

Destripando a Keras

O cómo visualizar y entender redes neuronales



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¿Quiénes somos?



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¿Qué vais a ver?

01

Entendiendo redes neuronales
artificiales

02

Entendiendo redes neuronales
convolucionales

03

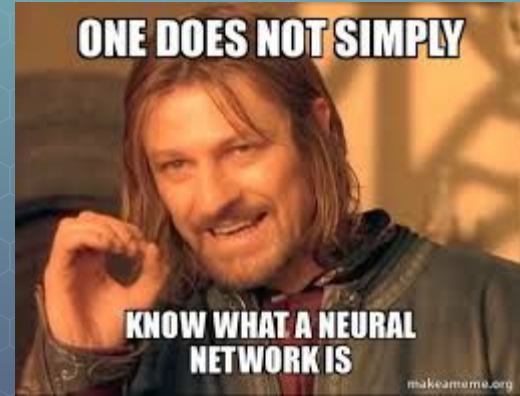
Entendiendo las redes neuronales
recurrentes

04

Conclusiones, link al repo y a las
demos, enlaces, y sorpresas



Redes Neuronales

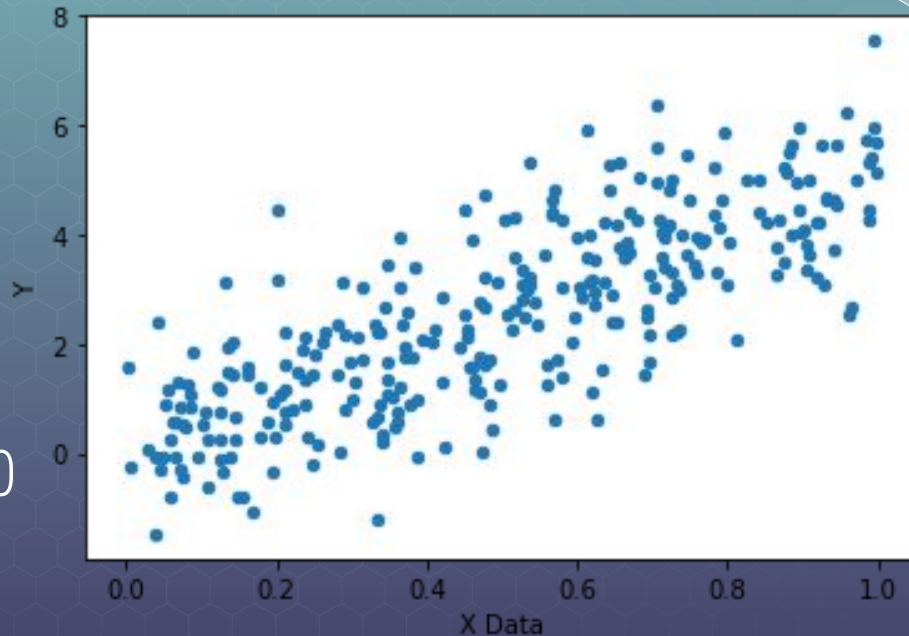


Regresión lineal en ID

	X Data	Y
0	0.000000	-0.830142
1	0.000001	-0.376774
2	0.000002	-1.657340
3	0.000003	0.286073
4	0.000004	-2.033165

¡¡¡1 millón de datos entre 0 y 1!!!

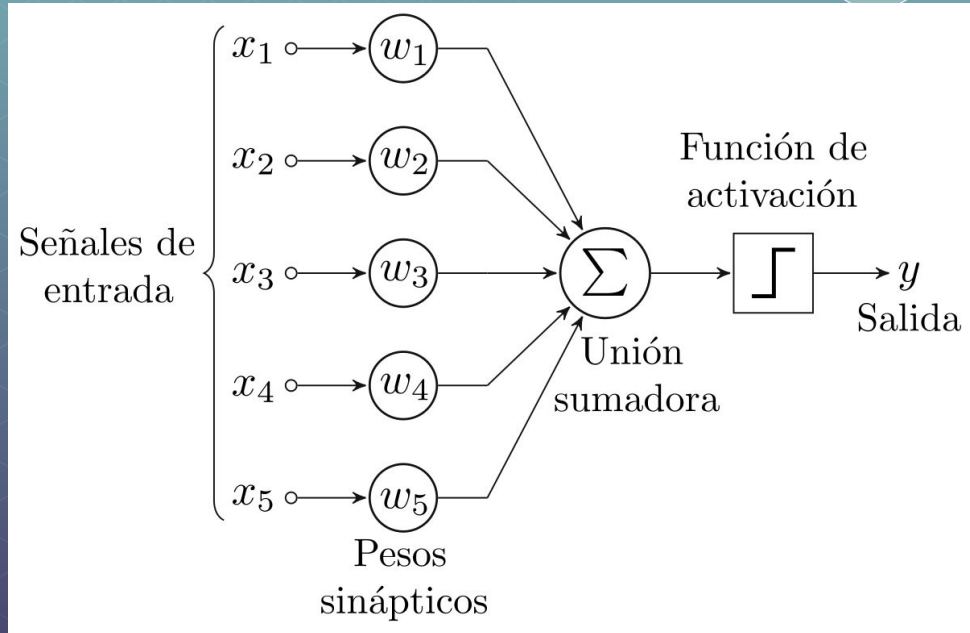
Datos generados usando: $y = 5x + 0.04 + \text{ruido}$



Regresión lineal en ID

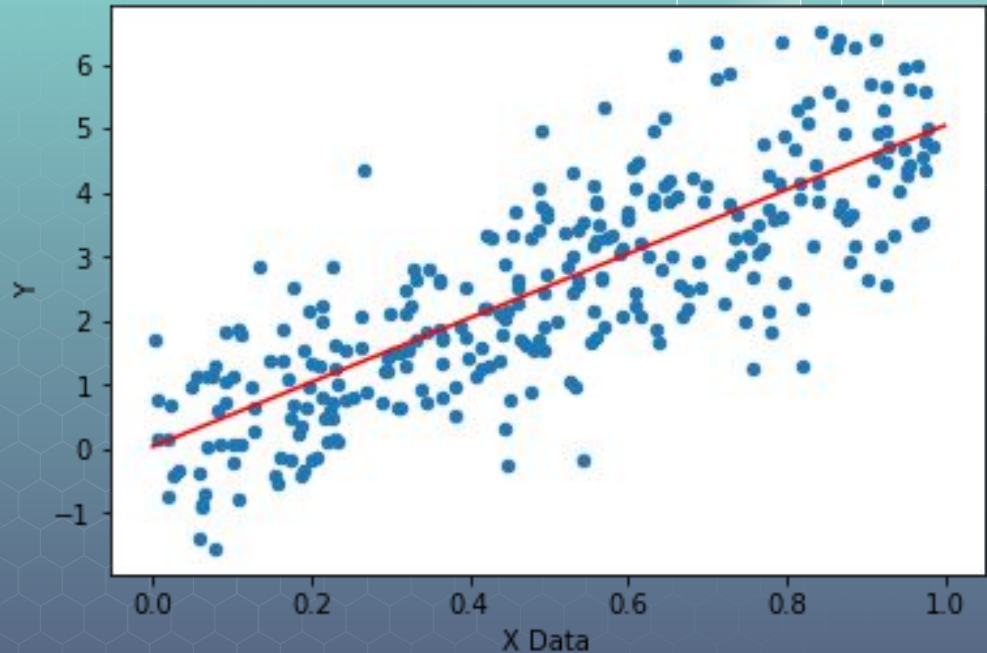
Red neuronal artificial
(perceptrón):

