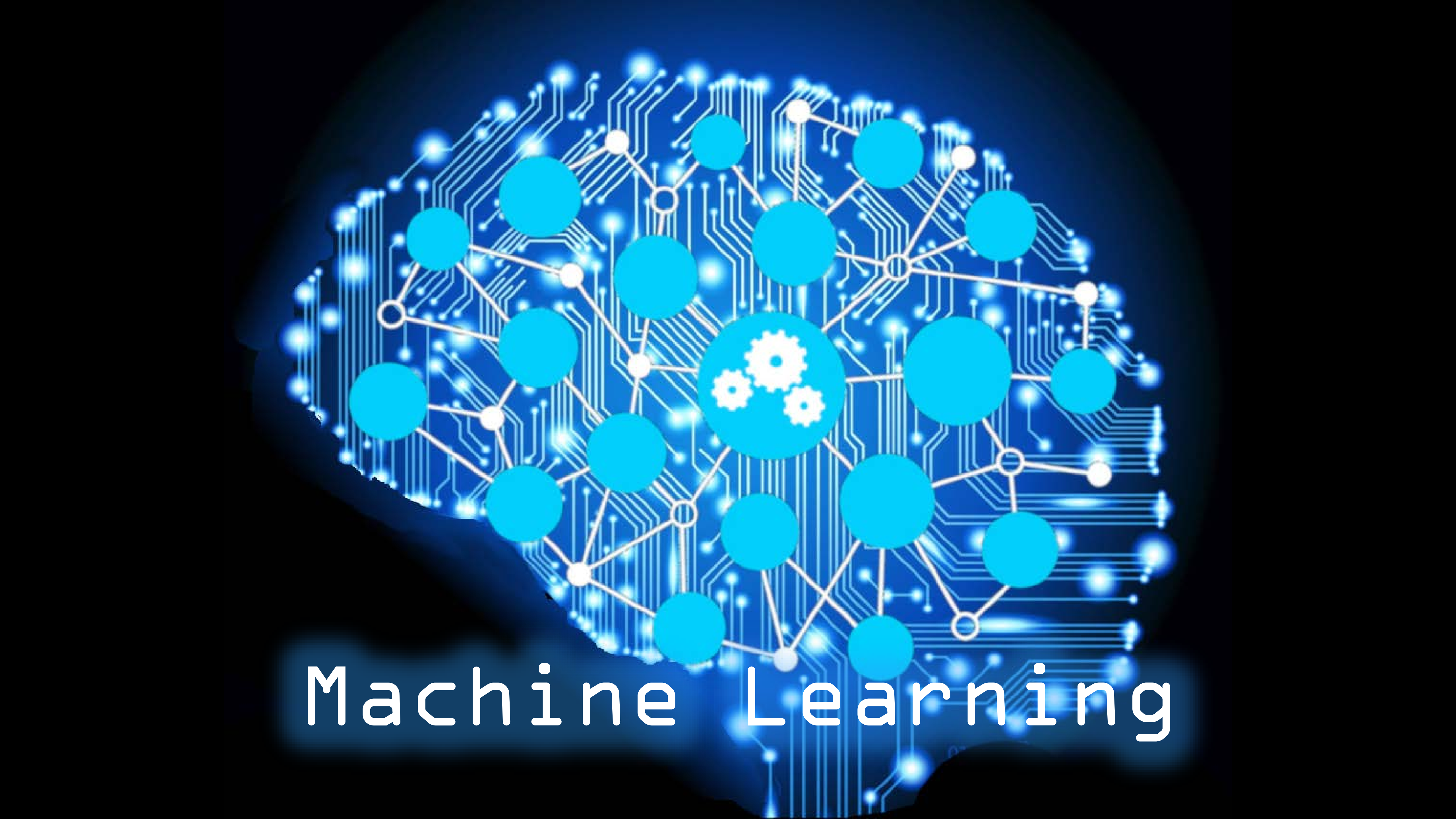
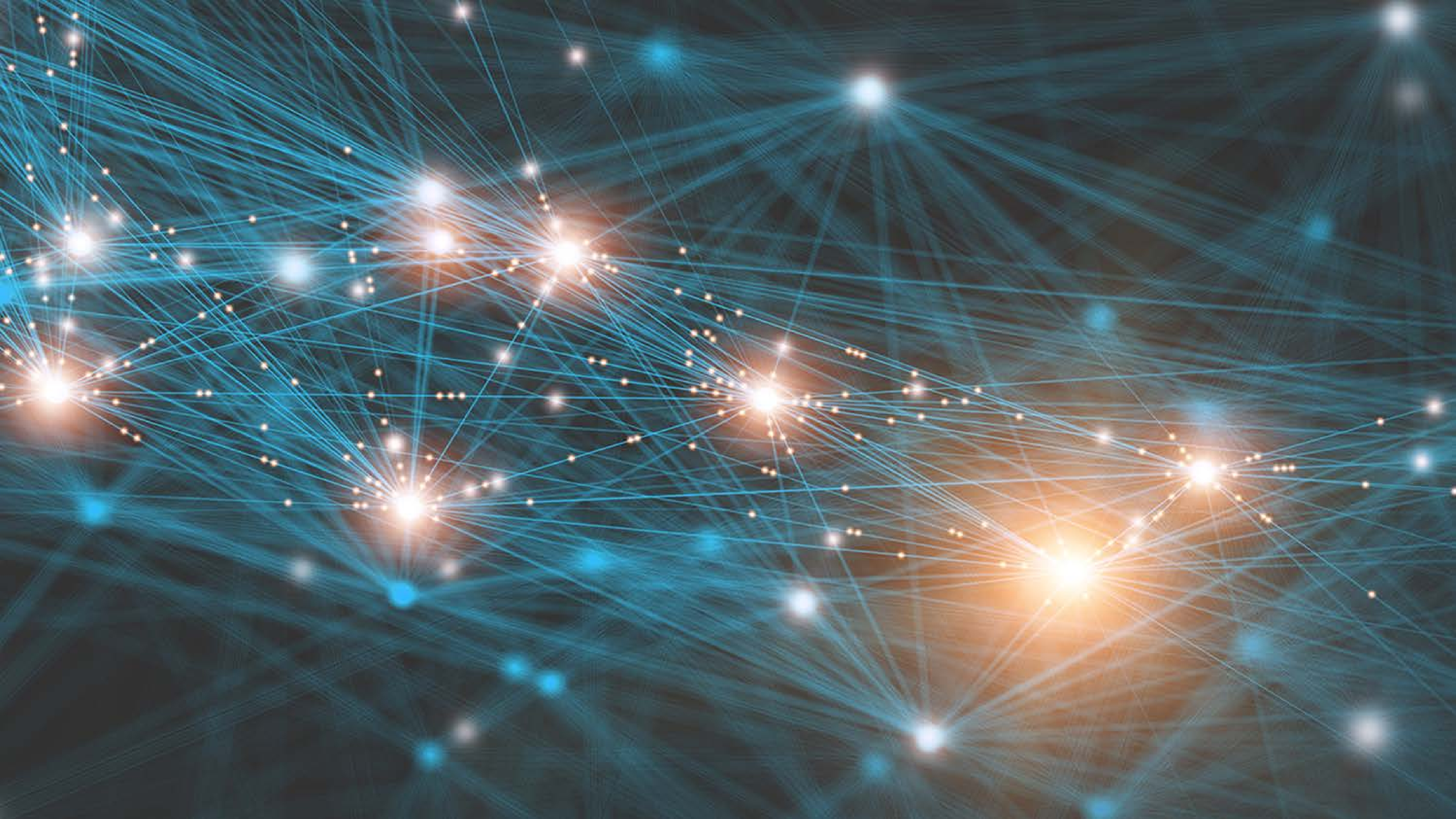
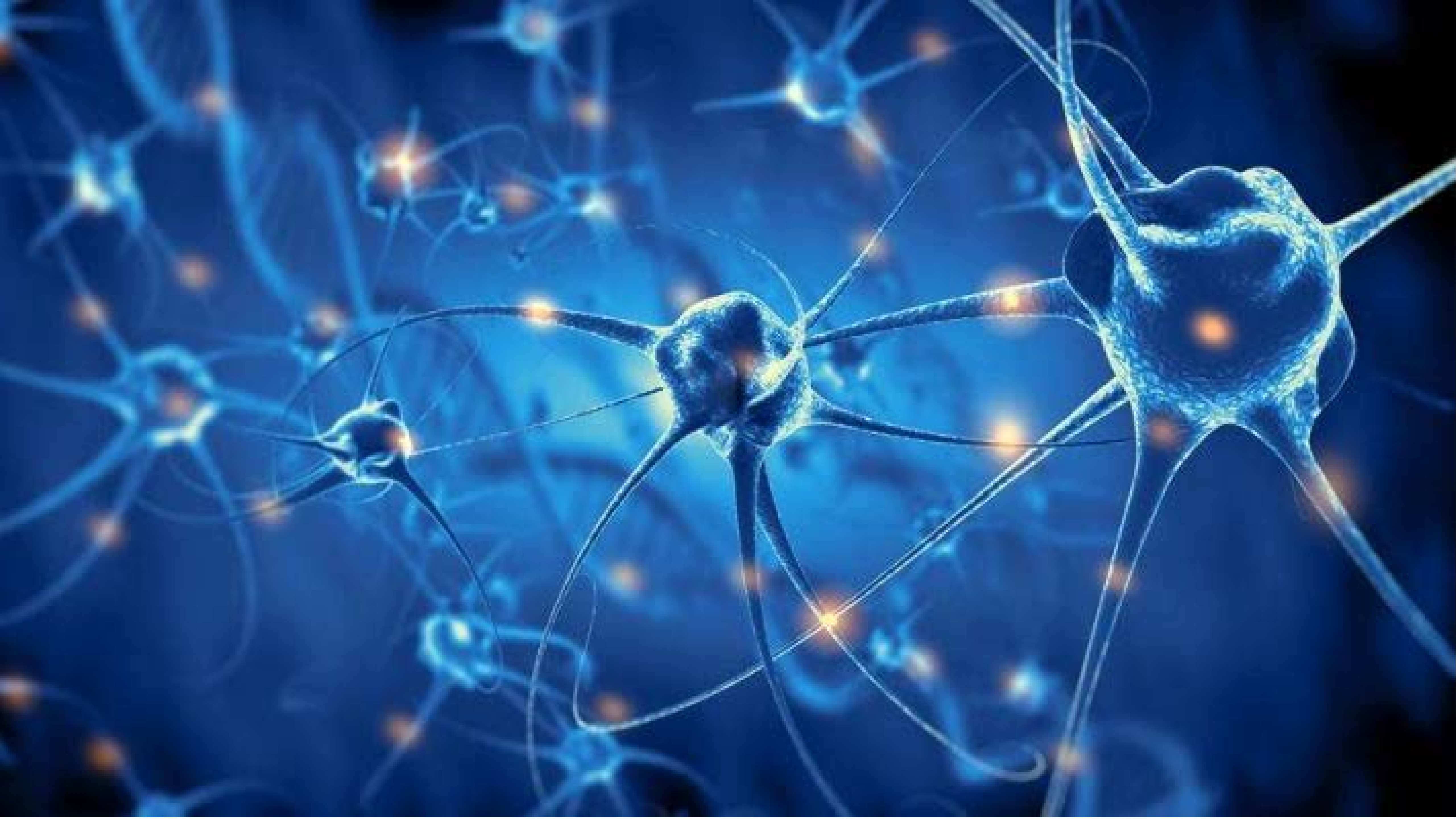
