15 DECEMBER 2018

GLOBAL AI&MR BOOTCAMP

MADRID 2018

NEW INTELLIGENT WORLDS

Super-Resolución con GAN's

Daniela Solis
Rodrigo Cabello

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TOKIOTA

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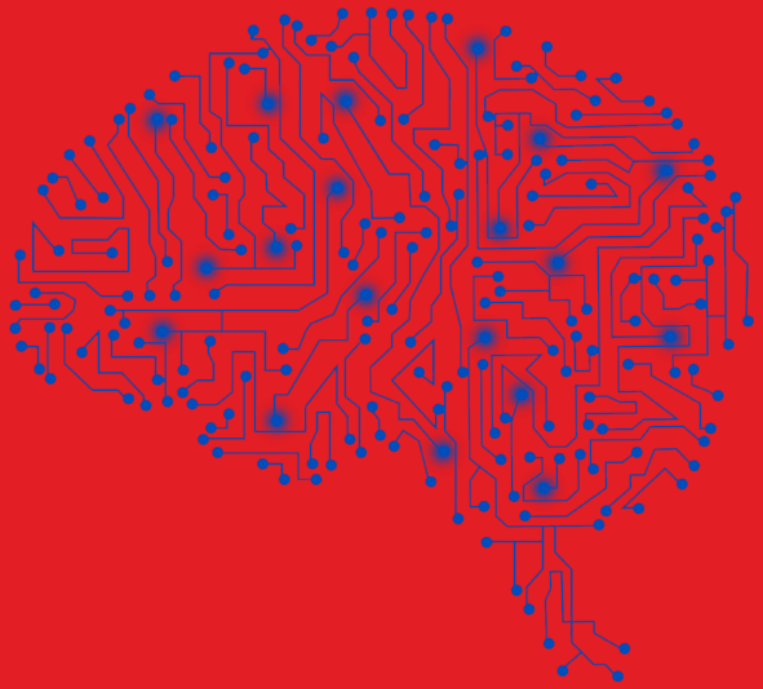
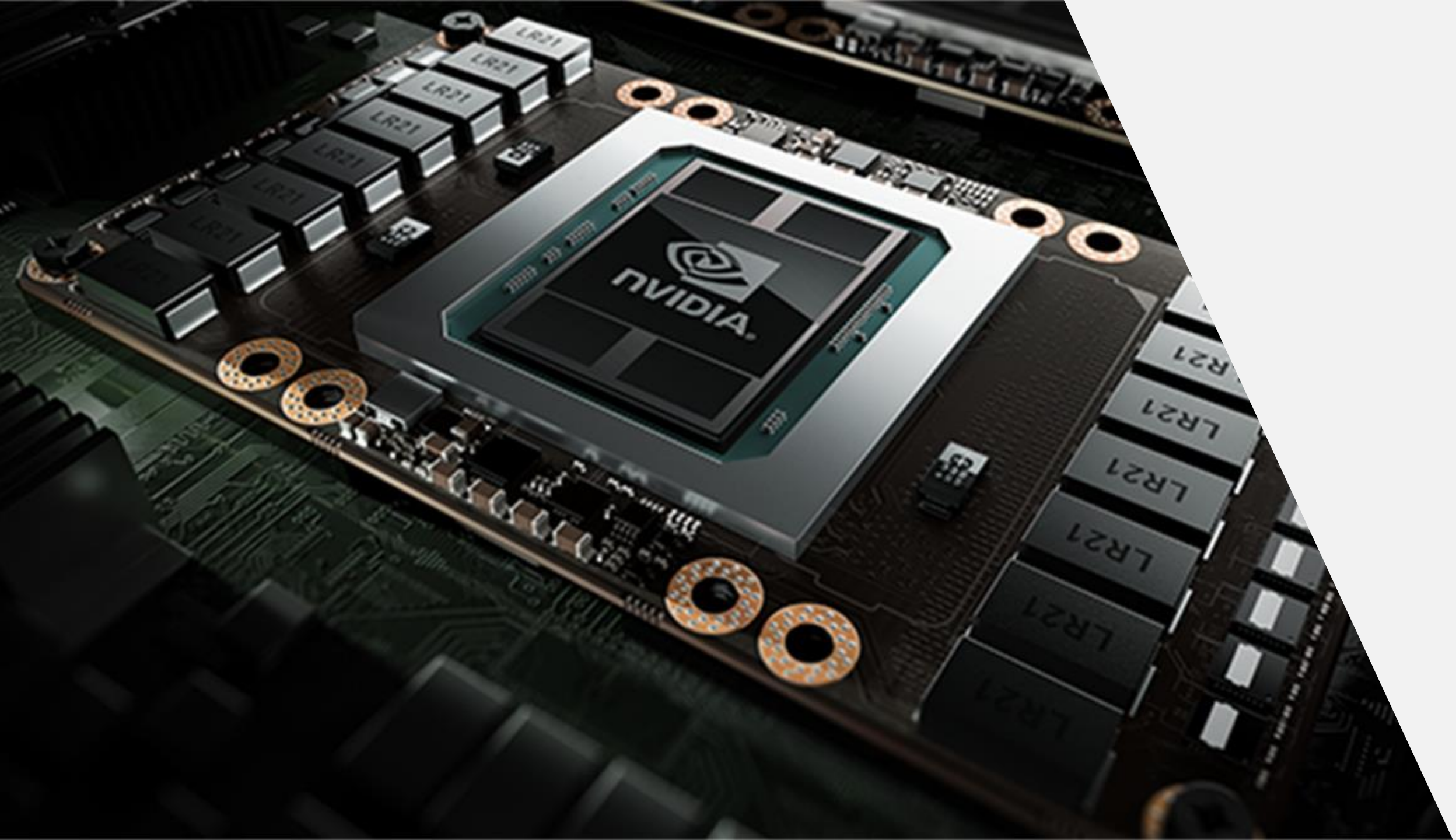
Deep Learning




NVIDIA

Imagen

- Clasificación de Imágenes
- Detección de Objetos
- Generación Sintética de Imágenes
- Super-resolución