Modelo a usar: $Y = m X + b$



Regresión lineal en ID

Resultado del perceptrón simple

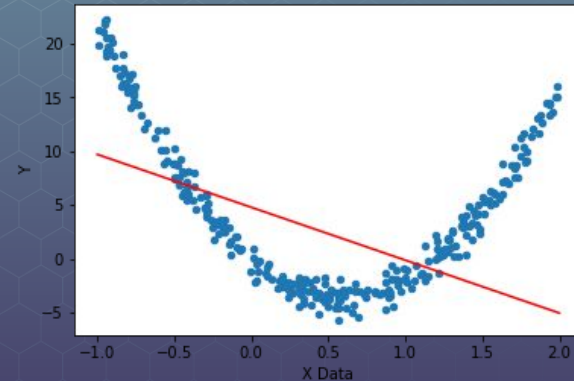
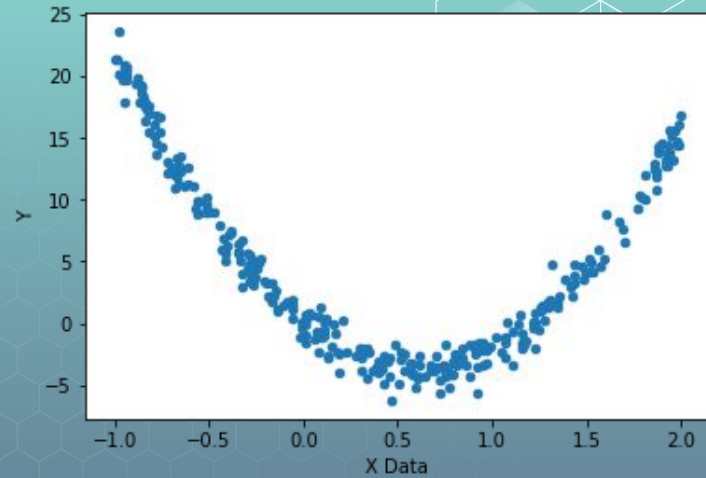
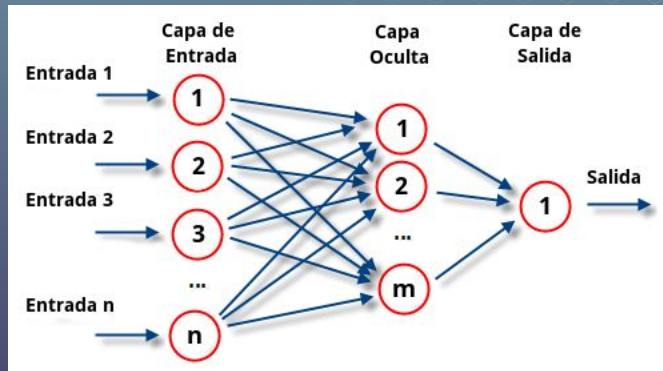


```
: model_m = model.get_weights()[0]
: model_b = model.get_weights()[1]
: model.get_weights()

: [array([[ 5.00645161]], dtype=float32), array([ 0.03365948], dtype=float32)]
```

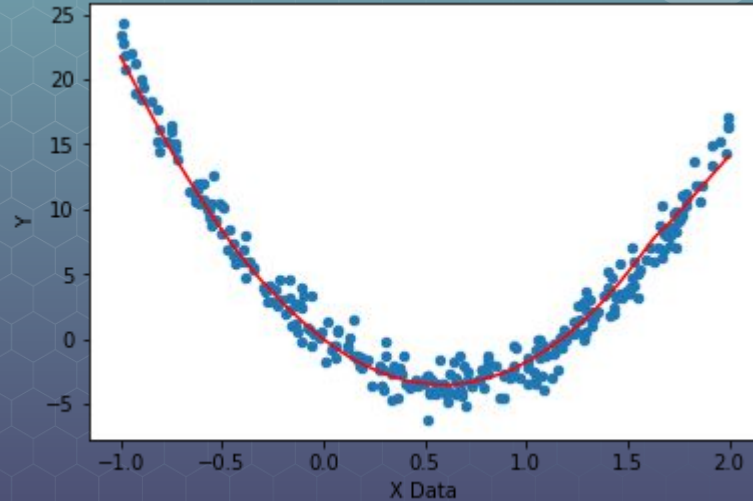
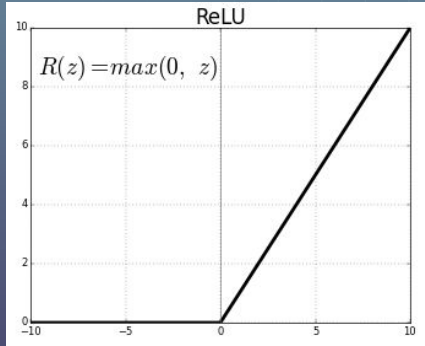

Regresión no lineal en ID

Resultado del perceptrón multicapa:

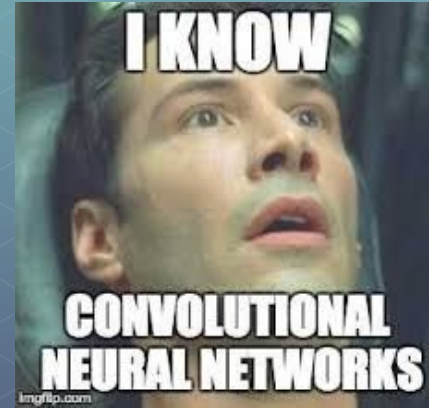


Regresión no lineal en ID

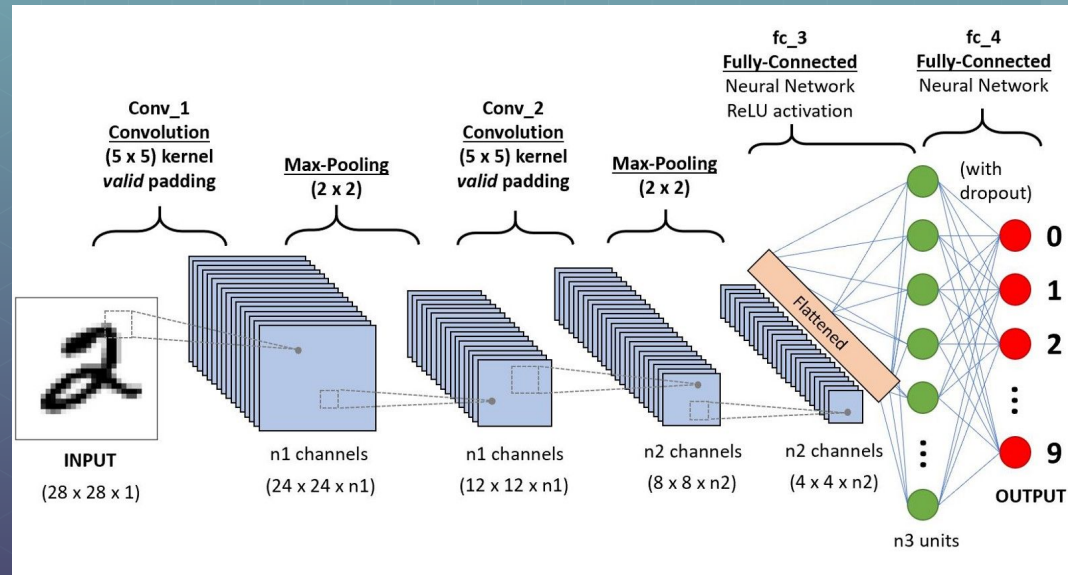
¡¡TENEMOS QUE AÑADIR NO LINEALIDADES!!