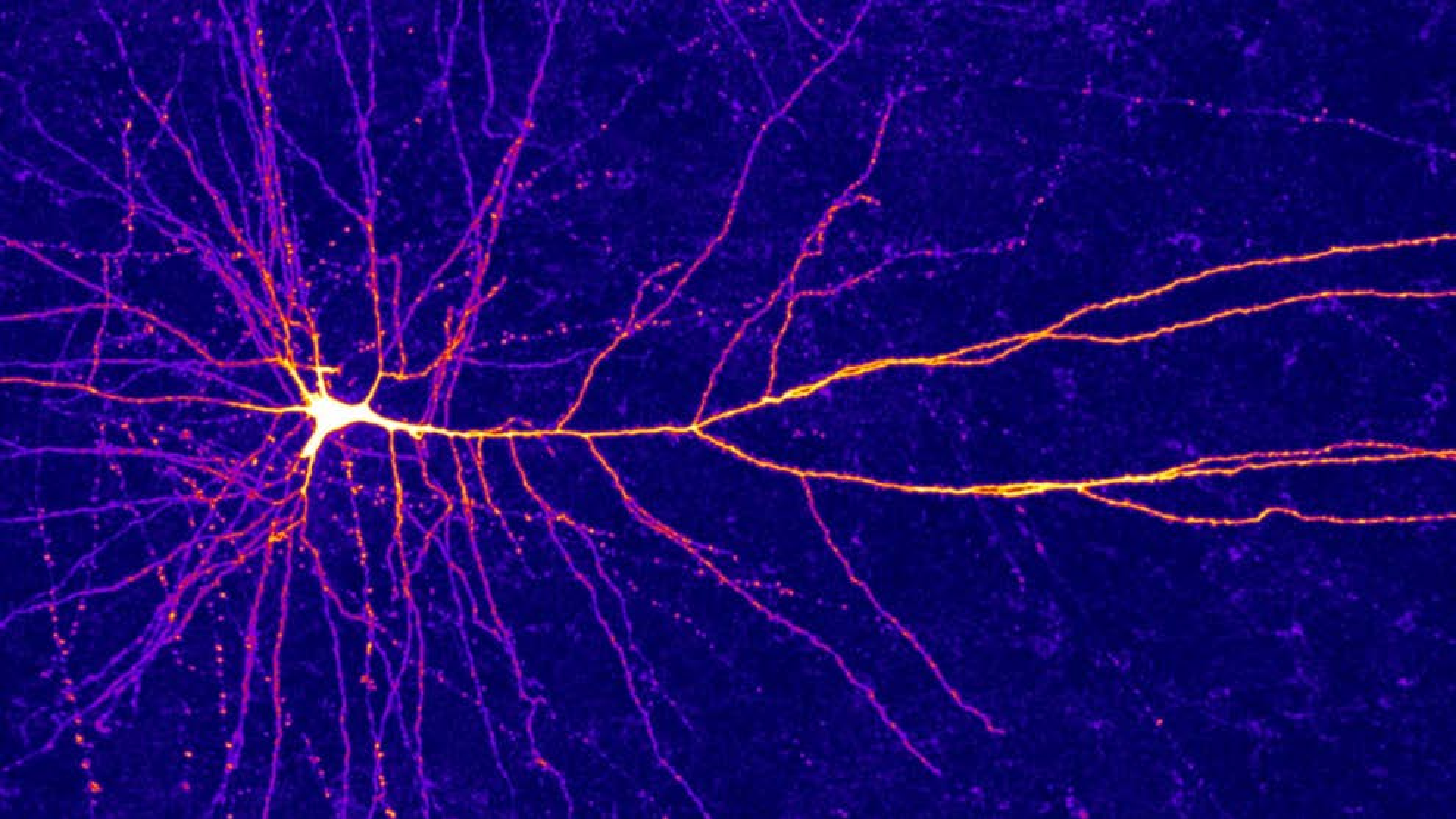
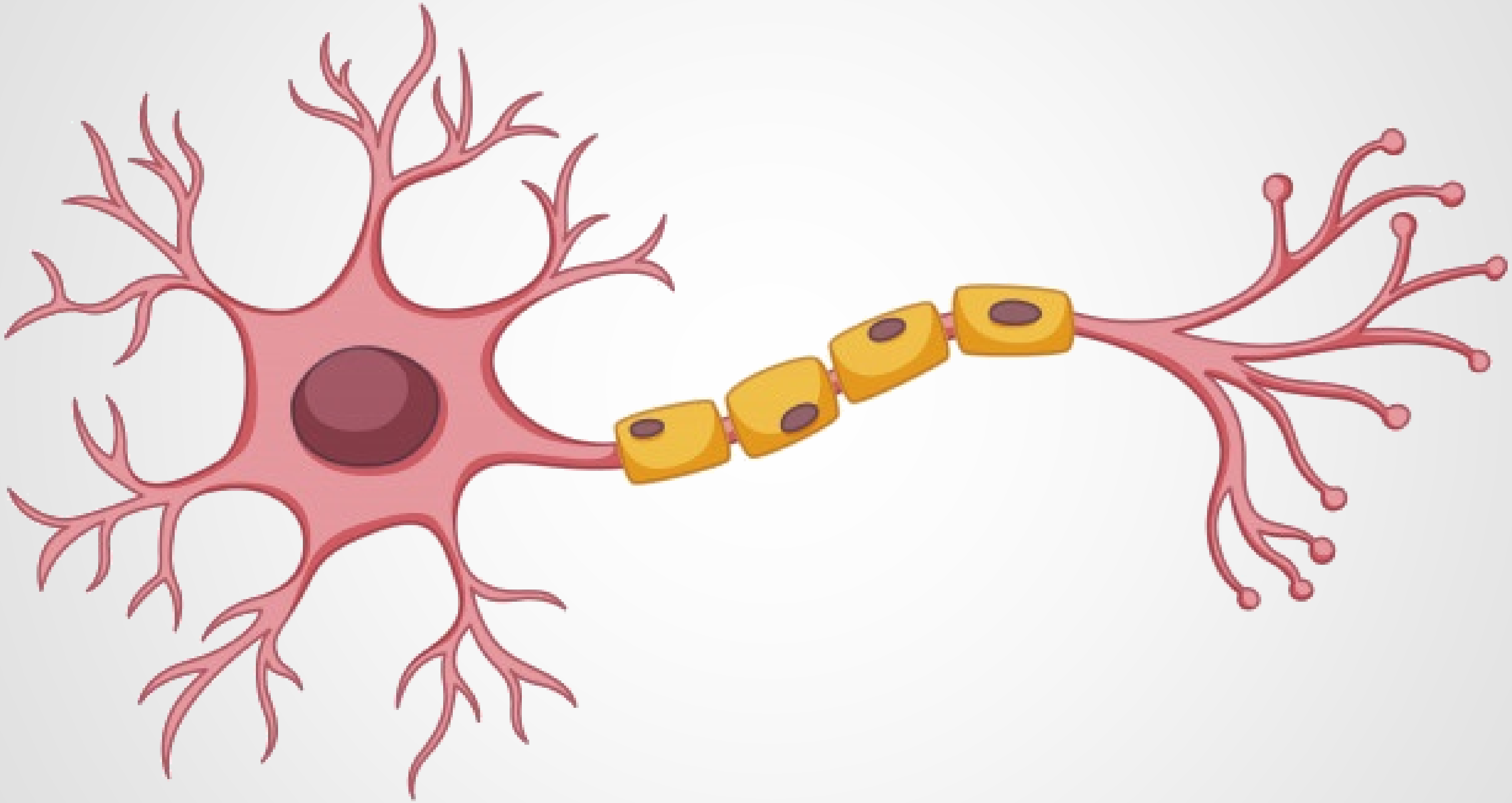