Sonido

- Detección de Fraude
- Corrección de Defectos
- Suplantación de Estilo

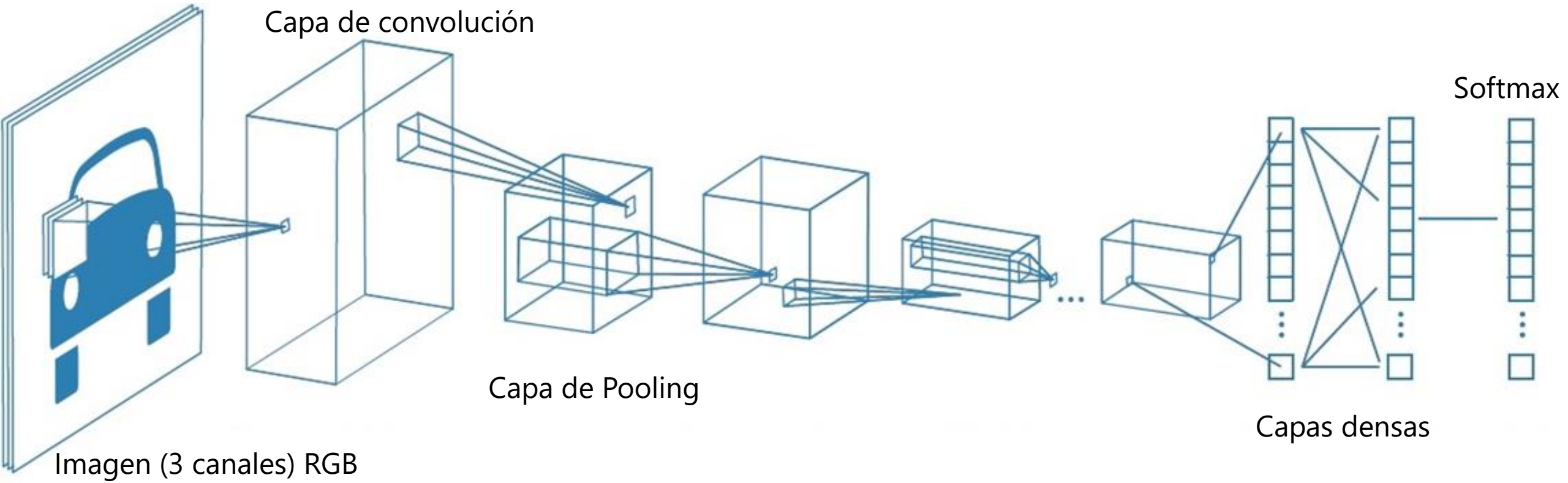
Texto

- Extracción de Conocimiento
- Análisis de Sentimiento
- Transferencia de Estilo

Señal

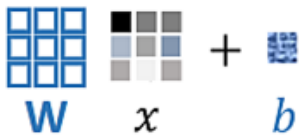
- Series Temporales

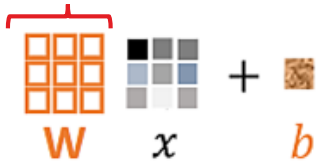
Deep Learning



Deep Learning

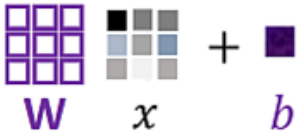
Tamaño filtro





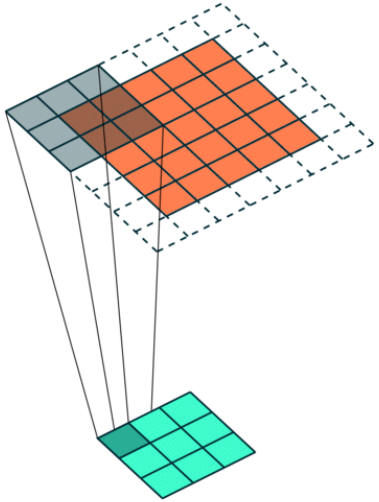
Número de filtros

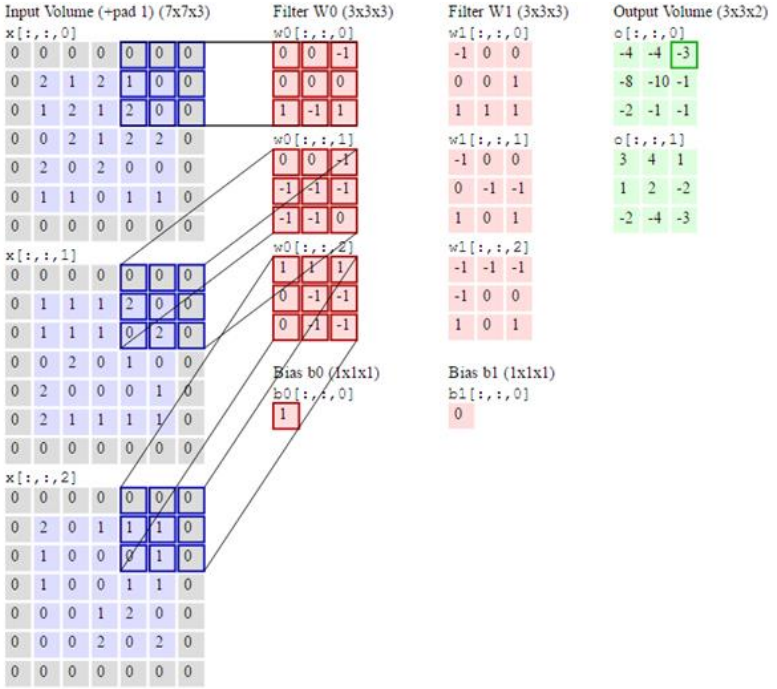
• • •



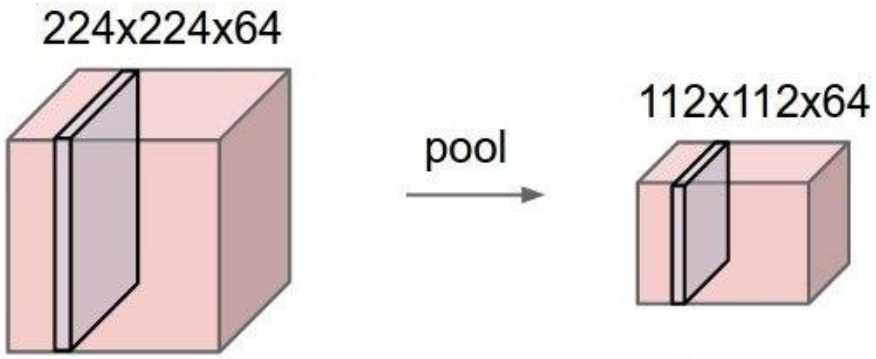
Strides (2,2)

Pad = True

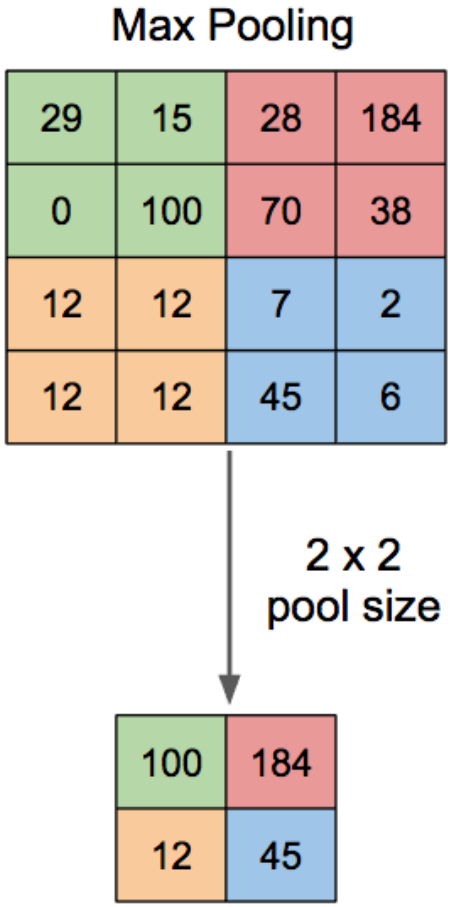


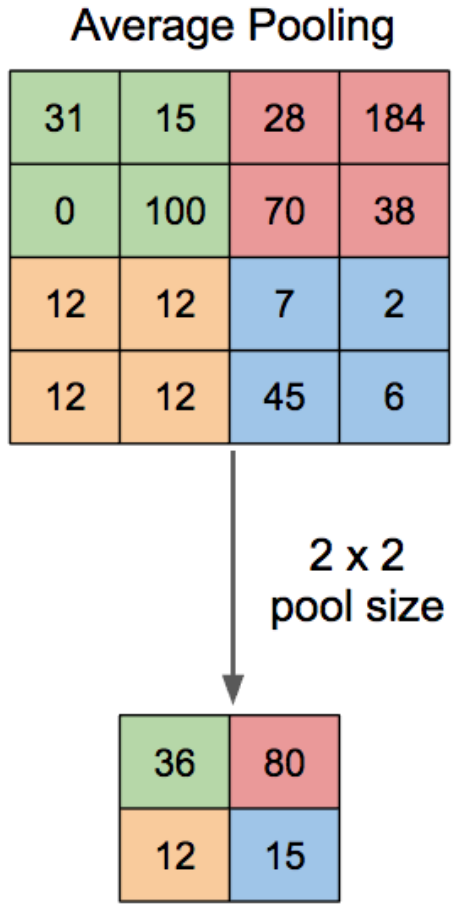


Deep Learning



- Evitar over-fitting
- Reducción de dimensionalidad (número de parámetros)