Redes Neuronales Convolucionales

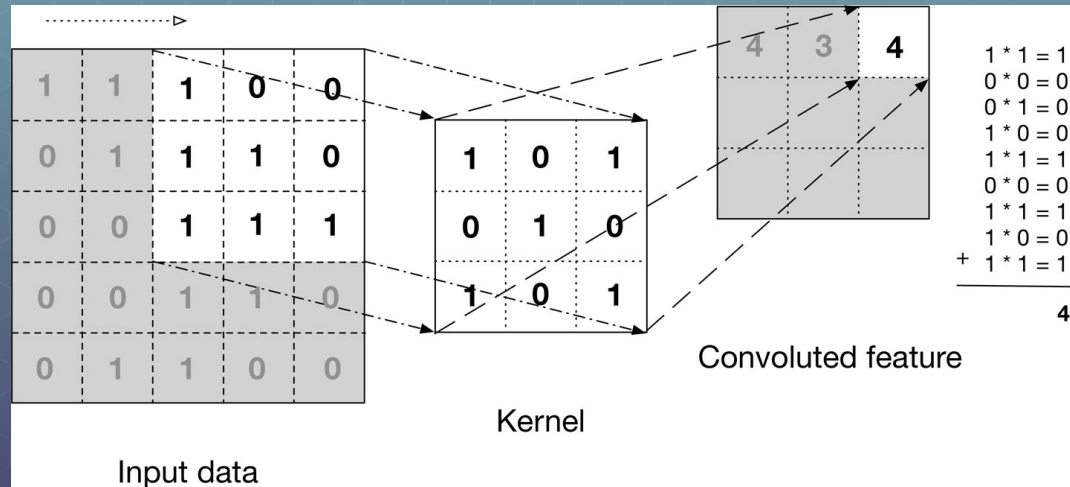


Redes convolucionales profundas

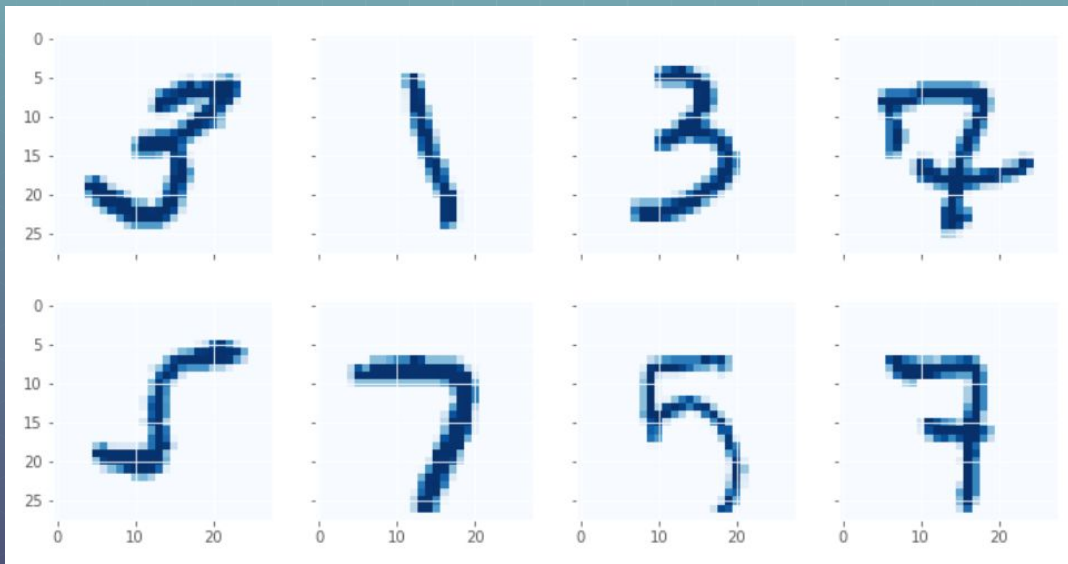


Redes convolucionales profundas

Convolución:



Ejemplo MNIST



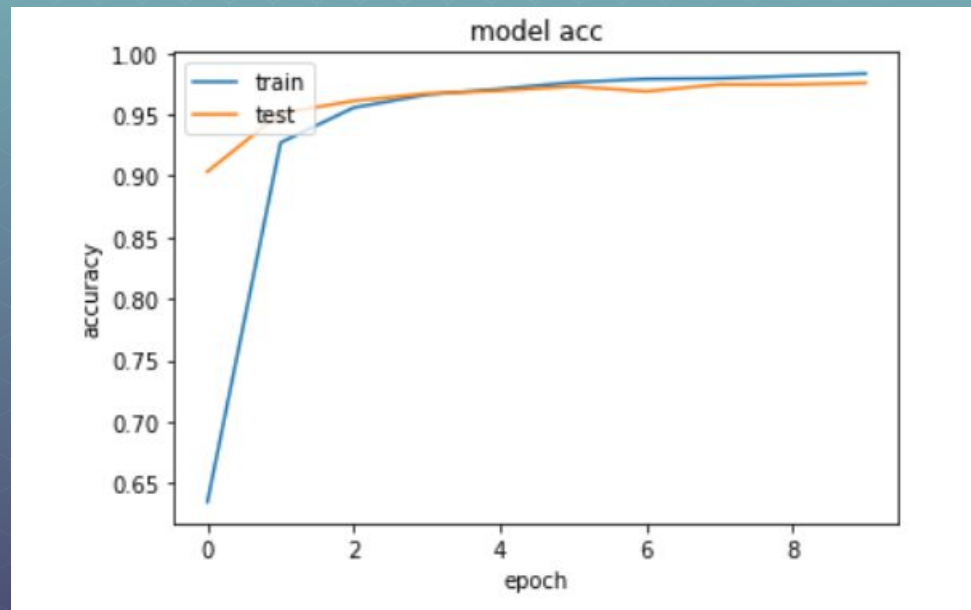
Ejemplo MNIST



```
model.summary()
```

Layer (type)	Output Shape	Param #
conv2d_1 (Conv2D)	(None, 26, 26, 16)	160
max_pooling2d_1 (MaxPooling2D)	(None, 8, 8, 16)	0
conv2d_2 (Conv2D)	(None, 6, 6, 8)	1160
flatten_1 (Flatten)	(None, 288)	0
dense_1 (Dense)	(None, 10)	2890
Total params: 4,210		
Trainable params: 4,210		
Non-trainable params: 0		

