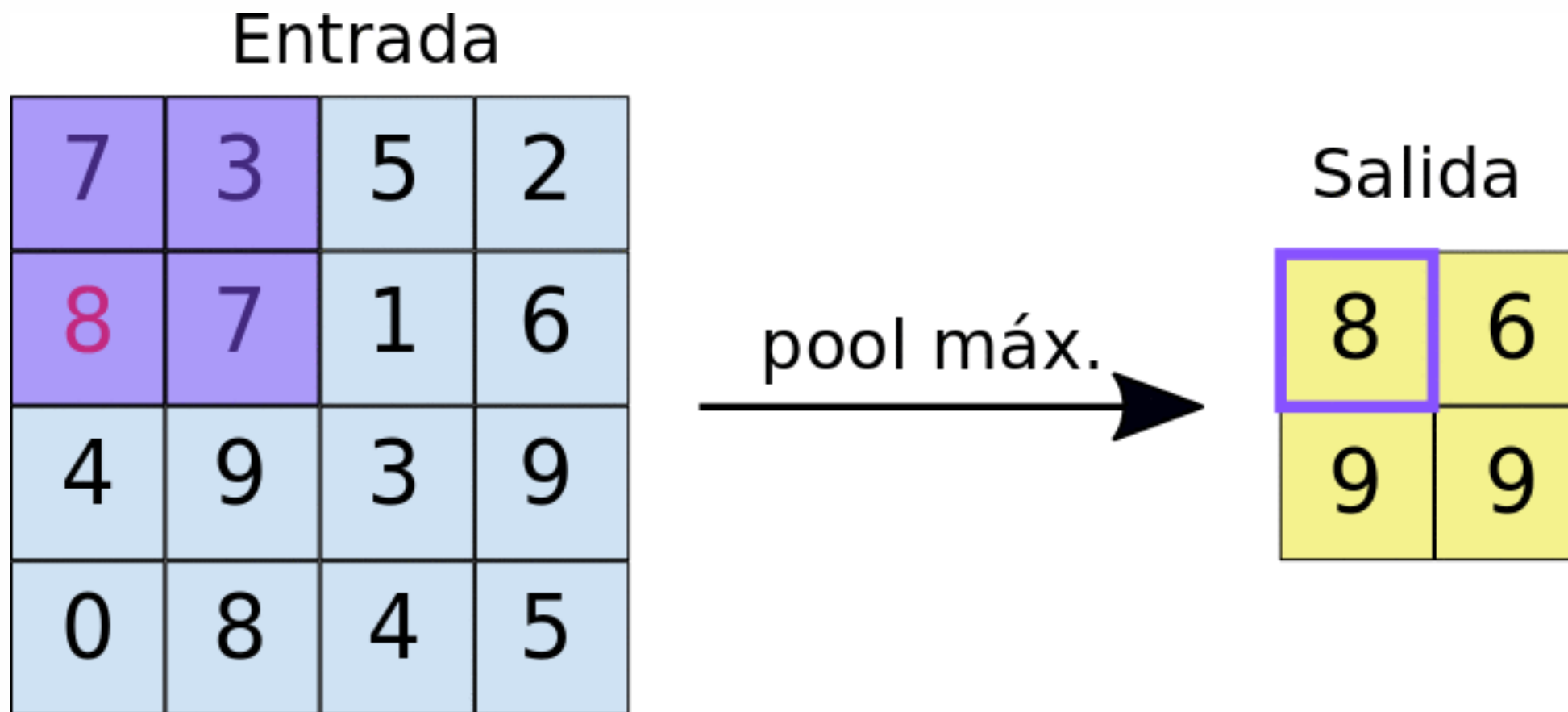


Input





Redes Neuronales Convolucionales



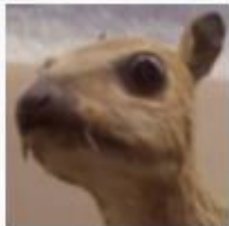
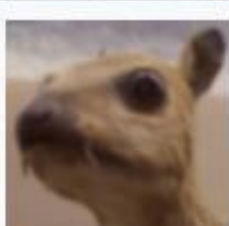