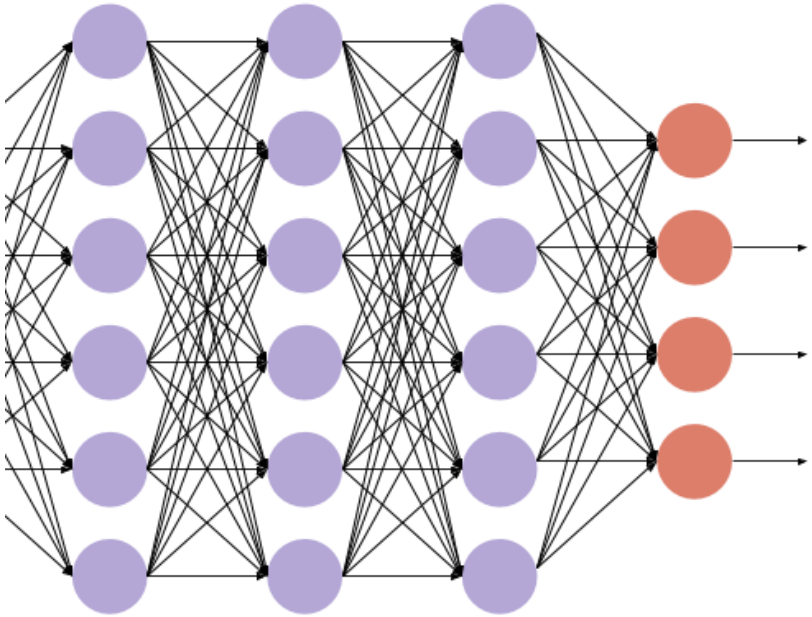




Deep Learning

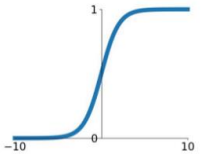
- Cada nodo se conecta con todos los nodos de la siguiente capa
- Se pueden definir distintas funciones de activación.

$$z = Wx + b$$



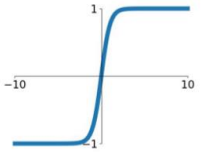
Sigmoid

$\sigma(x) = \frac{1}{1+e^{-x}}$



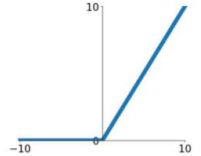
tanh

$\tanh(x)$



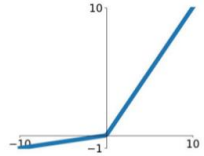
ReLU

$\max(0, x)$



Leaky ReLU

$\max(0.1x, x)$

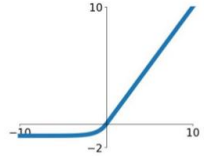


Maxout

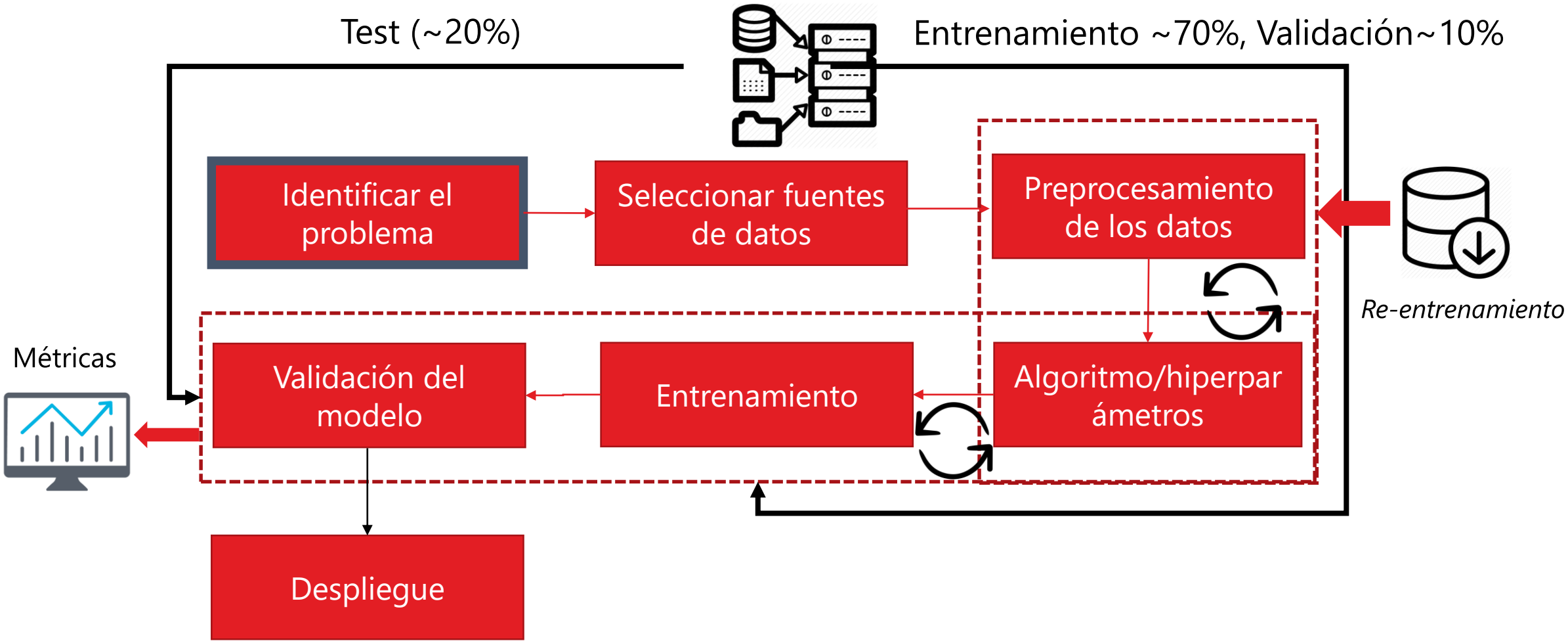
$\max(w_1^T x + b_1, w_2^T x + b_2)$

ELU

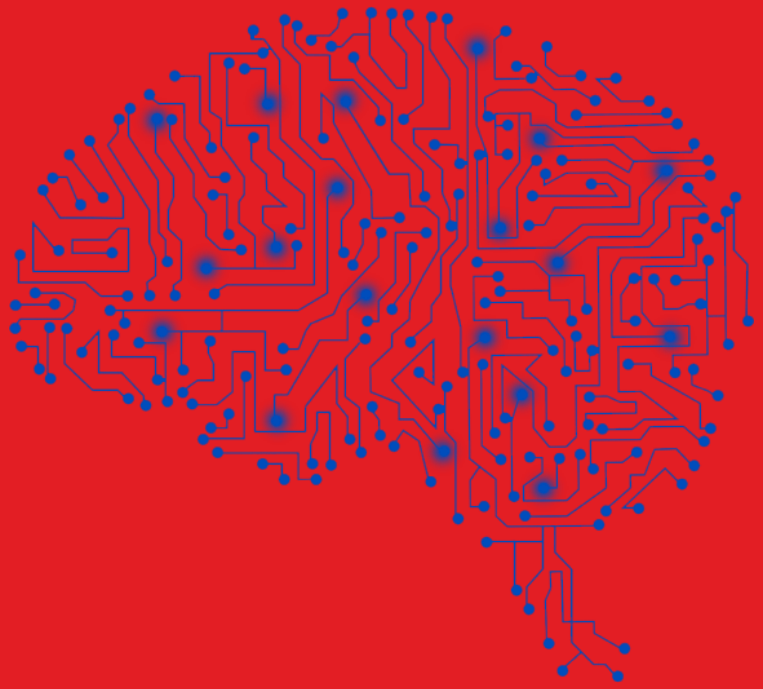
$$\begin{cases} x & x \geq 0 \\ \alpha(e^x - 1) & x < 0 \end{cases}$$