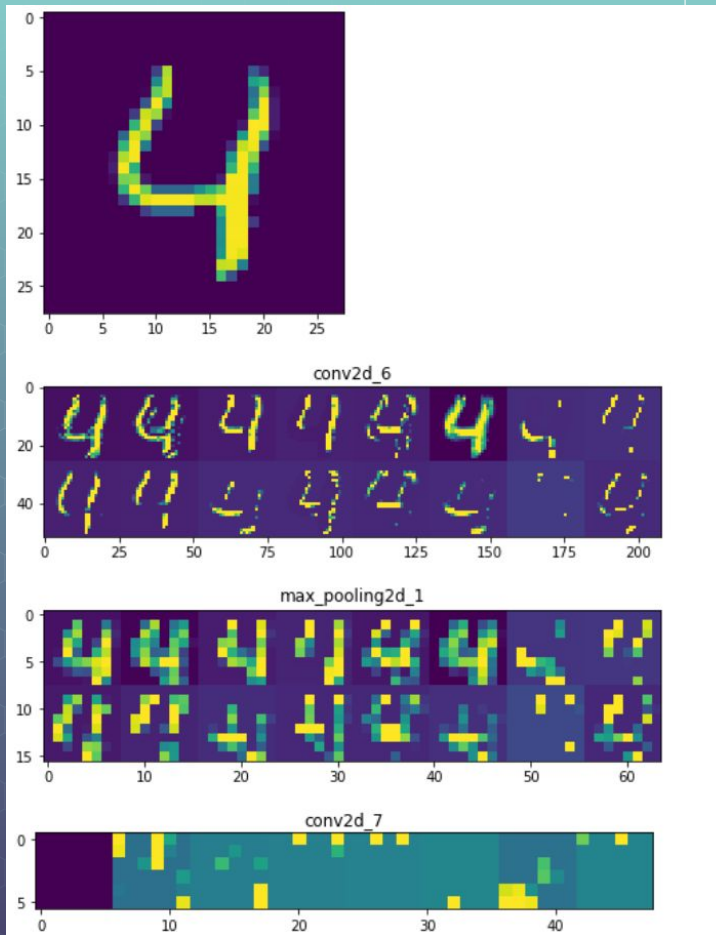
Ejemplo MNIST



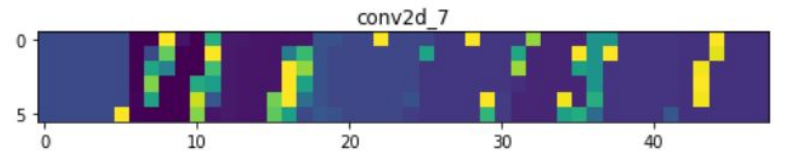
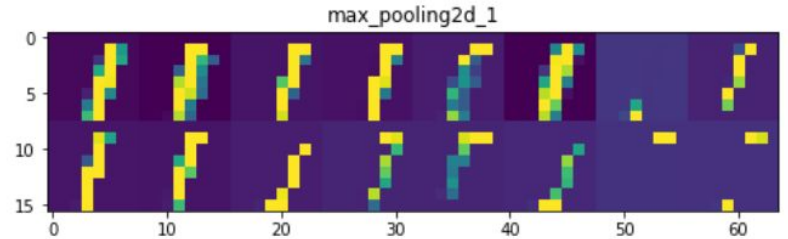
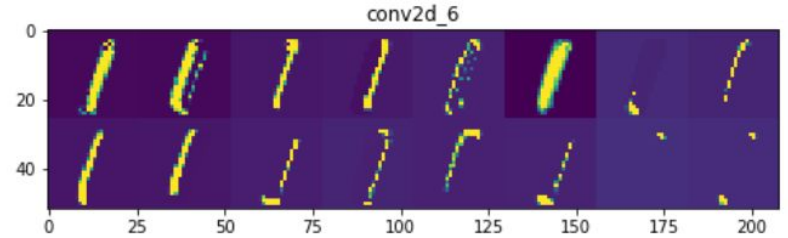
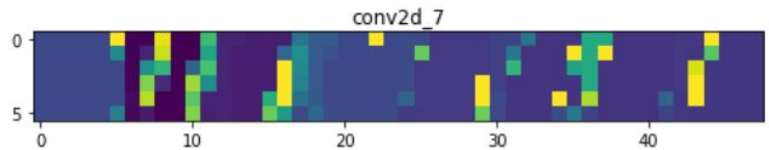
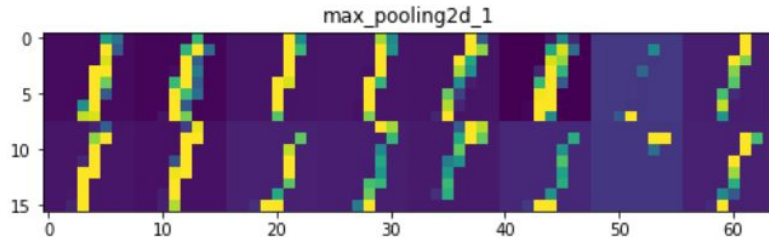
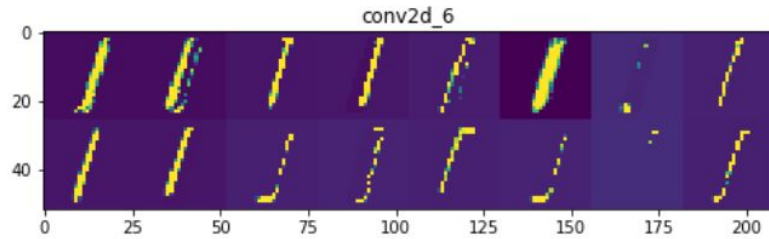
¡A visualizar!