Machine Learning

IV. Redes Neuronales

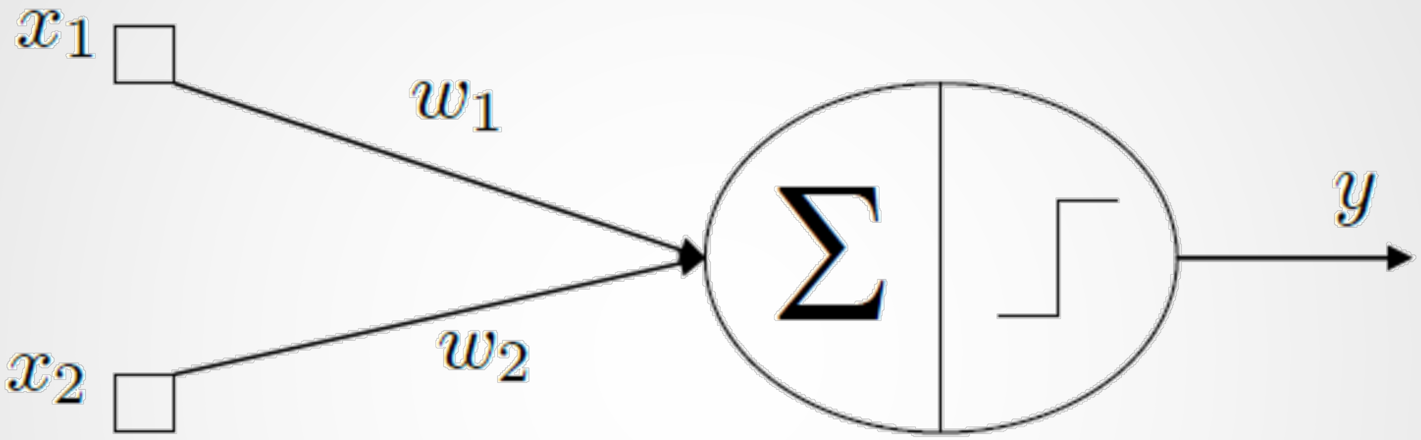








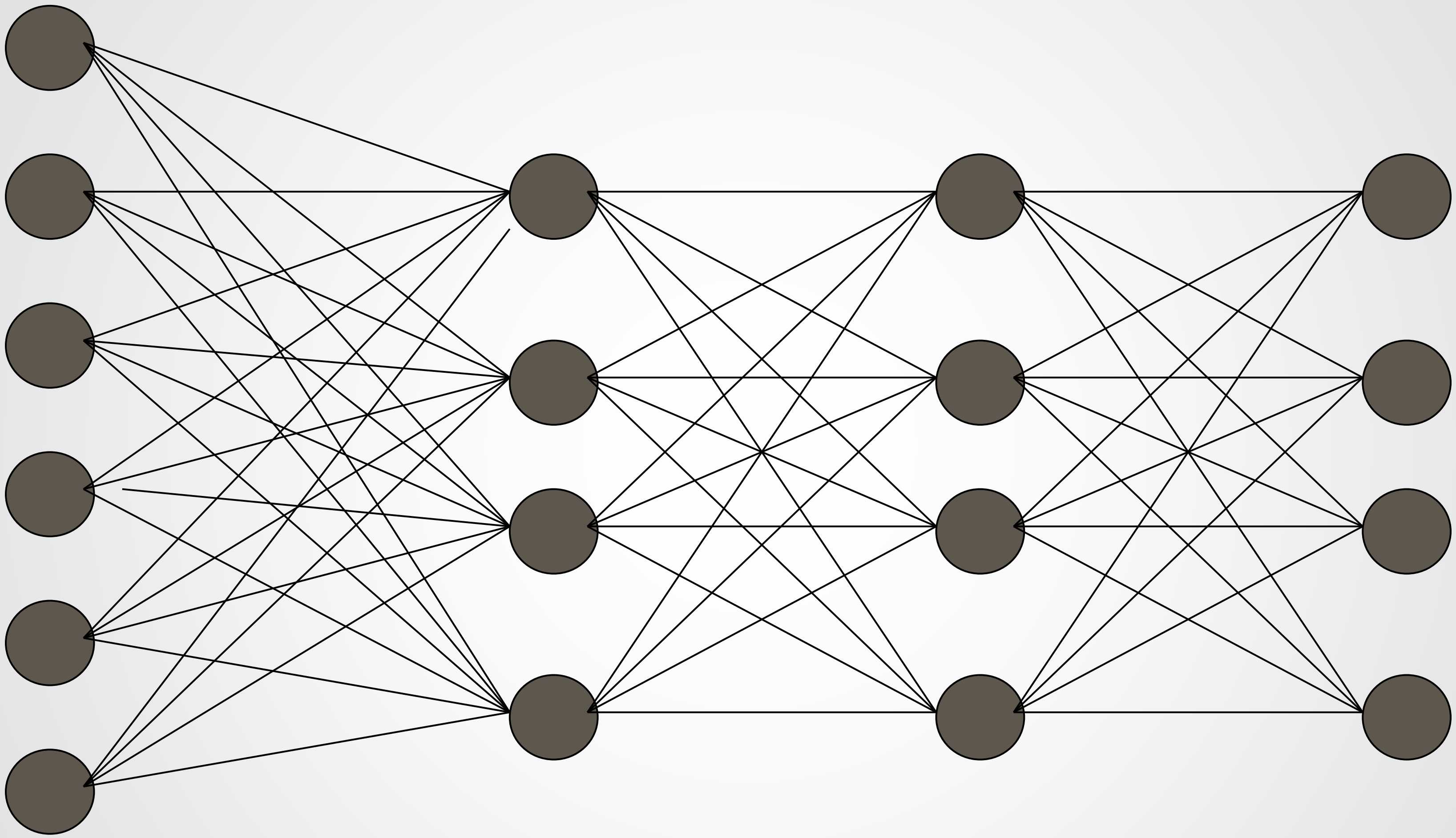
Modelo neuronal de McCulloch-Pitts (1943)

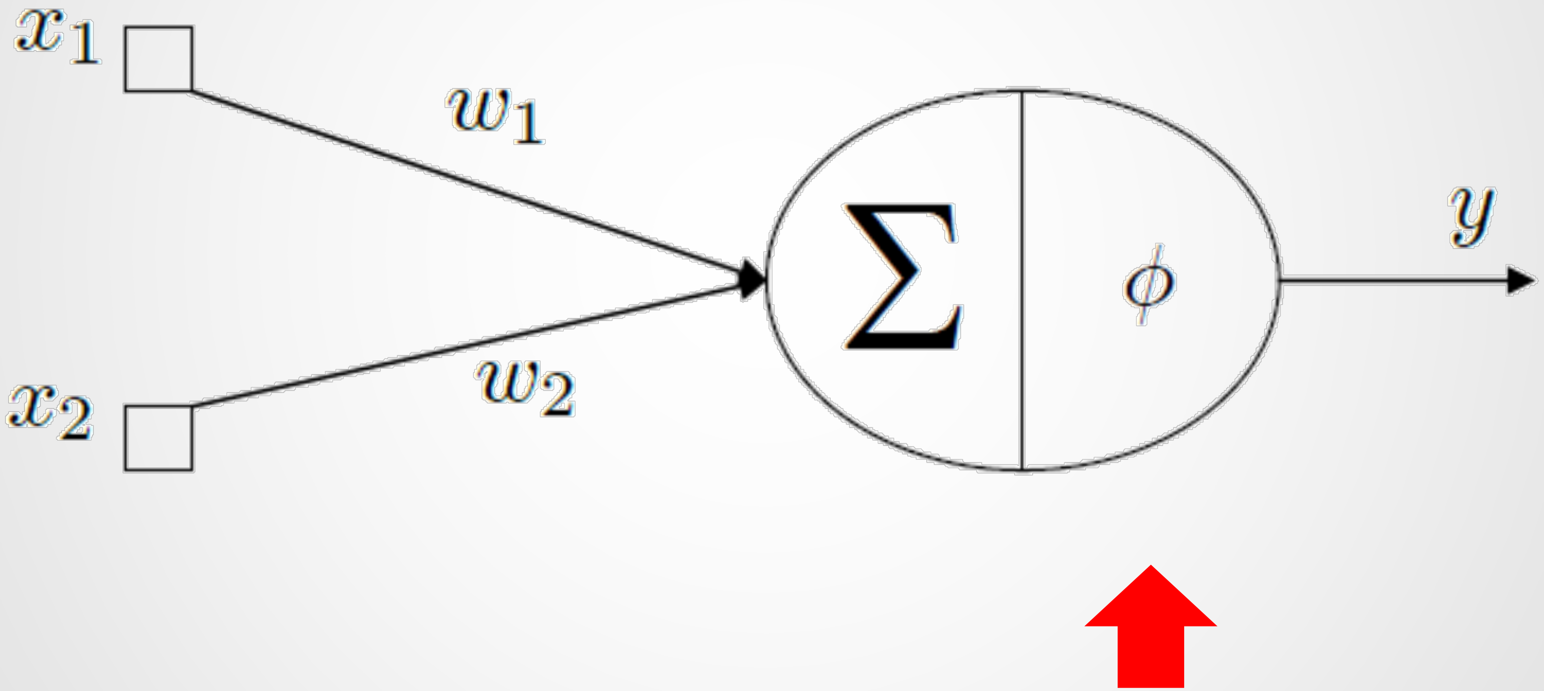


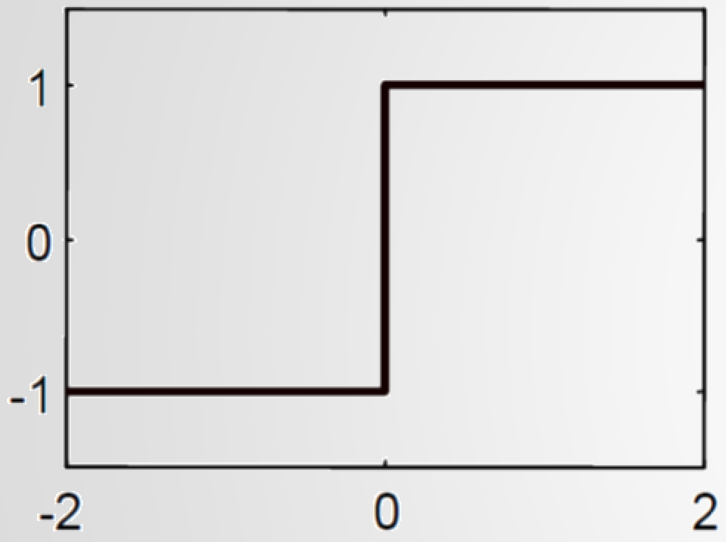
$$y = \phi\left(\sum_{i=1}^{D} w_i x_i + b\right)$$