Machine Learning Workflow



Super-Resolución



Super-Resolución de Imágenes

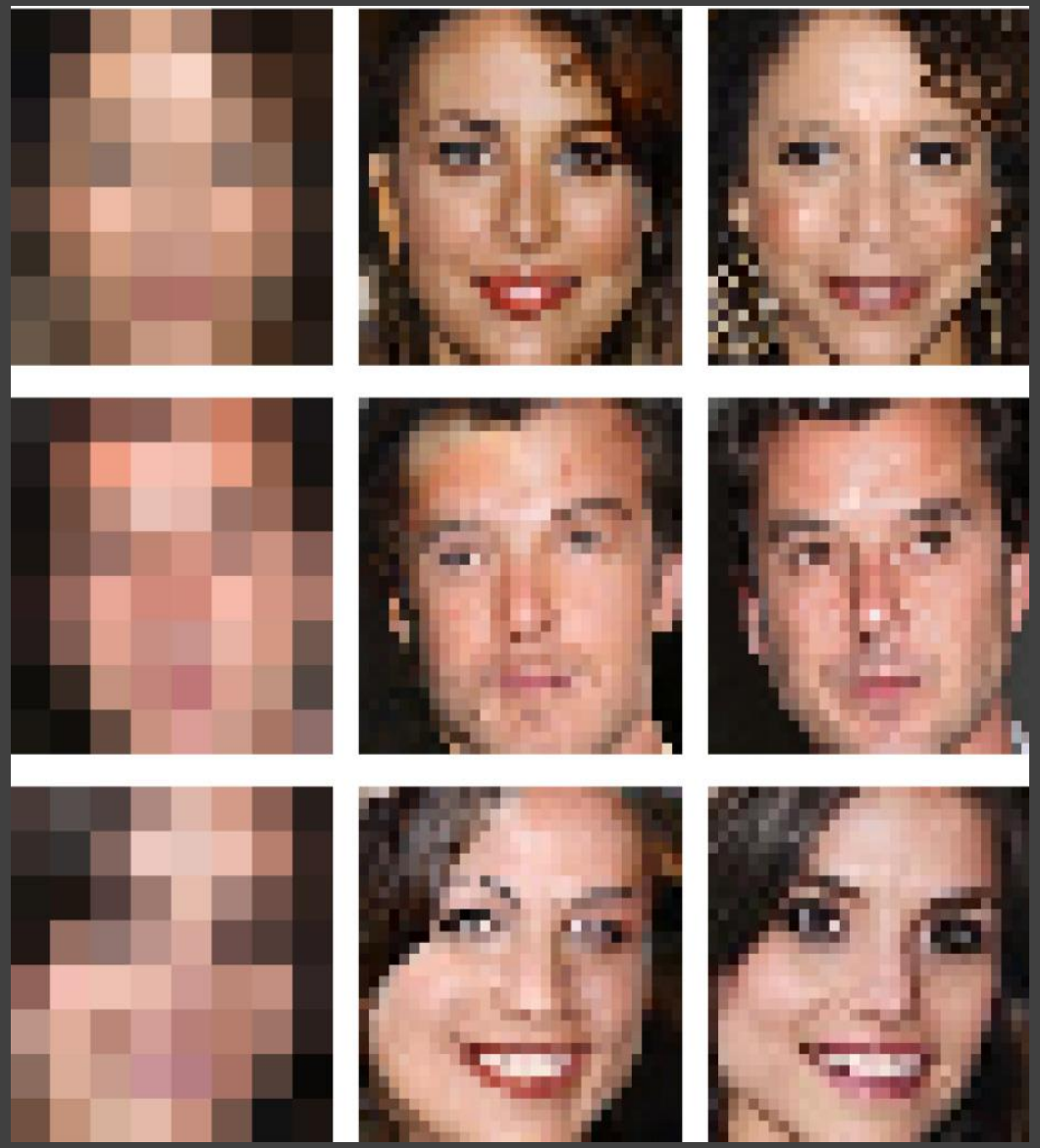
- Incrementar el tamaño de las imágenes intentando que la calidad disminuya lo menor posible.
- Restaurar imágenes de alta definición a partir de imágenes de baja resolución