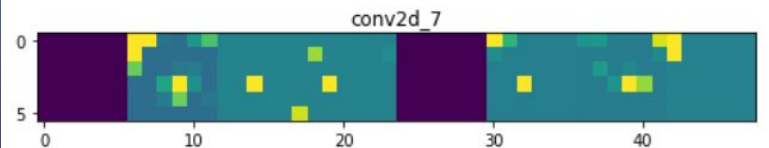
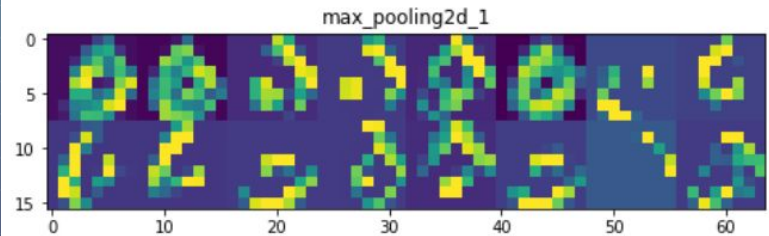
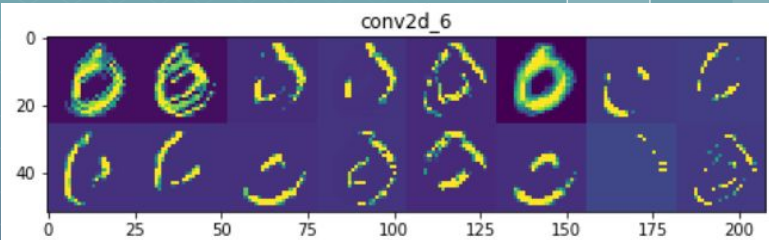
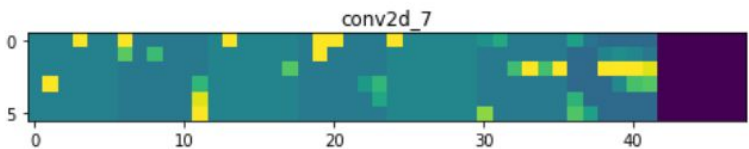
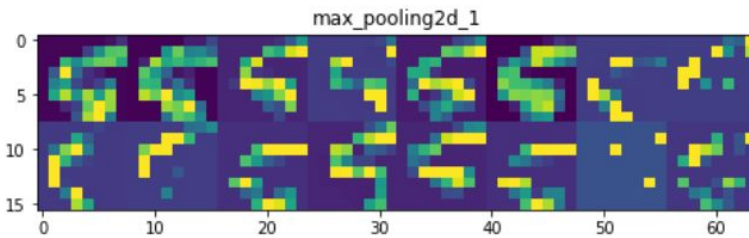
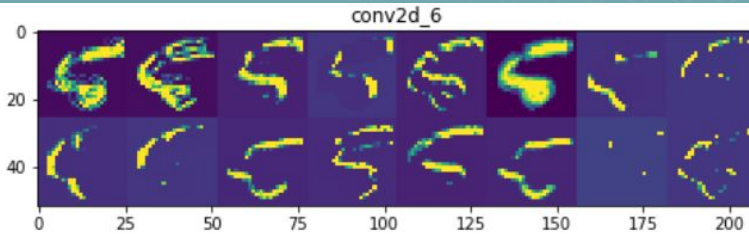
Ejemplo MNIST



Ejemplo MNIST



Ejemplo MNIST



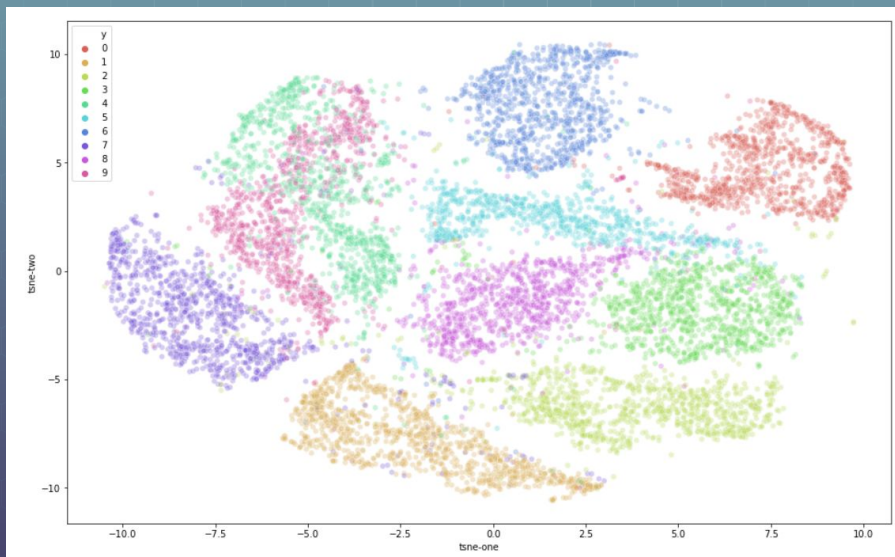
Ejemplo MNIST

Filtros aprendidos:



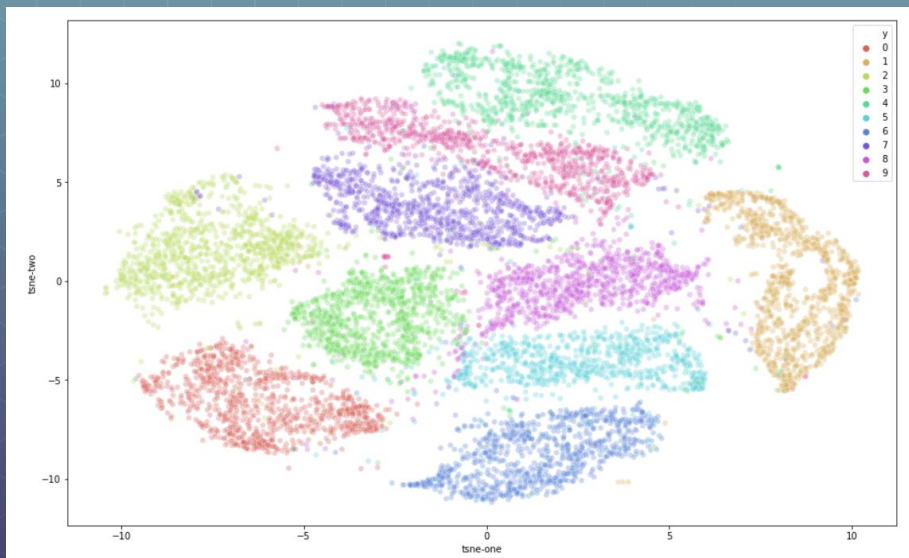
Ejemplo MNIST

Visualización TSNE de los datos:



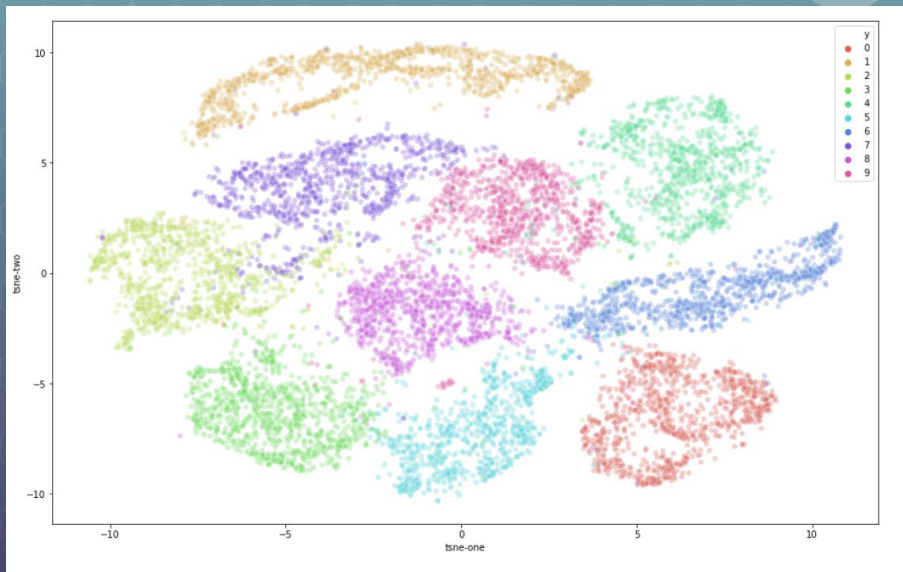
Ejemplo MNIST

Visualización TSNE de la primera
capa convolucional:

