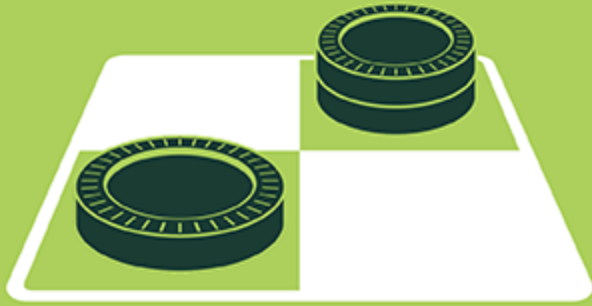


ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.



MACHINE LEARNING

Machine learning begins to flourish.



DEEP LEARNING

Deep learning breakthroughs drive AI boom.



1950's

1960's

1970's

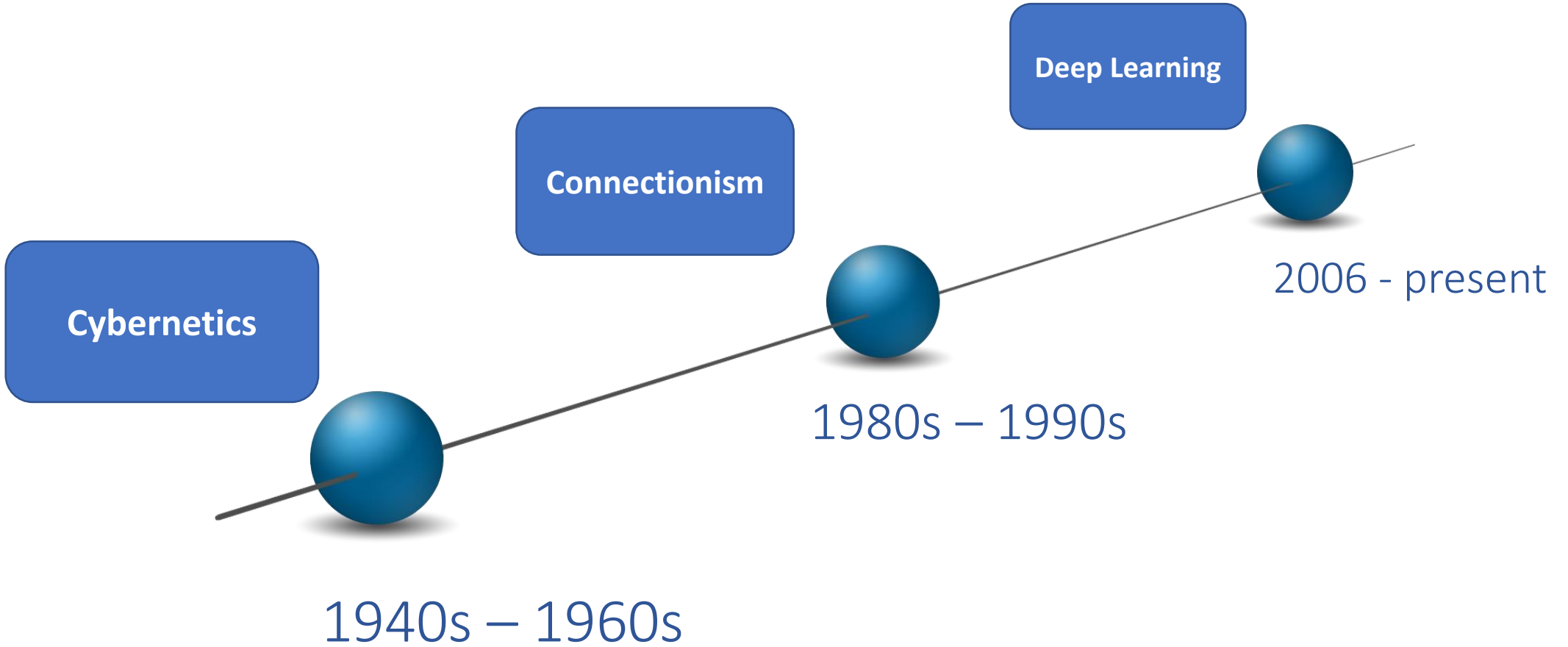
1980's

1990's

2000's

2010's

Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.