$$\phi(x) = +1, \quad z \geq 0$$

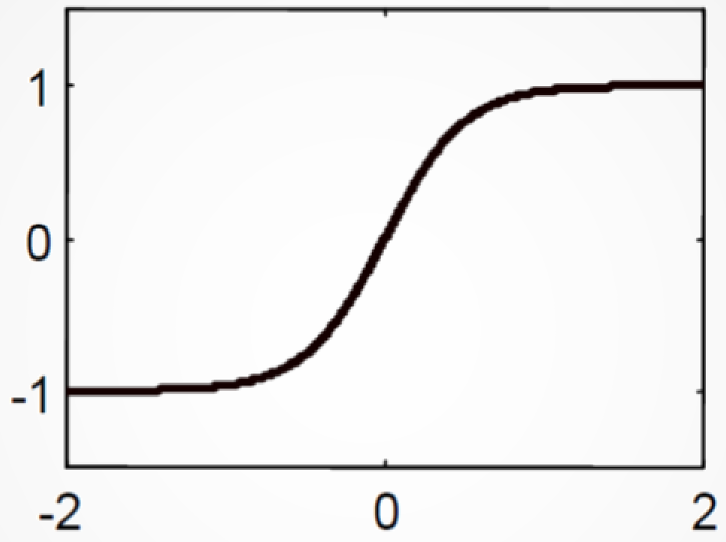
$$\phi(x) = -1, \quad z < 0$$



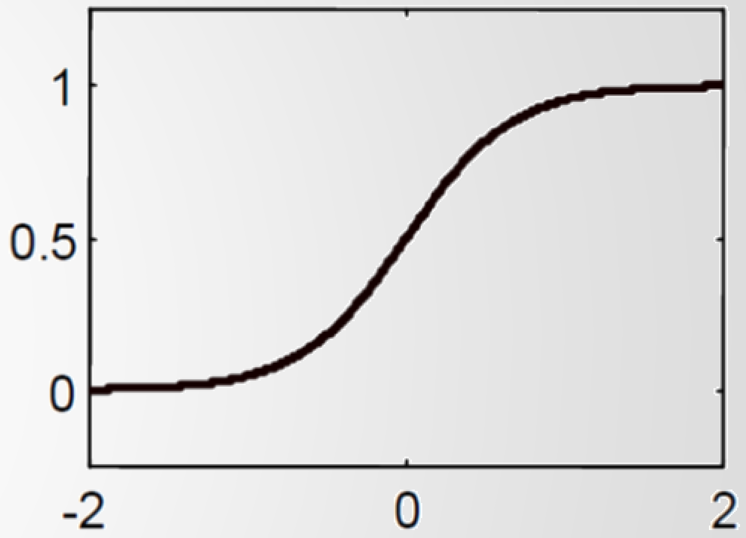

x_1
w_1
Σ
ϕ
y
x_2
w_2



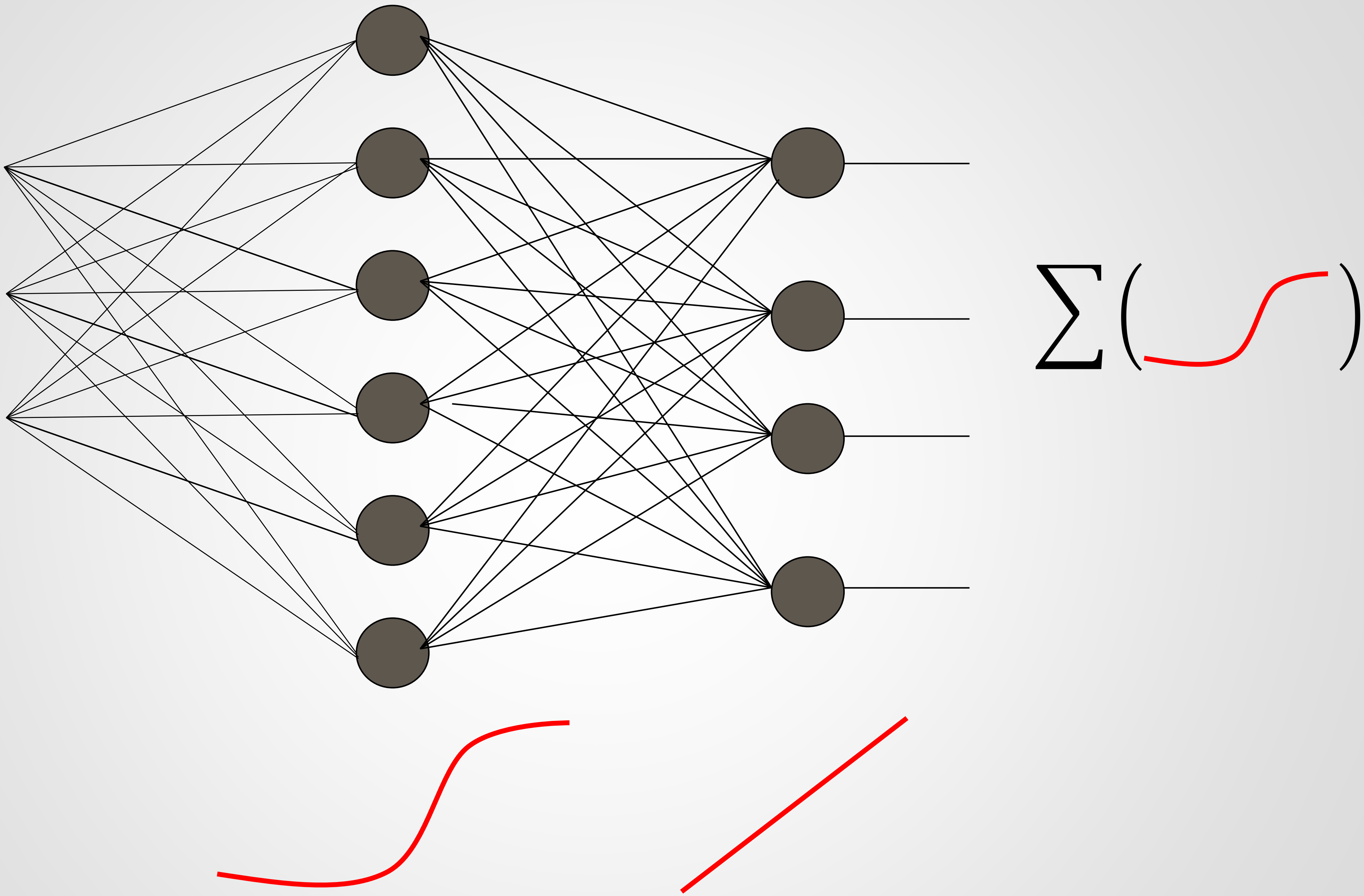