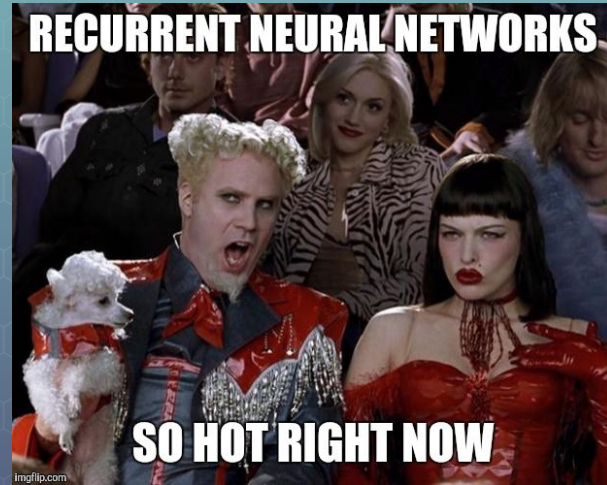


Ejemplo MNIST

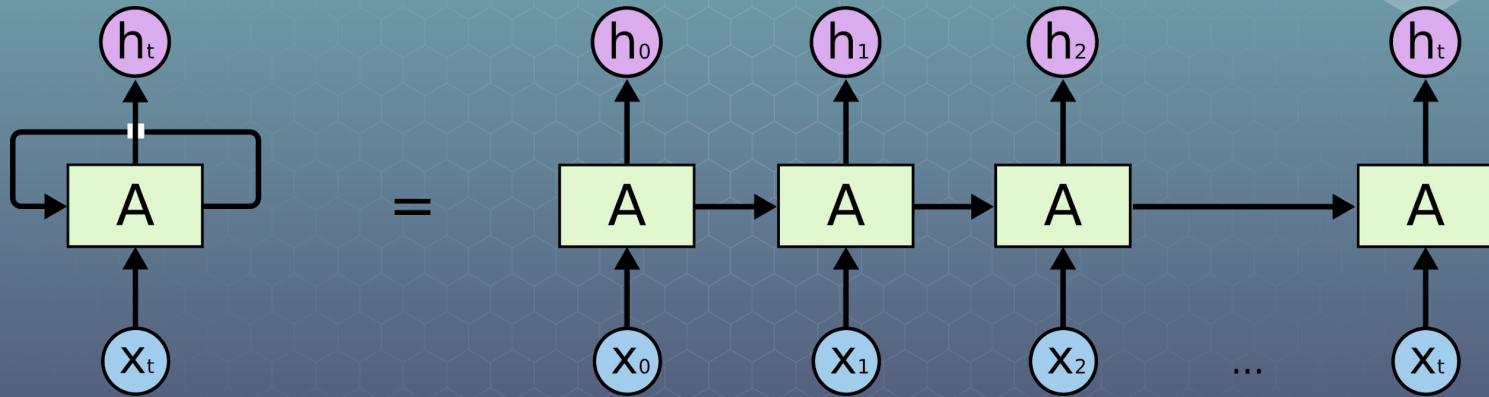
Visualización TSNE de la segunda capa:



Redes Neuronales Recurrentes

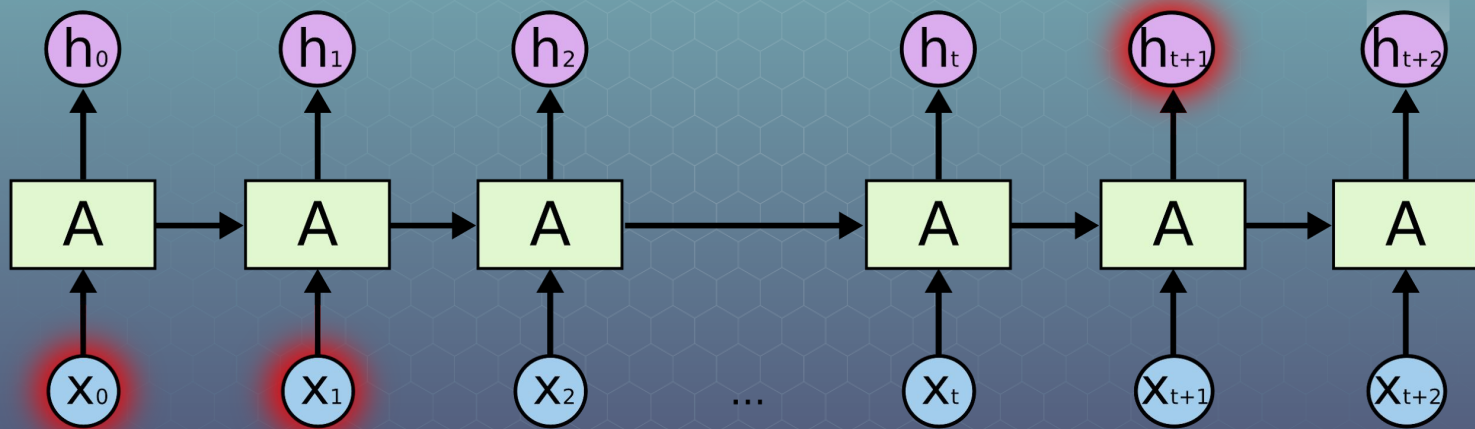


¿Qué son?



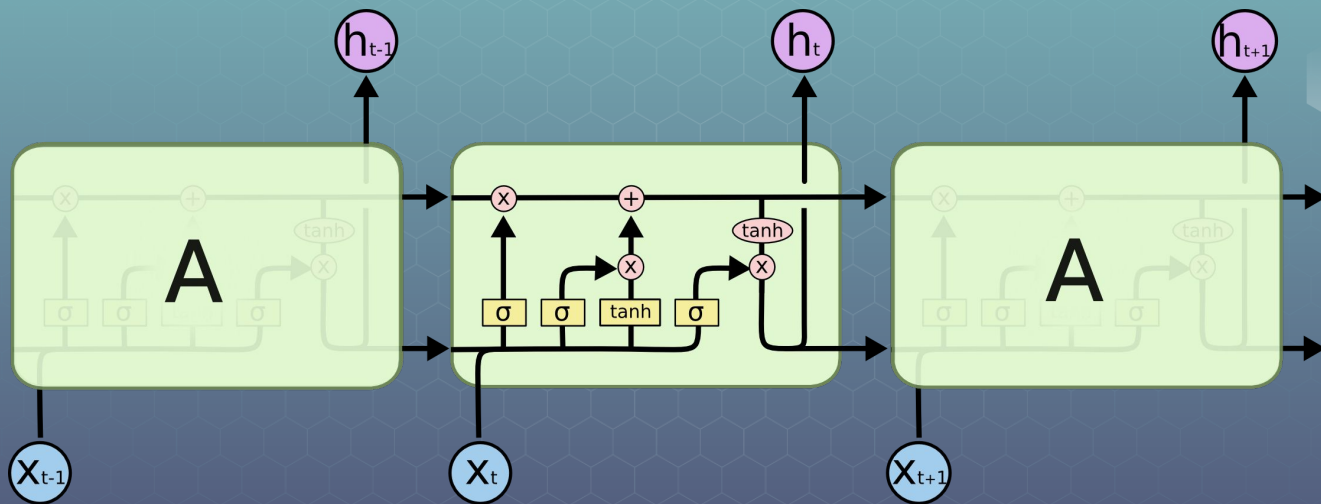
Graphics by Christopher Olah from his article: [Understanding LSTM Networks](#)

¿Problema inicial?