Aplicaciones

Análisis de imágenes de satélite

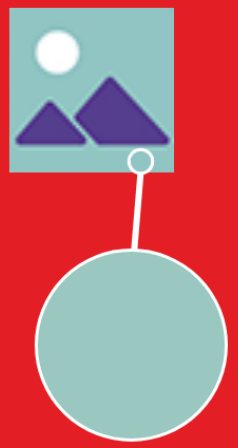
Procesamiento de imágenes medicas

Mejora de la compresión de imágenes/video

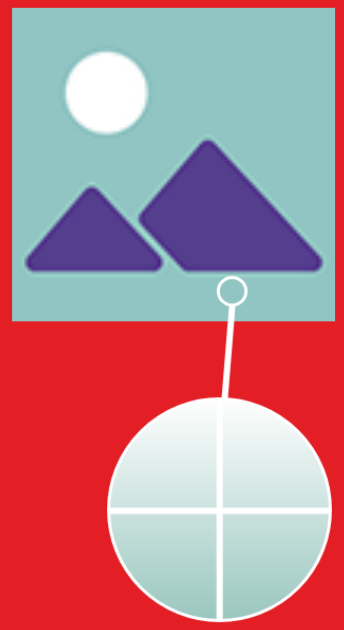


Más posibilidades que átomos en el universo

1x

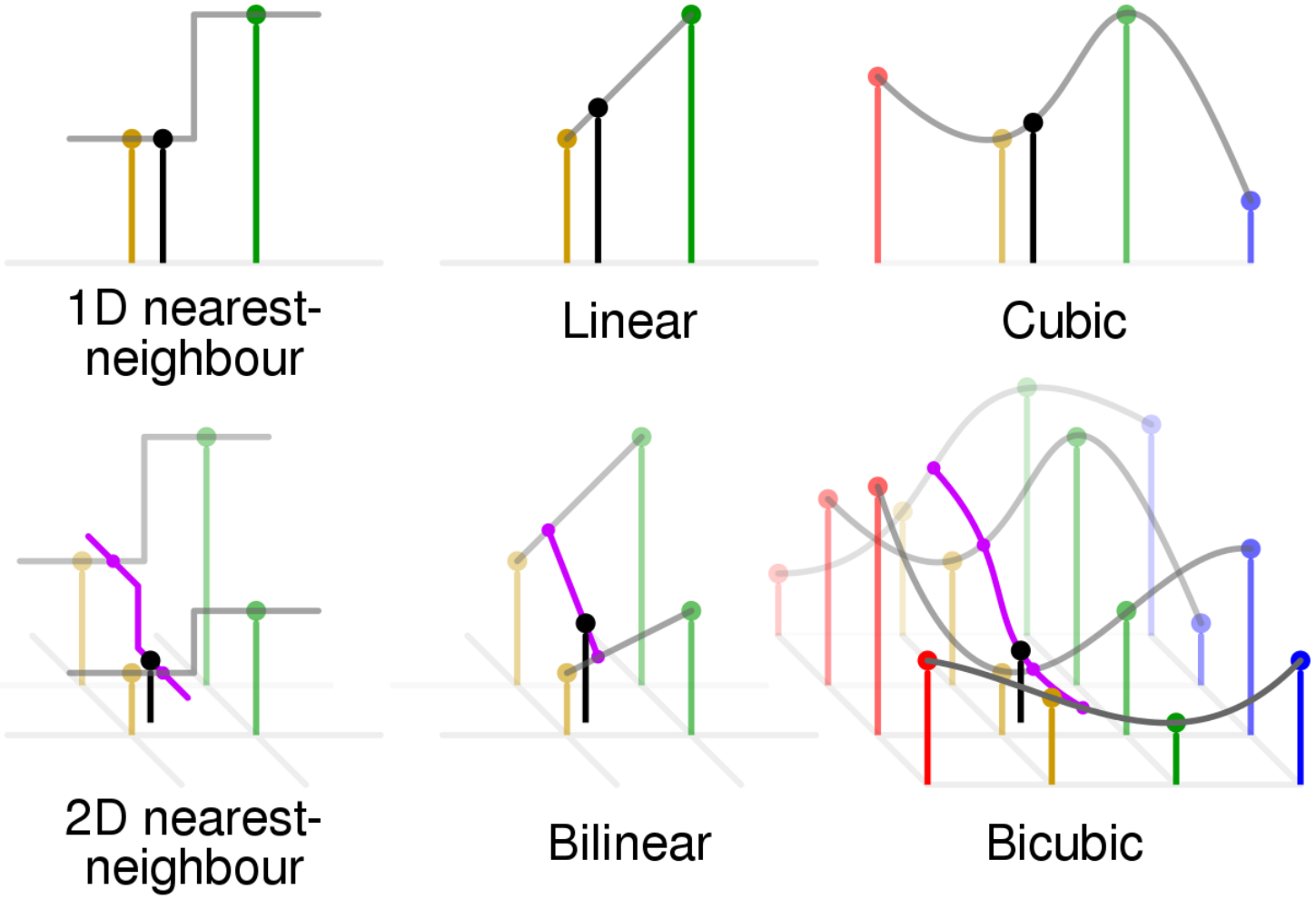


2x



3x

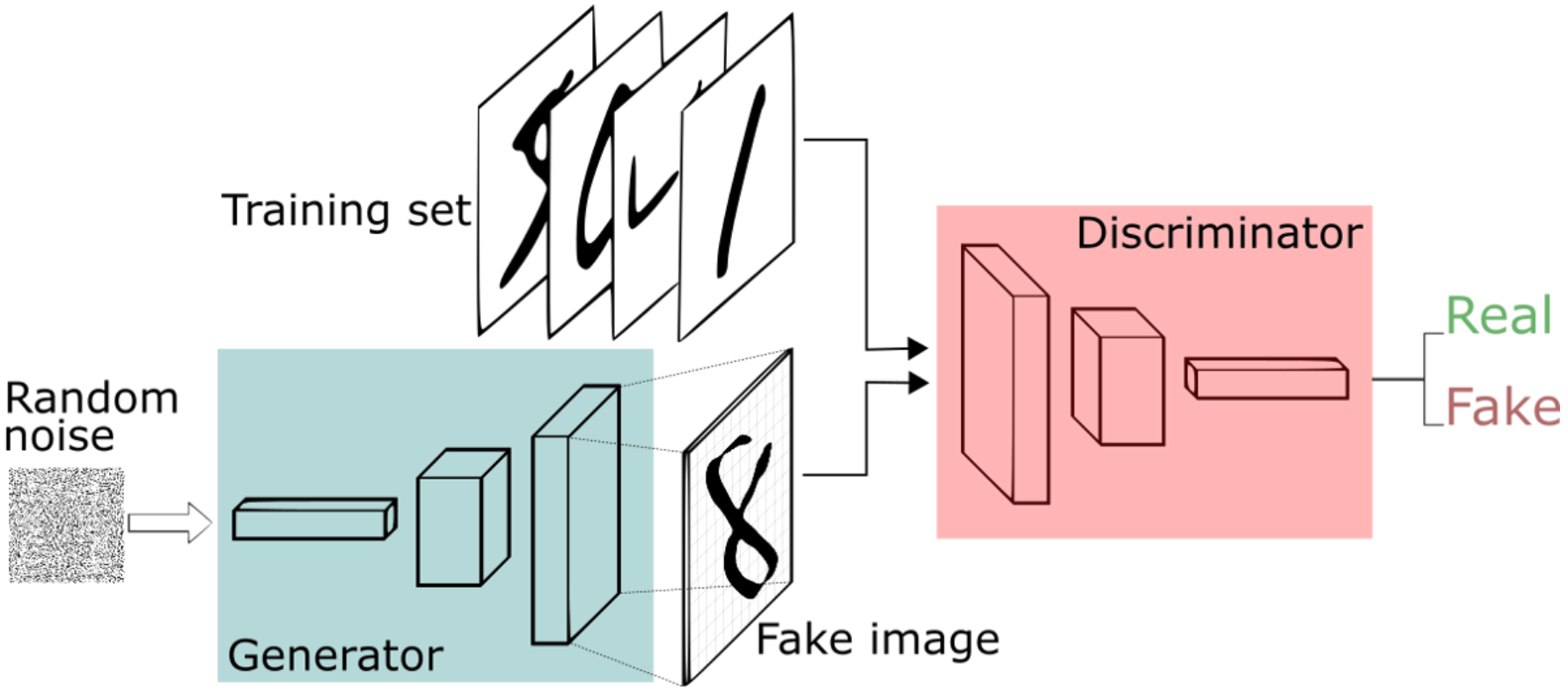
Soluciones Previas: Interpolación



SRGAN—Super Resolution Generative Adversarial Network

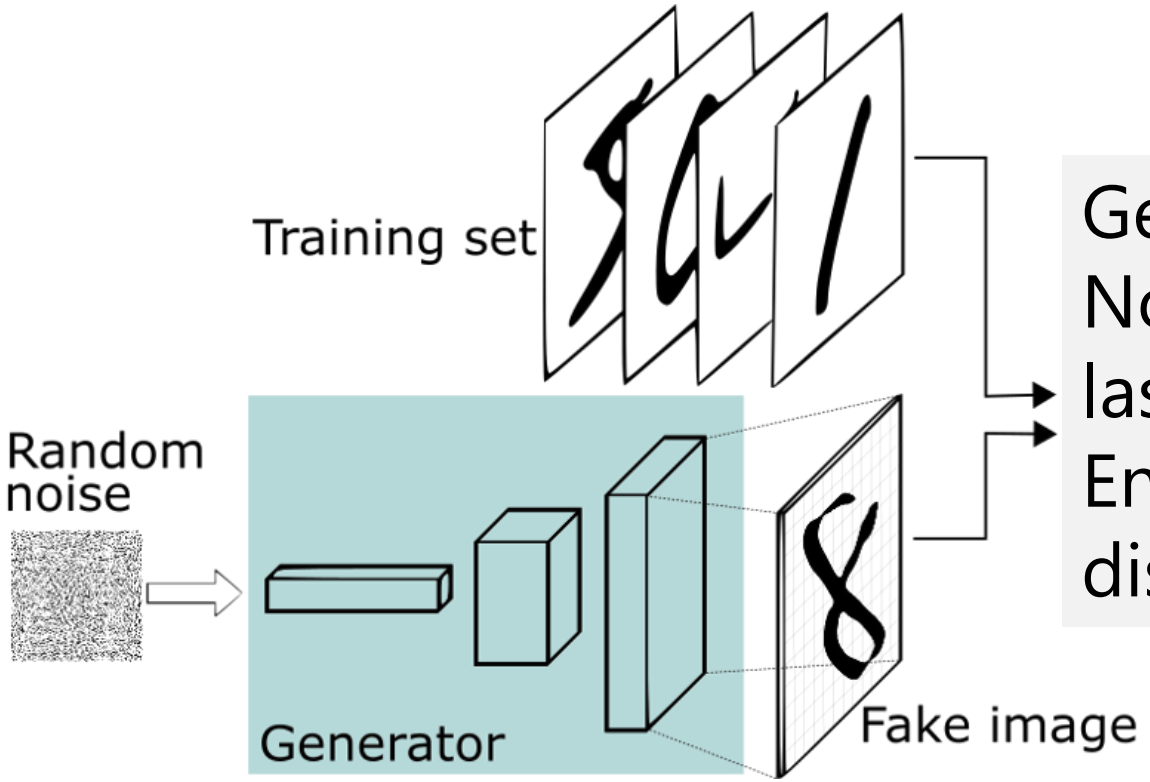
- Soluciones previas cómo la interpolación son fáciles de usar pero generan imágenes borrosas.
- A diferencia de otros modelos, SRGAN genera imágenes con "textura".
- Es capaz de generar imágenes que no solo se enfocan en que la imagen no esté distorsionada sino también en generar detalles de alta frecuencia.