$$\varphi(u) = \operatorname{sgn}(u)$$

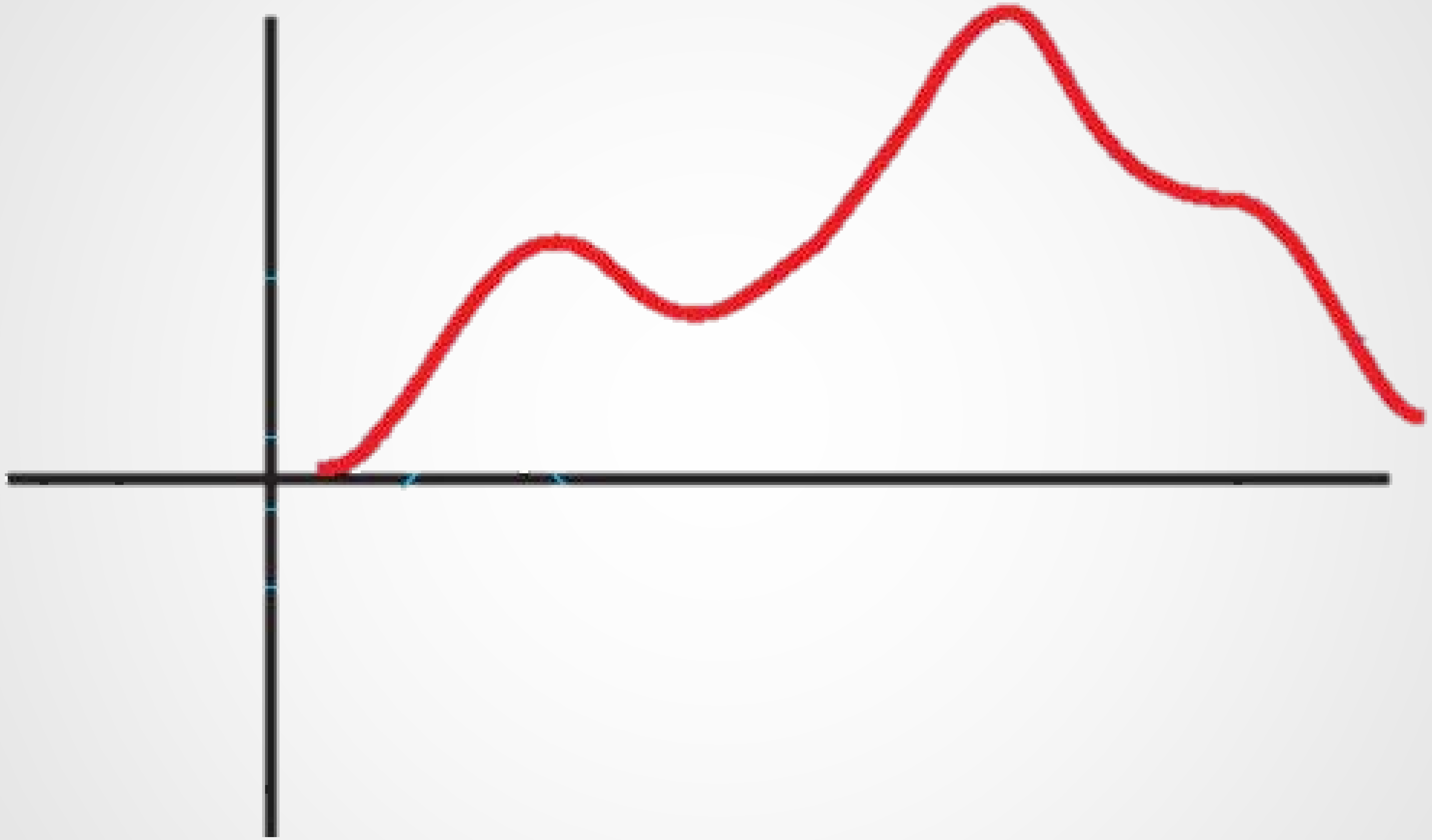


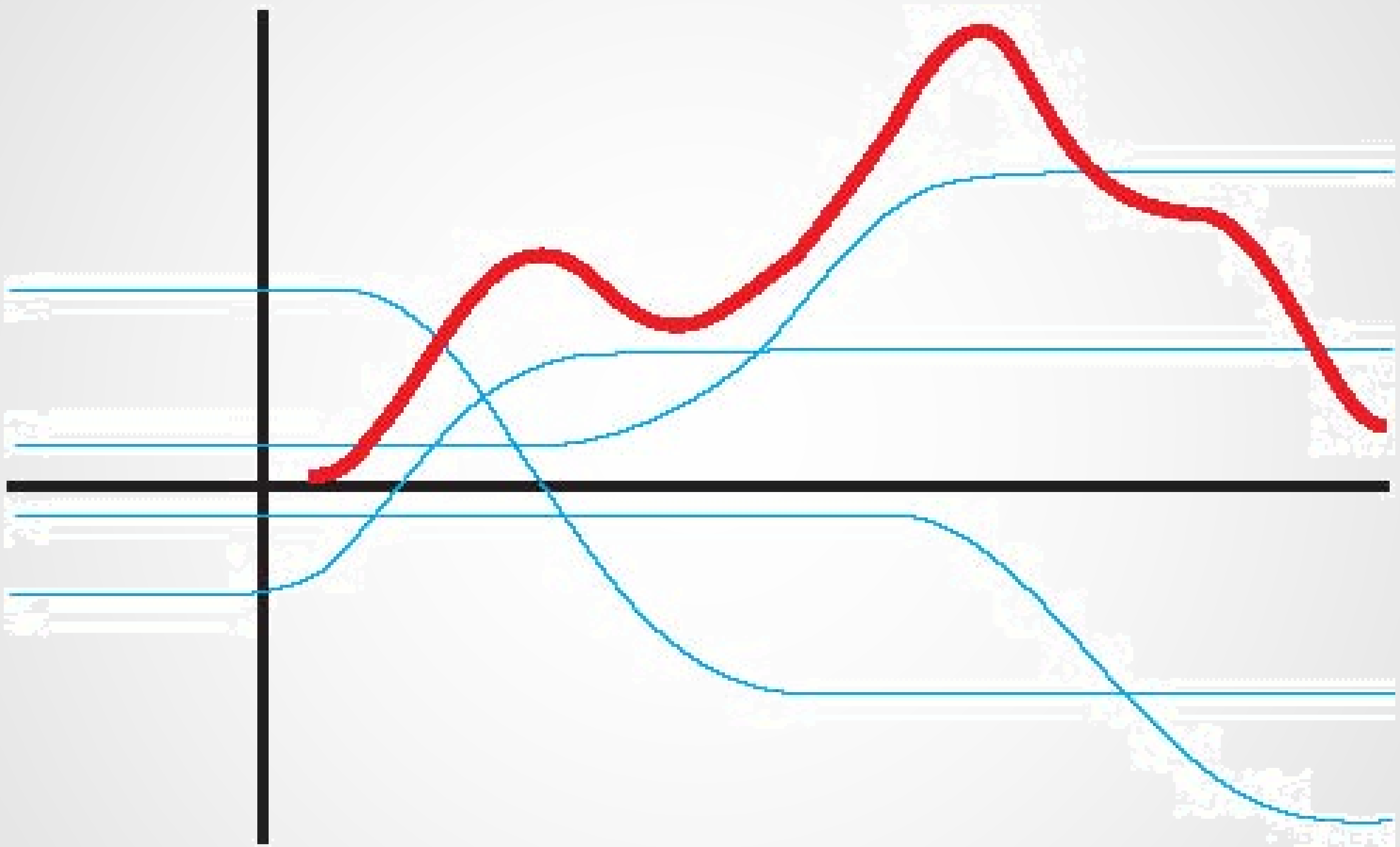
$$\varphi(u) = \tanh(au)$$



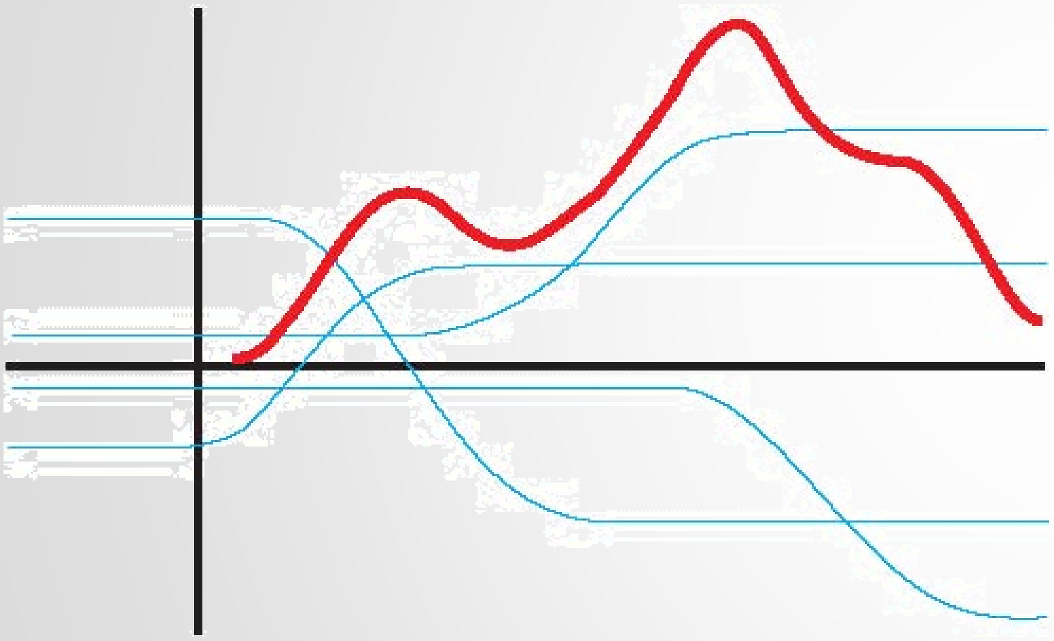
$$\varphi(u) = \frac{1}{1 + \exp(-au)}$$