Graphics by Christopher Olah from his article: [Understanding LSTM Networks](#)

LSTM!



Graphics by Christopher Olah from his article: [Understanding LSTM Networks](#)

¡A visualizar!



5 Jan 2016

**Encoder
Network**

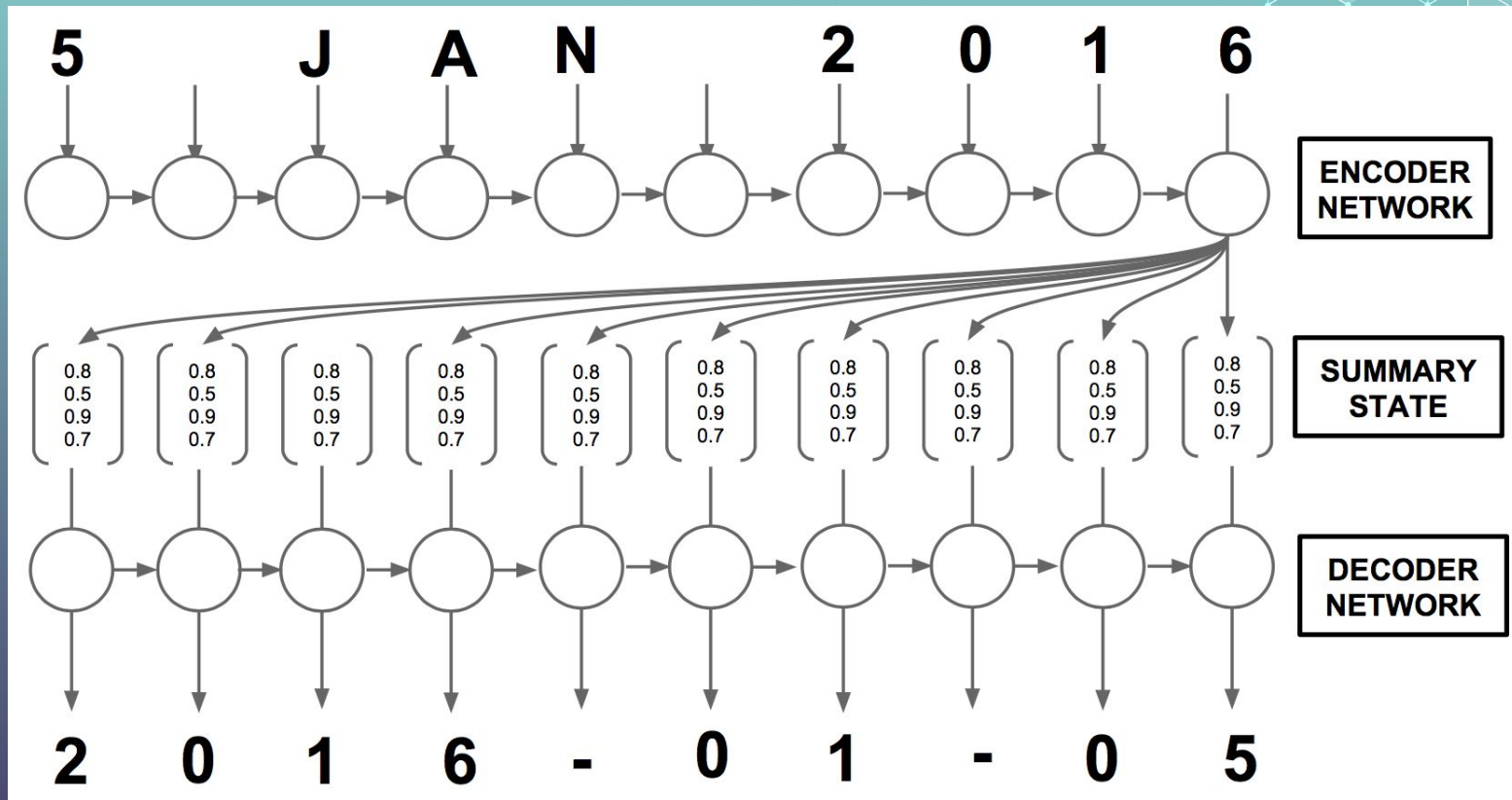
Encoded Date

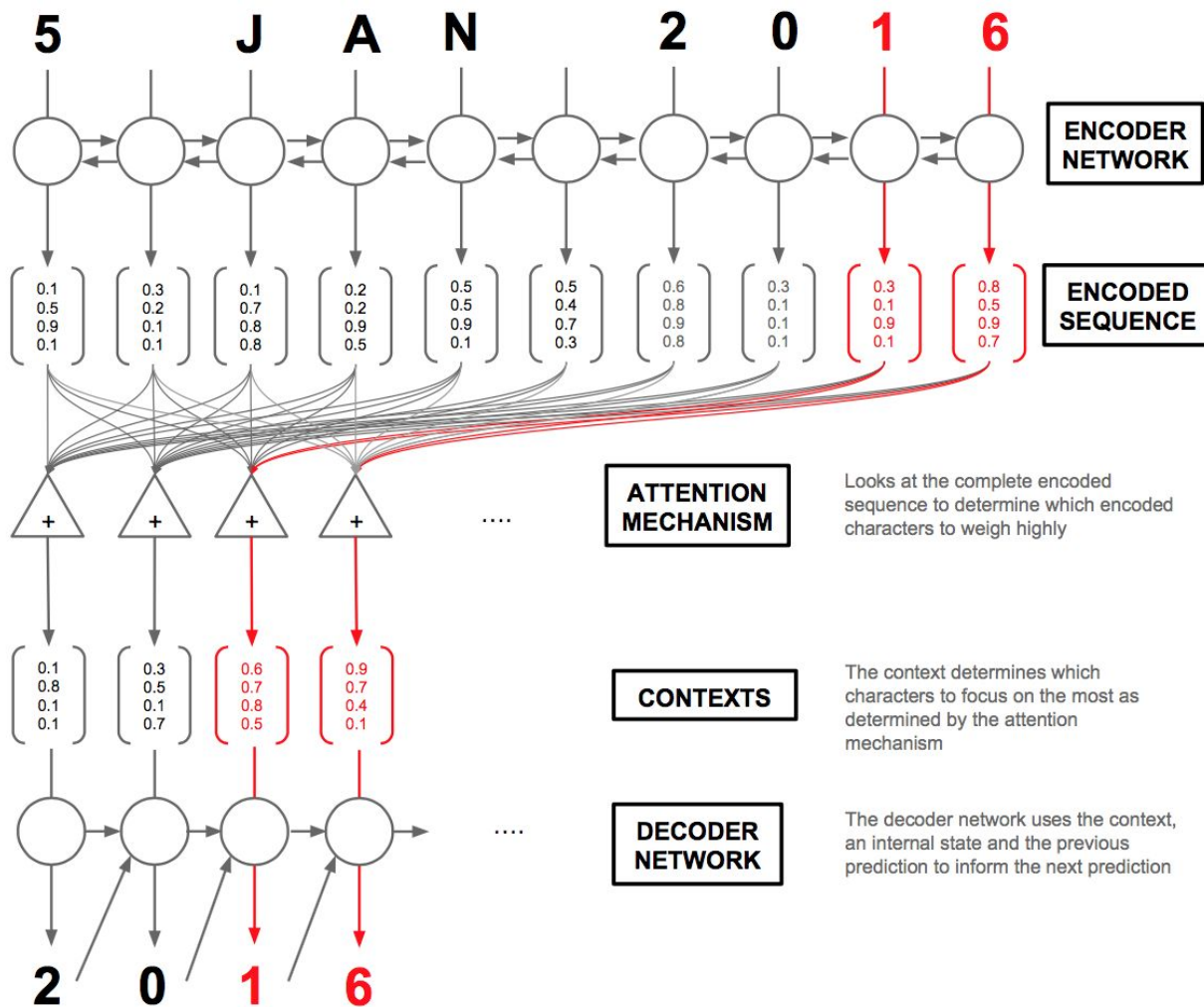
0.1	0.1	0.8	0.1	0.4	0.9	0.4	0.1	0.9	0.8
0.5	0.3	0.5	0.2	0.5	0.2	0.5	0.2	0.2	0.5
0.9	0.9	0.1	0.2	0.9	0.2	0.9	0.2	0.2	0.1
0.1	0.3	0.3	0.2	0.6	0.1	0.6	0.2	0.1	0.3