SRGAN—Super Resolution Generative Adversarial Network



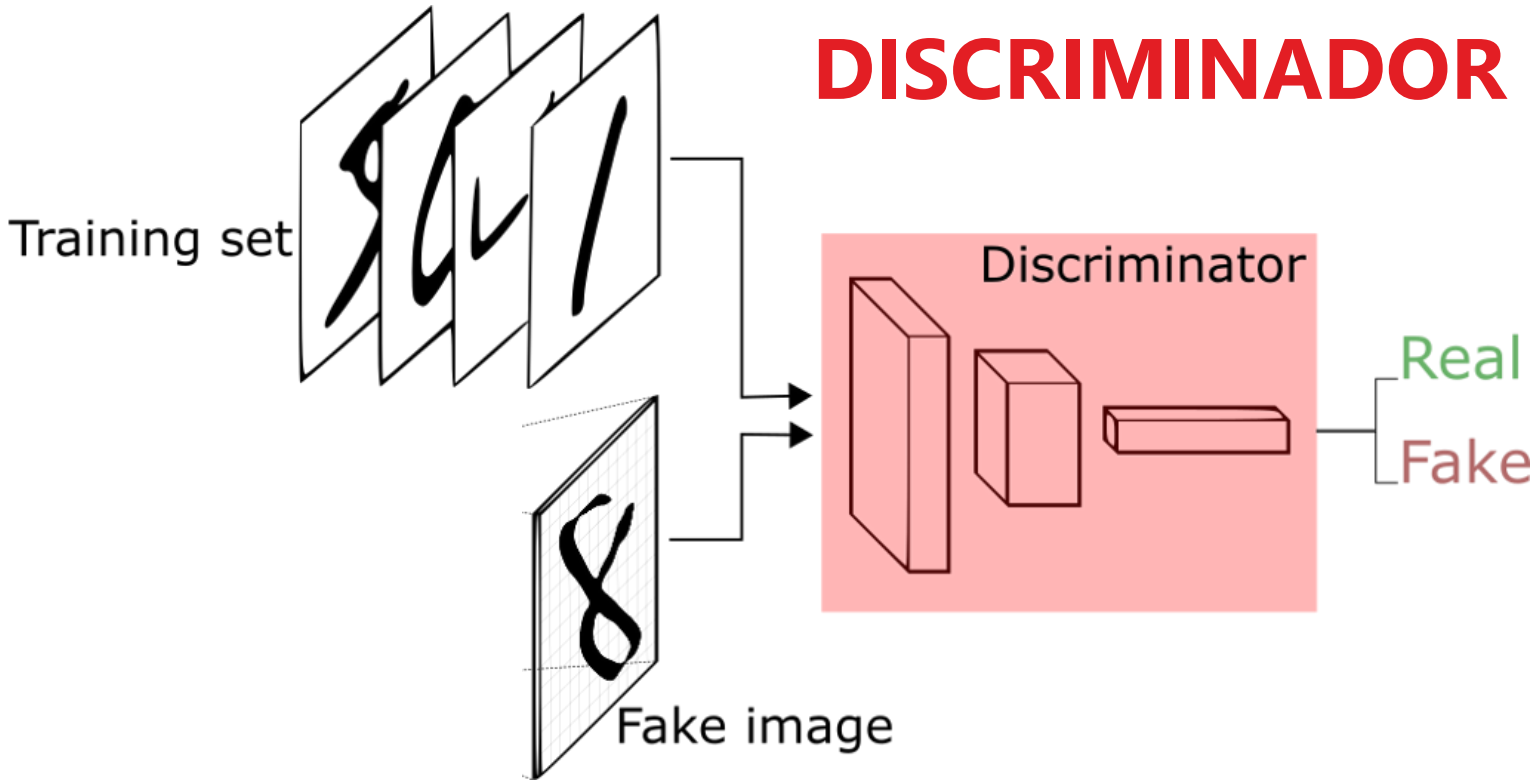
GAN—Generative Adversarial Network

GENERADOR

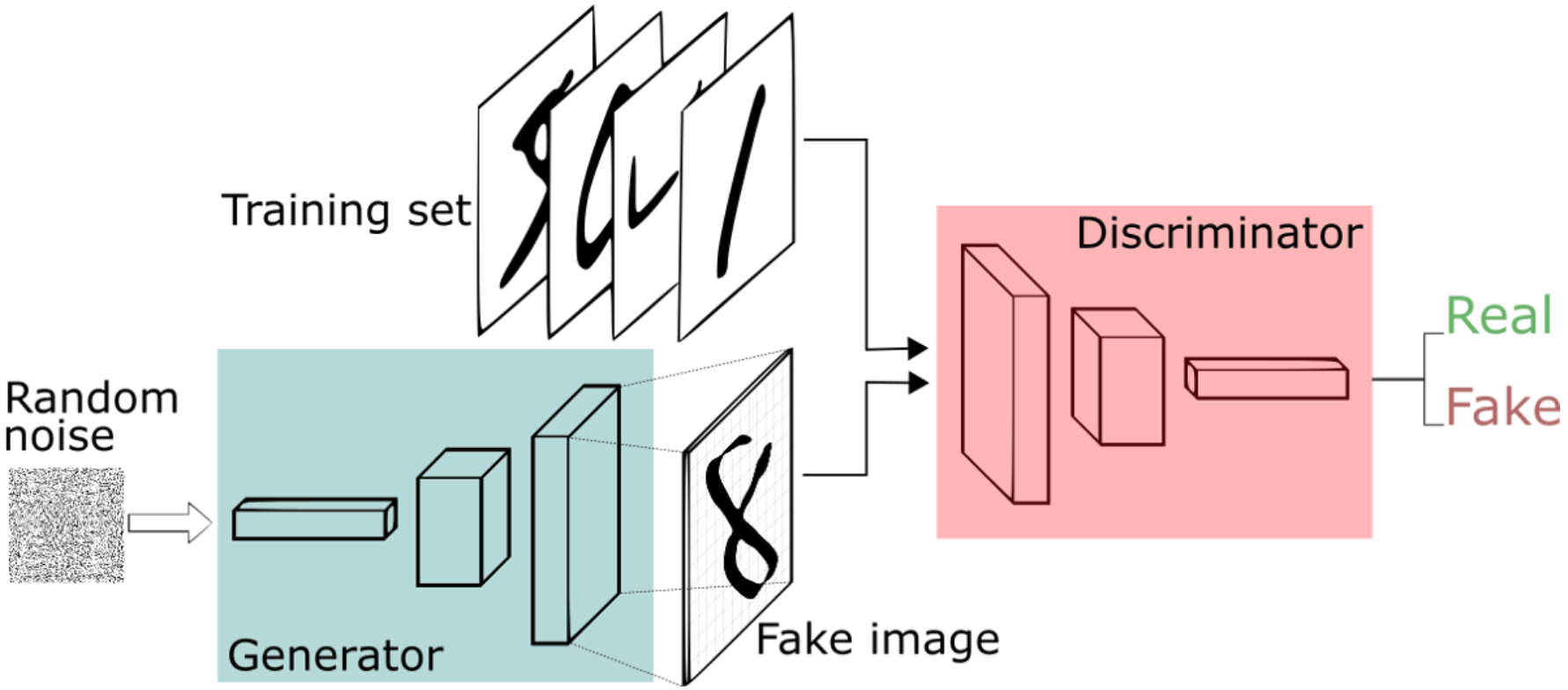


Generar datos desde cero
No tiene información de las clases.
Enfocado en modelar la distribución de los datos

GAN—Generative Adversarial Network

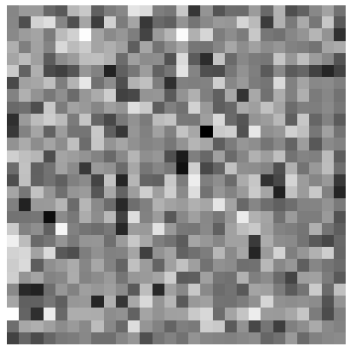
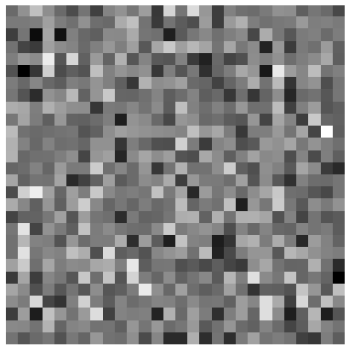
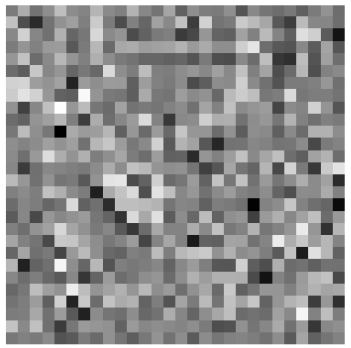
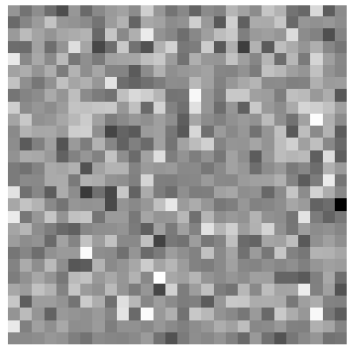