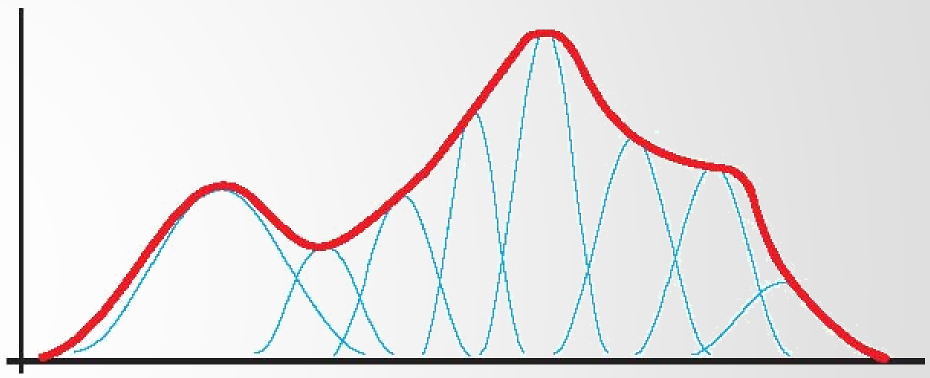


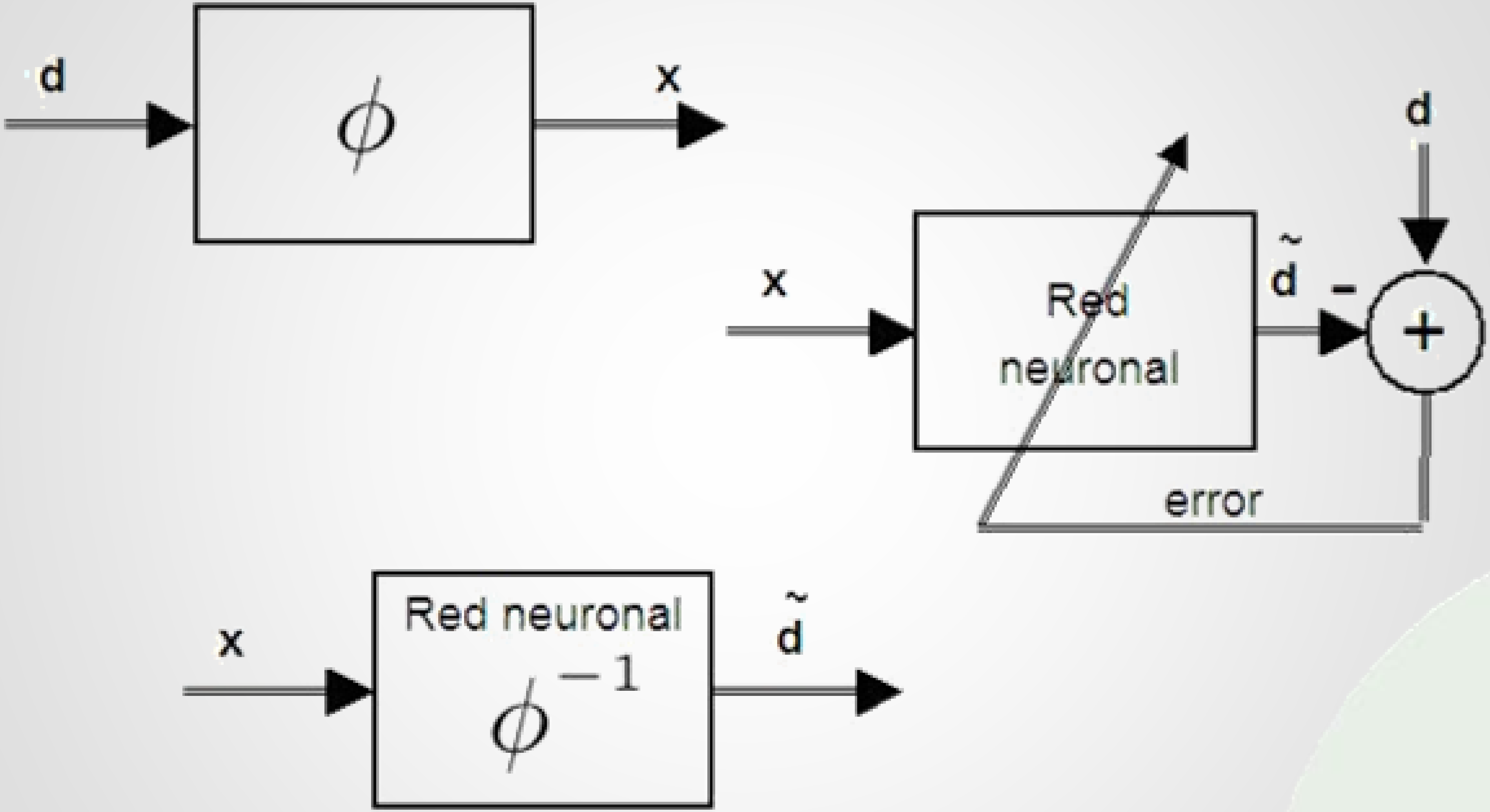




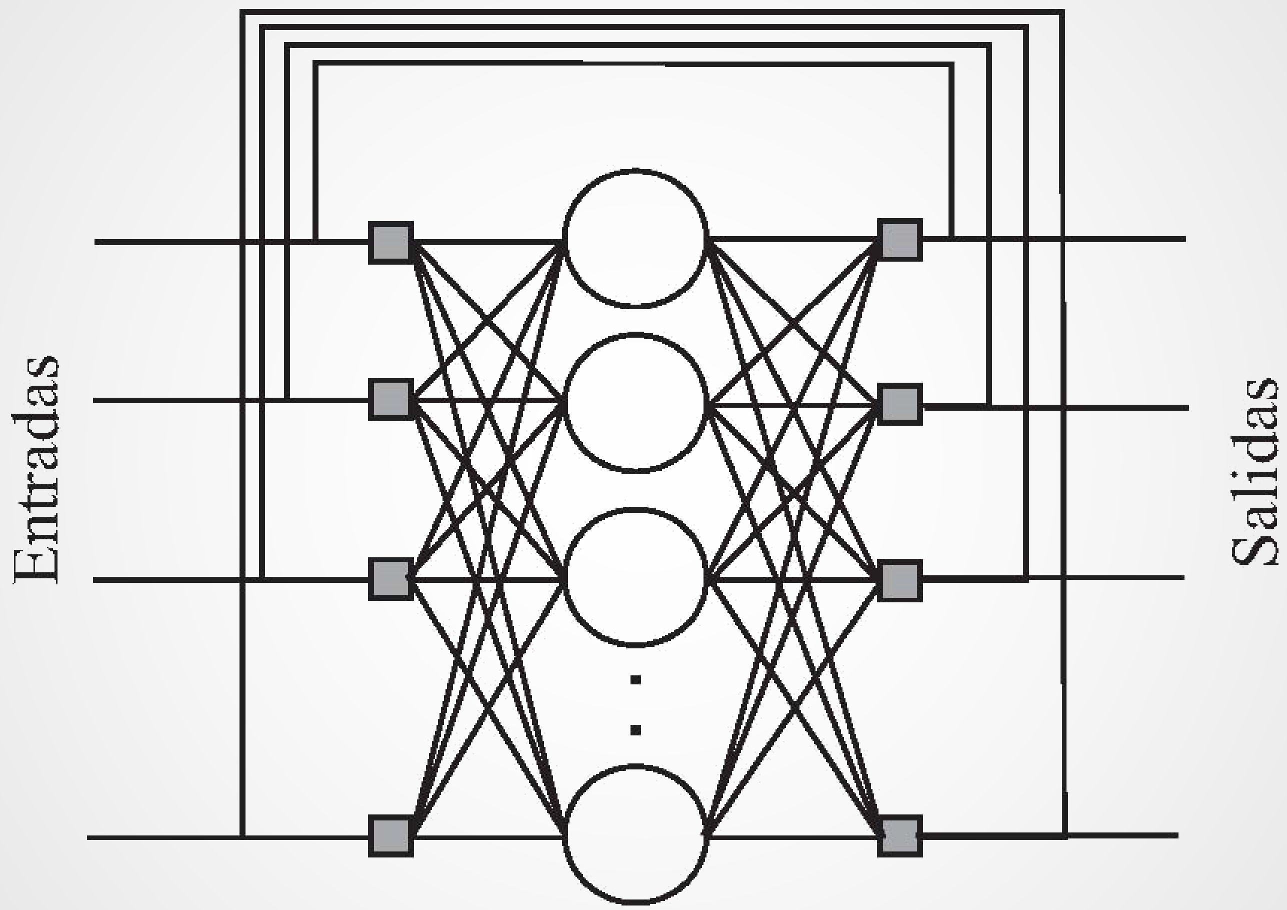
Principio de Aproximación Universal



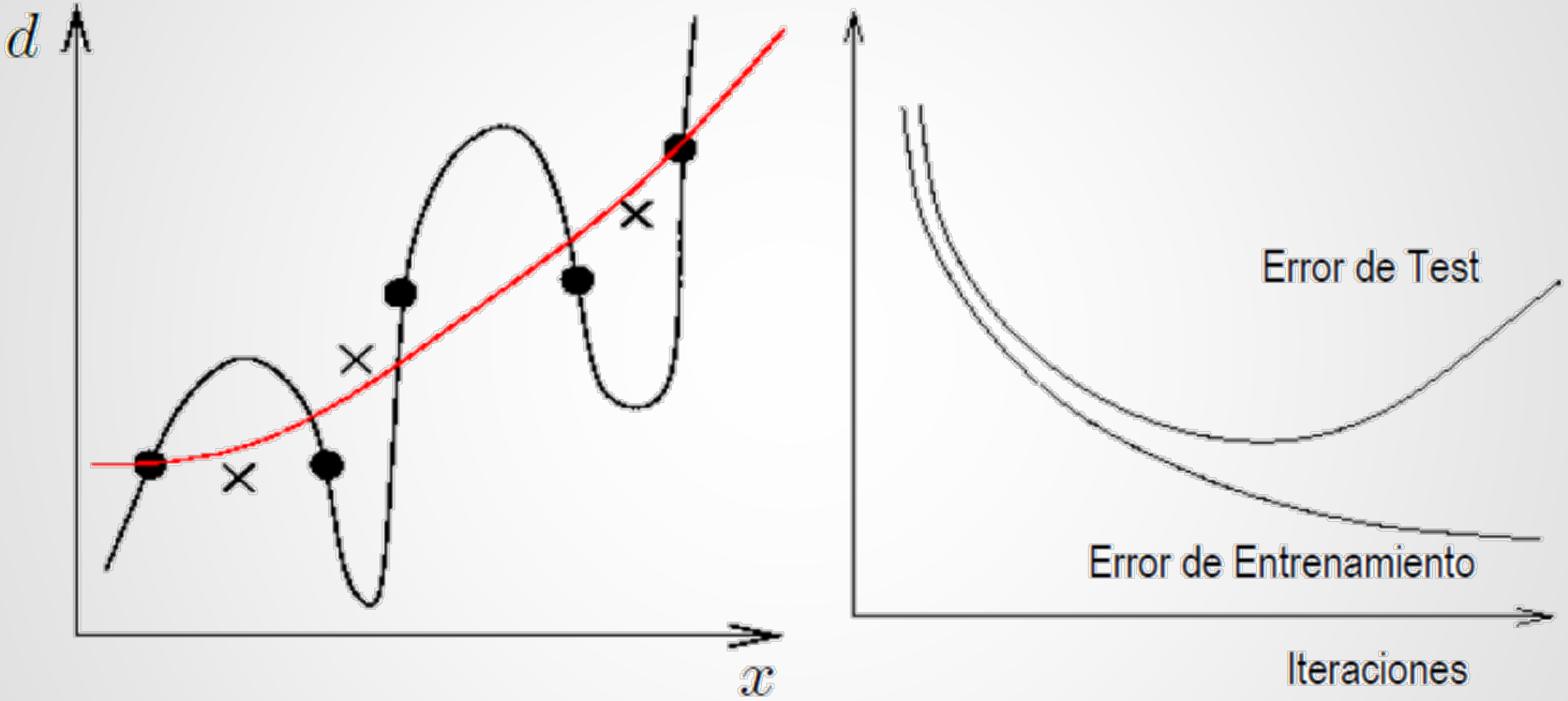




d
ϕ
x
x
Red neuronal
$\tilde{d}$
-
+
d
error
x
Red neuronal
ϕ^{-1}
$\tilde{d}$


Entradas
Salidas

Overfitting



La “Maldición de la Dimensionalidad” (Curse of Dimensionality)

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La complejidad de la red neuronal crece exponencialmente con la dimensión (complejidad del problema)

La “Maldición de la Dimensionalidad” (Curse of Dimensionality)

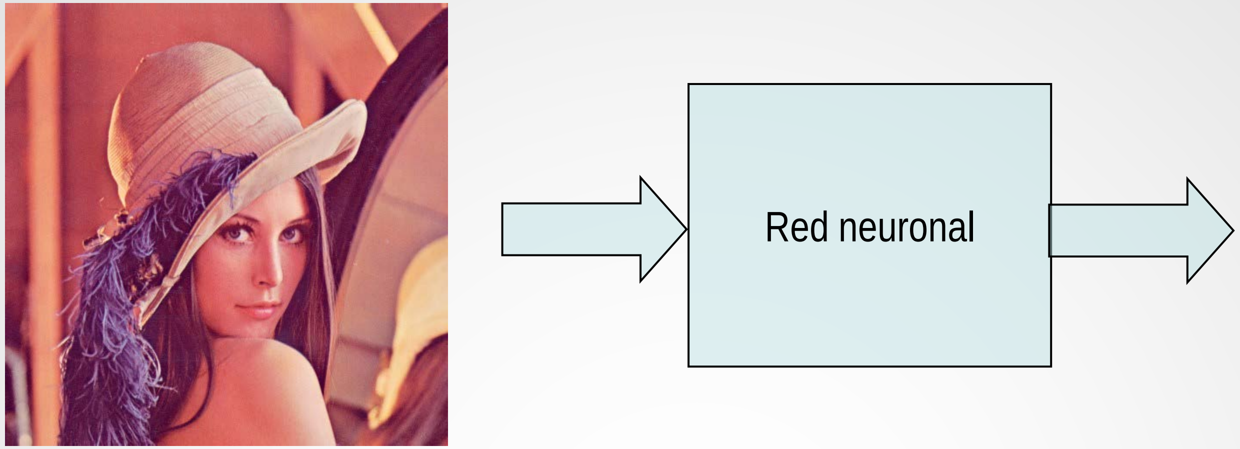
La complejidad de la red neuronal crece exponencialmente con la dimensión (complejidad del problema)

- Neuronas necesarias
- Datos de entrenamiento necesarios
- Tiempo de entrenamiento
- Etc.