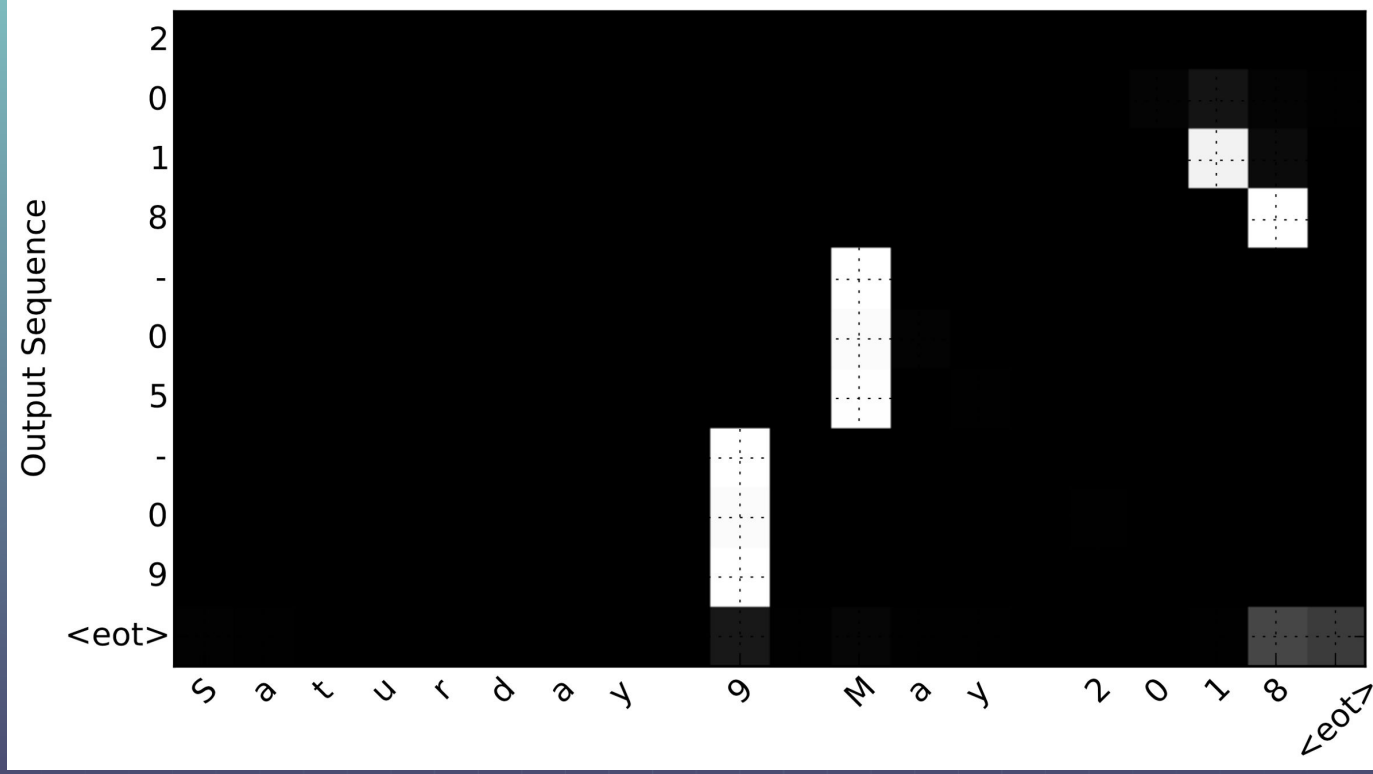
**Decoder
Network**

2016-01-05









Conclusiones



Keras

Keras es una herramienta poderosísima que nos permite implementar de forma rápida y sencilla pruebas de concepto que transforman ideas en resultados.



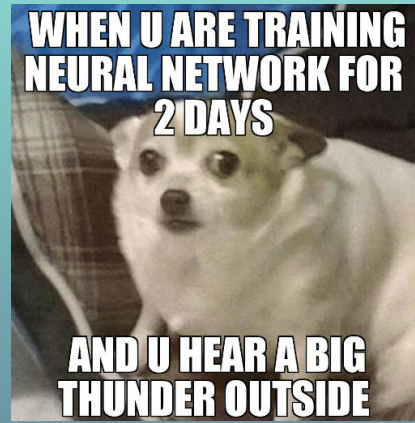
Keras

**Fun isn't something one considers when optimising a neural network.
But this... does put a smile on my face.**



Redes Neuronales

Por favor, aprendamos que hay detrás de ellas antes de usarlas para todo. Esto reducirá riesgos innecesarios y producirá avances interesantes.



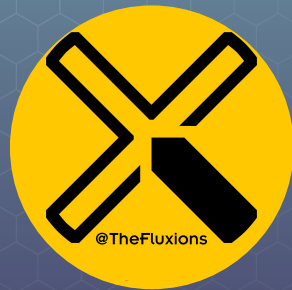
¡Gracias por su atención!



Enlaces y demases

- [Visualizations of Recurrent Neural Networks](#)
- [How to Visualize Your Recurrent Neural Network with Attention in Keras](#)
- [Understanding LSTM Networks](#)
- [Visualizing intermediate activation in Convolutional Neural Networks with Keras](#)

¿Os interesa el tema?
¡Tenemos un podcast!



@TheFluxions

<https://github.com/wizmik12/en-las-tripas-de-keras>