GAN— Generative Adversarial Network

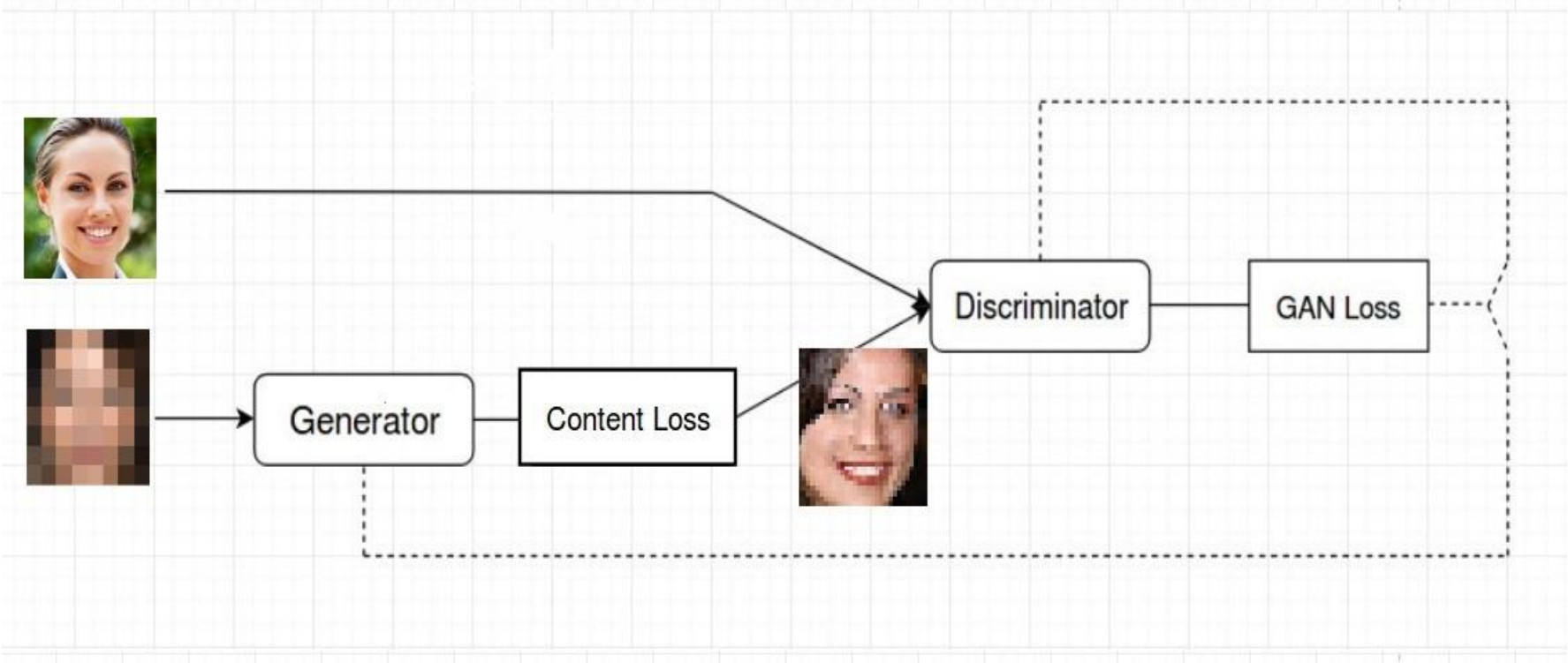


GAN— Generative Adversarial Network

Imágenes generadas a lo largo del entrenamiento de una GAN

SRGAN—Super Resolution Generative Adversarial Network



Perceptual Loss

bicubic
(21.59dB/0.6423)

SRResNet
(23.53dB/0.7832)

SRGAN
(21.15dB/0.6868)

original

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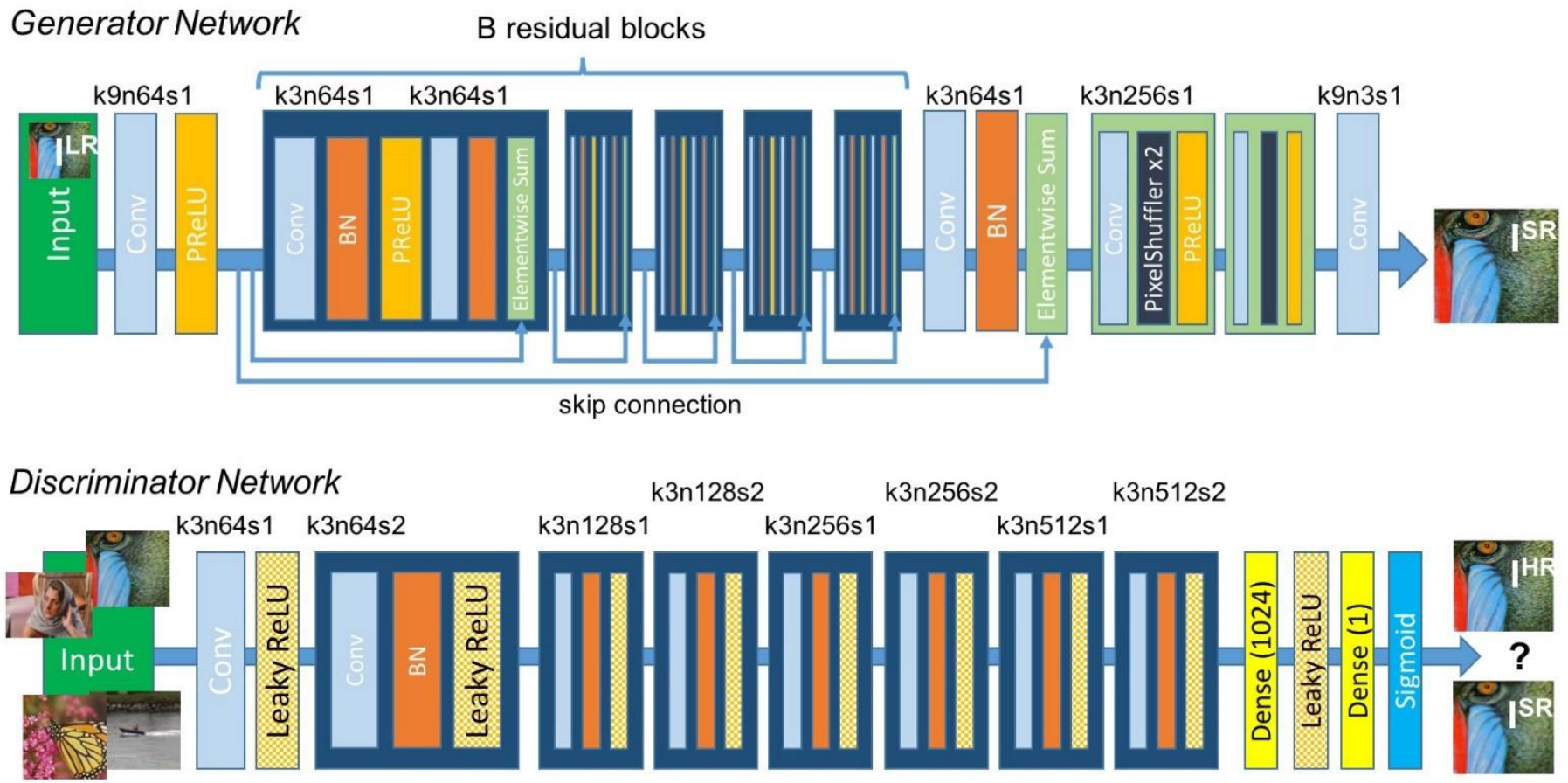
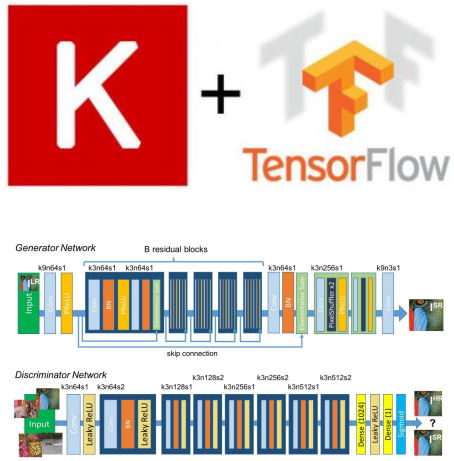
Demo!