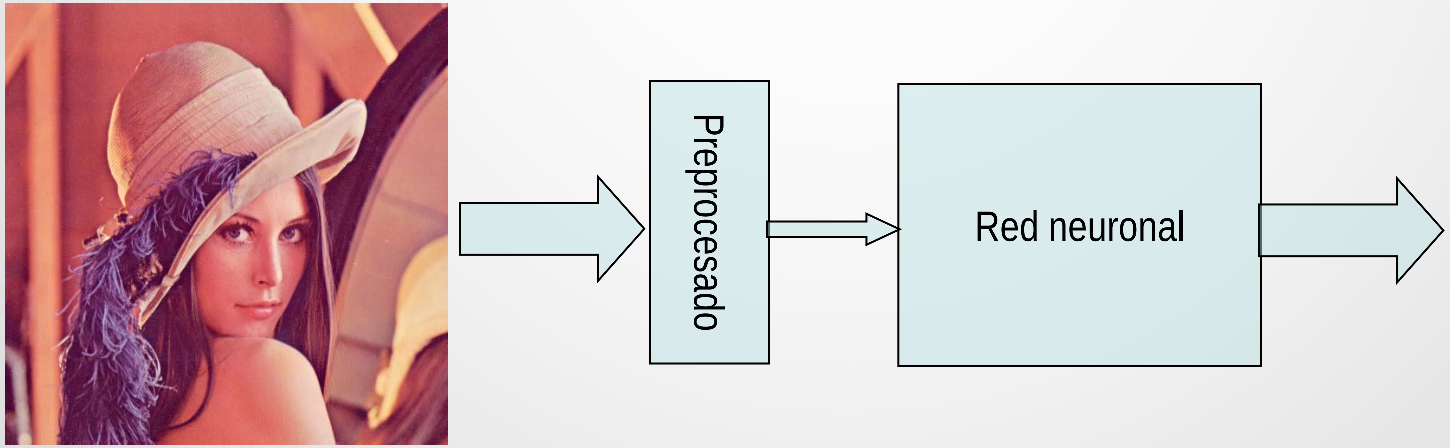
– Siempre que sea posible reducir un problema, es MUY conveniente hacerlo: preprocesado de los datos

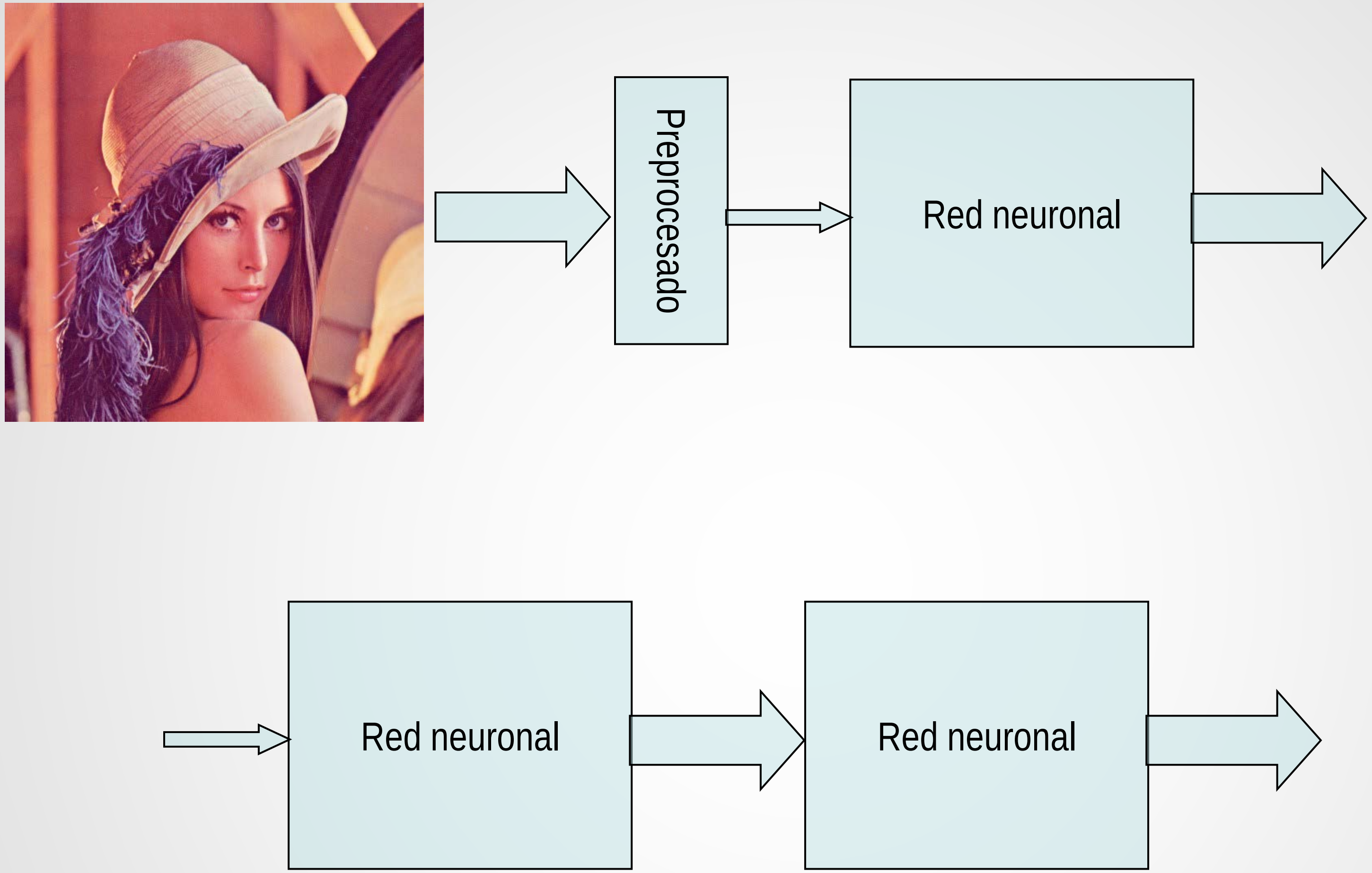
- Extracción de las características relevantes del problema
- Eliminación de información redundante

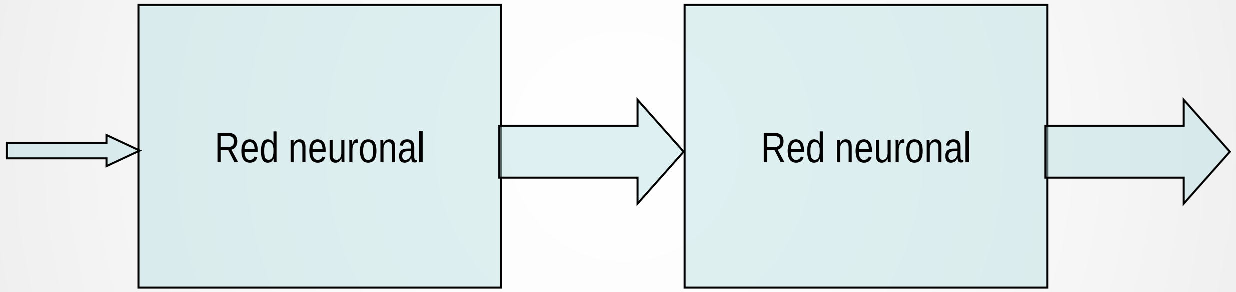
- Si se pretende procesar…



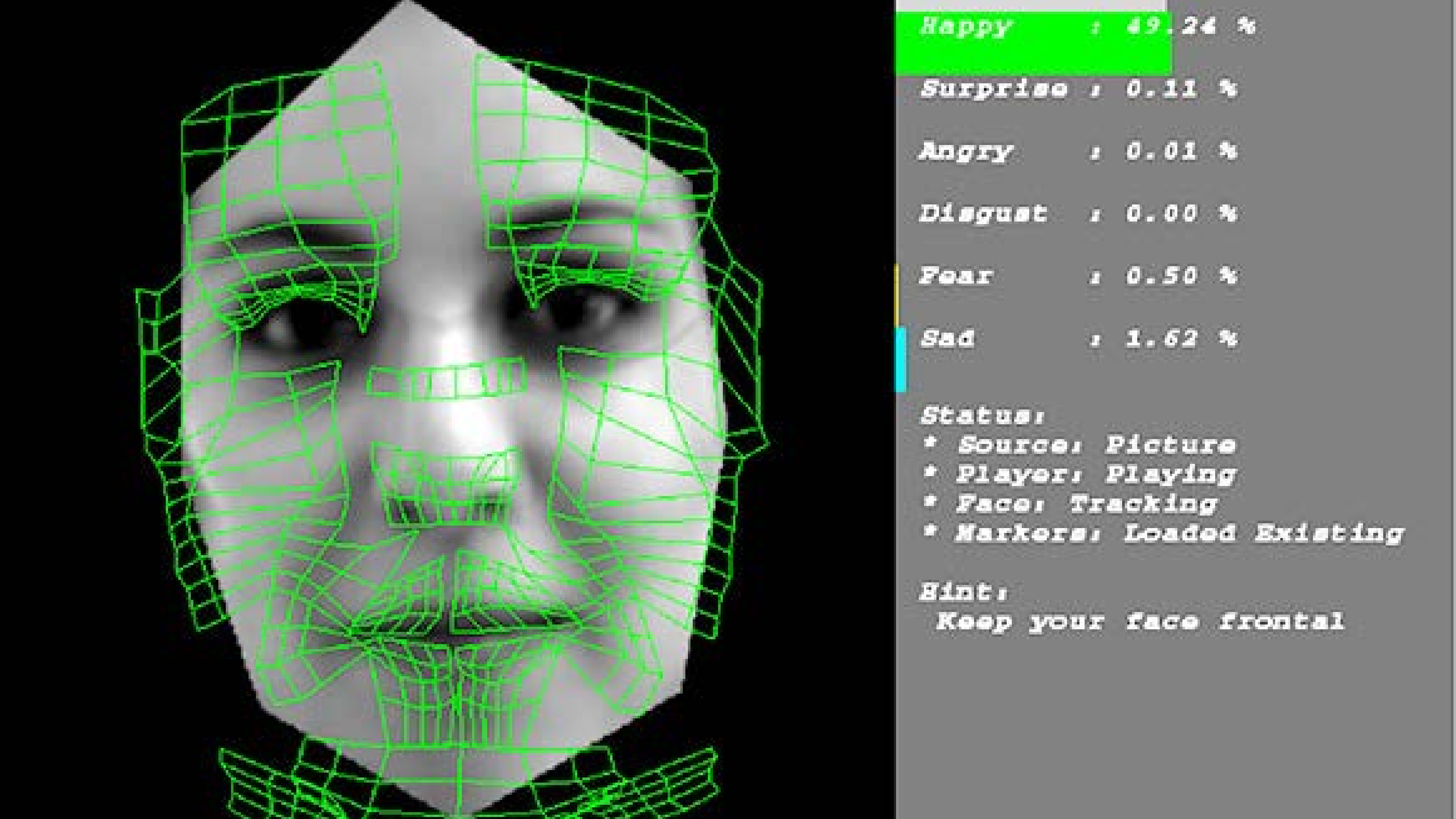
  - Si la imagen es de 256x256=65536 píxeles (parámetros de entrada) se necesita una red neuronal muy grande
  - Se puede reducir el número de datos eliminando redundancia de la imagen, extrayendo bordes, etc.