Redes Neuronales Convolucionales

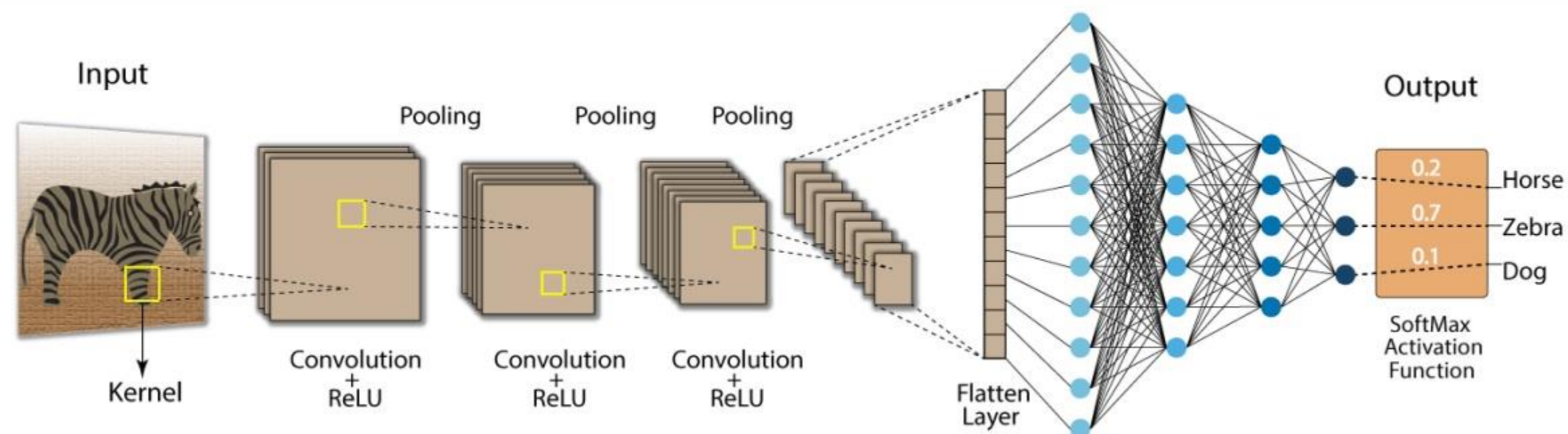


Redes Neuronales Convolucionales

Operation	Kernel ω	Image result $g(x,y)$
Identity	$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$	
Edge detection	$\begin{bmatrix} 1 & 0 & -1 \\ 0 & 0 & 0 \\ -1 & 0 & 1 \end{bmatrix}$	
	$\begin{bmatrix} 0 & -1 & 0 \\ -1 & 4 & -1 \\ 0 & -1 & 0 \end{bmatrix}$	
	$\begin{bmatrix} -1 & -1 & -1 \\ -1 & 8 & -1 \\ -1 & -1 & -1 \end{bmatrix}$	

Sharpen	$\begin{bmatrix} 0 & -1 & 0 \\ -1 & 5 & -1 \\ 0 & -1 & 0 \end{bmatrix}$	
Box blur (normalized)	$\frac{1}{9} \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$	
Gaussian blur 3×3 (approximation)	$\frac{1}{16} \begin{bmatrix} 1 & 2 & 1 \\ 2 & 4 & 2 \\ 1 & 2 & 1 \end{bmatrix}$	
Gaussian blur 5×5 (approximation)	$\frac{1}{256} \begin{bmatrix} 1 & 4 & 6 & 4 & 1 \\ 4 & 16 & 24 & 16 & 4 \\ 6 & 24 & 36 & 24 & 6 \\ 4 & 16 & 24 & 16 & 4 \\ 1 & 4 & 6 & 4 & 1 \end{bmatrix}$	

Redes Neuronales Convolucionales



w_1	w_2	w_3
w_4	w_5	w_6
w_7	w_8	w_9

w'_1	w'_2	w'_3
w'_4	w'_5	w'_6
w'_7	w'_8	w'_9

Redes Neuronales Convolucionales



29	70	114	76	0	8	4	5	5	0	111	162
33	61	102	106	34	0	0	0	0	49	182	150
40	54	123	90	72	77	52	51	49	121	205	98
41	57	74	54	96	181	220	170	90	149	208	56
32	36	47	81	85	90	176	206	140	171	186	22
31	39	66	71	71	97	147	214	203	190	198	22
15	30	52	57	68	123	161	197	207	200	179	8
17	37	34	40	78	103	148	187	205	225	165	1
20	44	37	34	35	26	78	156	214	145	200	38
20	34	21	43	70	21	43	139	205	93	211	70
16	24	14	21	102	175	120	130	226	212	236	75
13	21	28	28	97	216	184	90	196	255	255	84
15	25	30	39	63	105	140	66	113	252	251	74
16	32	38	57	69	85	93	120	128	251	255	154
20	42	55	62	66	76	86	104	148	242	254	241
20	38	55	64	69	80	78	109	195	247	252	255
23	34	44	64	88	104	119	173	234	247	253	254
24	37	45	63	85	114	154	196	226	245	251	252

.12	.45	.56	.12	.00	.44	.54	.03
.45	.07	.02	.76	.78	.56	.89	.04
.12	.45	.56	.12	.00	.44	.54	.03
.45	.07	.02	.76	.78	.56	.89	.04
.12	.45	.56	.12	.00	.44	.54	.03
.45	.07	.02	.76	.78	.56	.89	.04
.12	.45	.56	.12	.00	.44	.54	.03
.45	.07	.02	.76	.78	.56	.89	.04
.12	.45	.56	.12	.00	.44	.54	.03
.45	.07	.02	.76	.78	.56	.89	.04

Redes Neuronales Convolucionales