Súper-Resolución con GAN's

SRGAN—Super Resolution Generative Adversarial Network



Implementación



Azure Machine Learning Service

NC6

Entrenamiento

Produccionalización

Microsoft Learn

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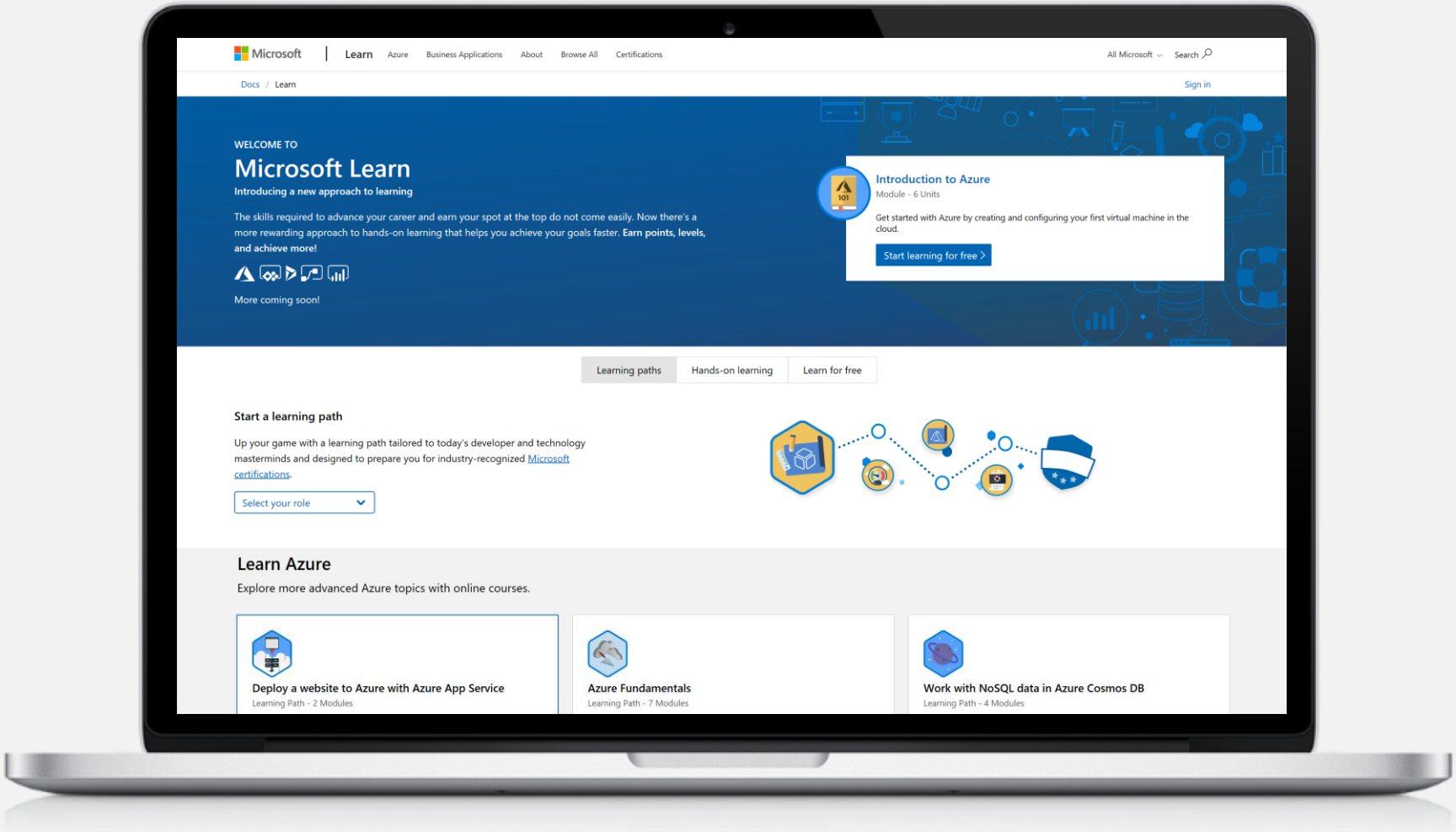

Scan the QR code below for AI Microsoft Learn resources

Docs.microsoft.com

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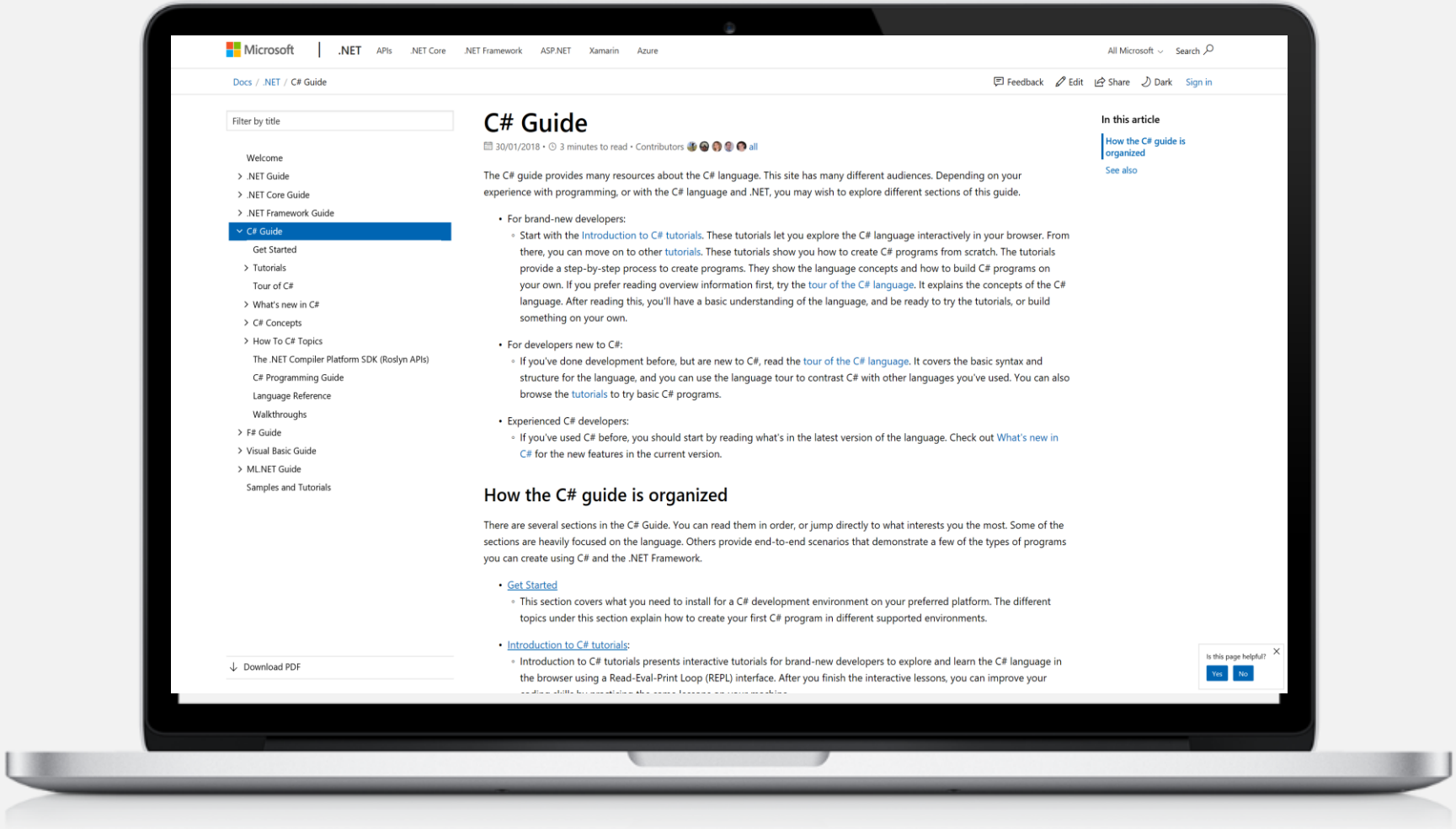

Scan the QR code below for AI documentation and examples

Thanks!

Please don’t forget to complete the survey!

Next up…

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