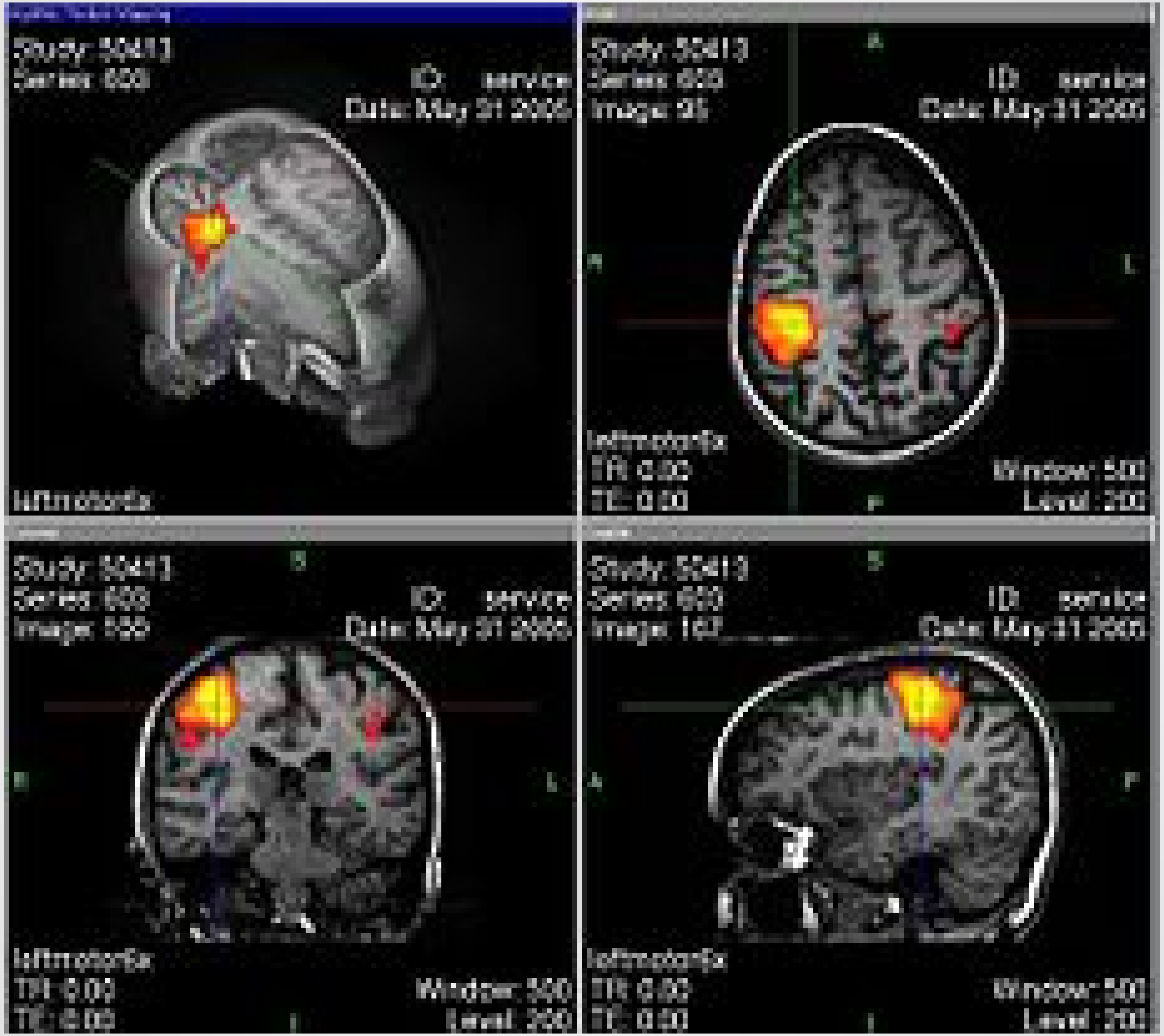



Preprocesado
Red neuronal
Red neuronal
Red neuronal


Red neuronal
Red neuronal

Deep Learning


Happy : 49.24 %
Surprise : 0.11 %
Angry : 0.01 %
Disgust : 0.00 %
Fear : 0.50 %
Sad : 1.62 %
Status:
* Source: Picture
* Player: Playing
* Face: Tracking
* Markers: Loaded Existing
Hint:
Keep your face frontal

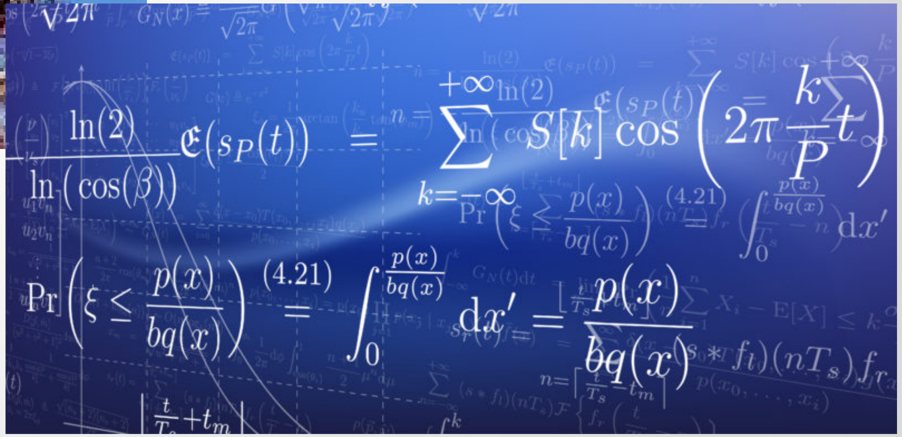


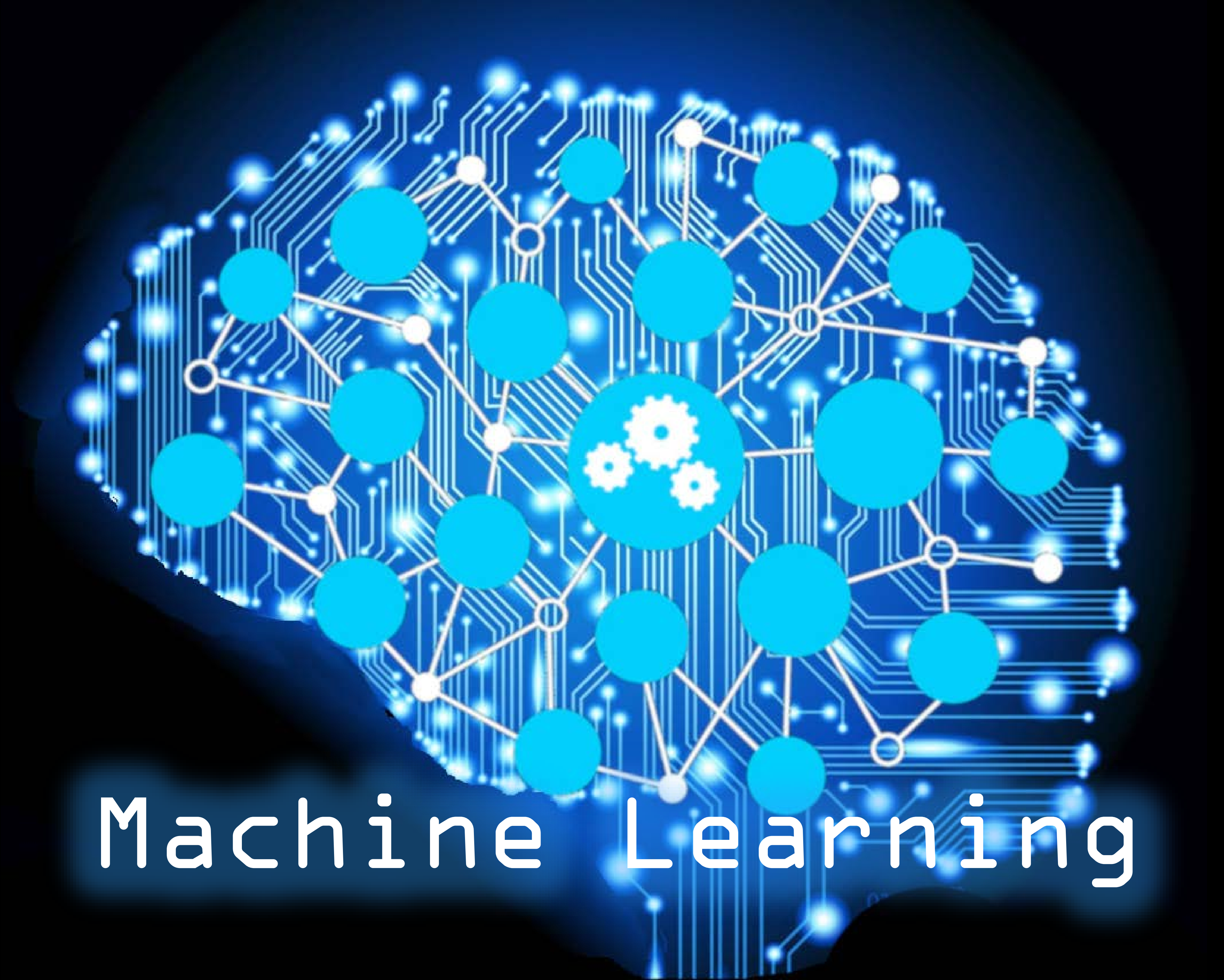
Study: 50413
Series: 600
ID: service
leftmotorfix
TR: 0.00
TE: 0.00
Window: 500
Level: 200

Google


Autonomous
Mode
NETWORK
DRIVER
48
mph






Machine Learning