Cybernetics

Neuroscience was the predominant guide for the field

$$f(x, w) = x_1 w_1 + \dots + x_n w_n$$

Severe limitations of linear models – e.g. unable to learn the XOR function

Connectionism = parallel distributed processing

Large number of computational units networked together

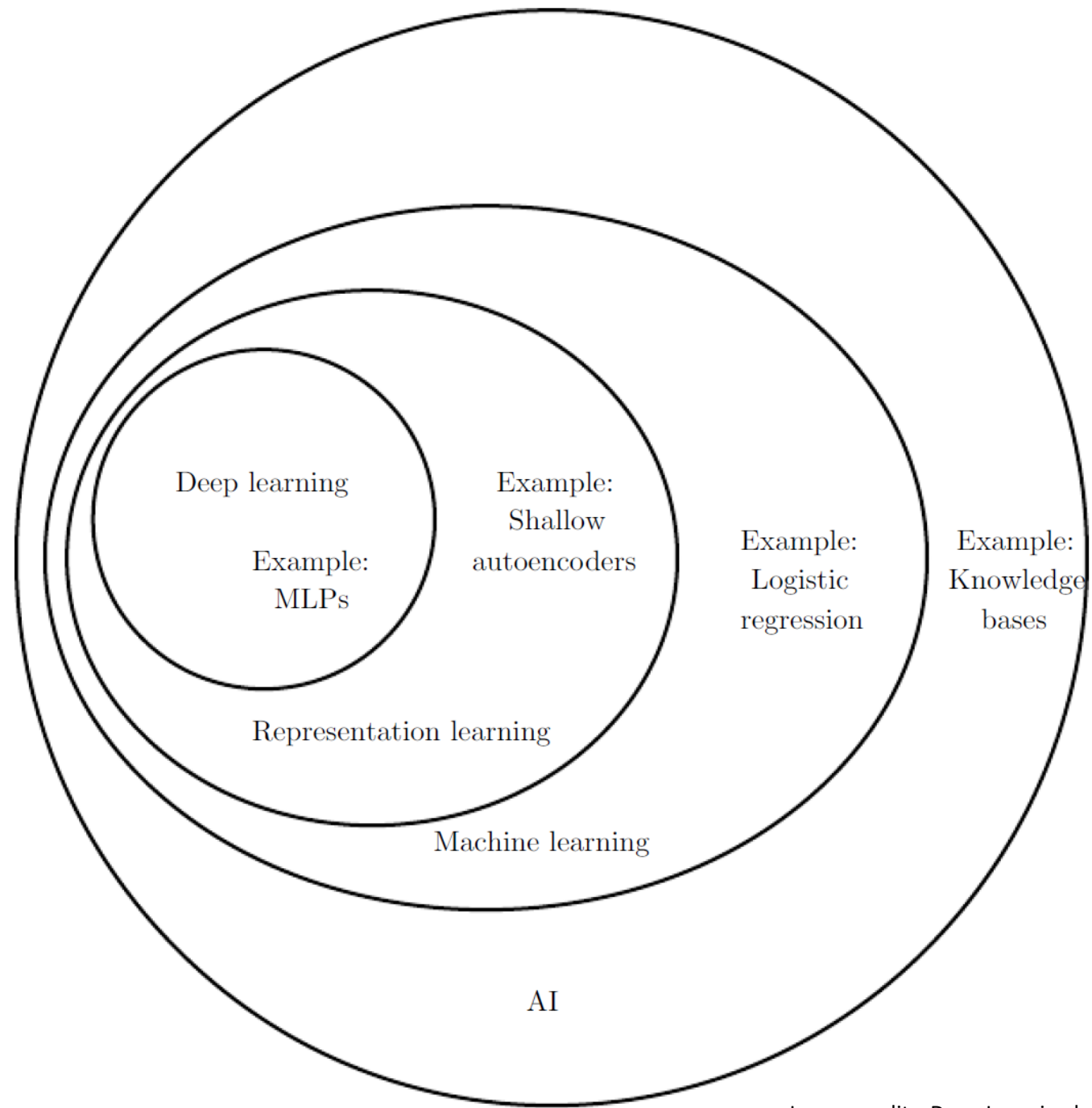
Simple example: solution to recognize 4 objects and 3 colors

Major breakthroughs: back-propagations, LSTM

Deep Learning

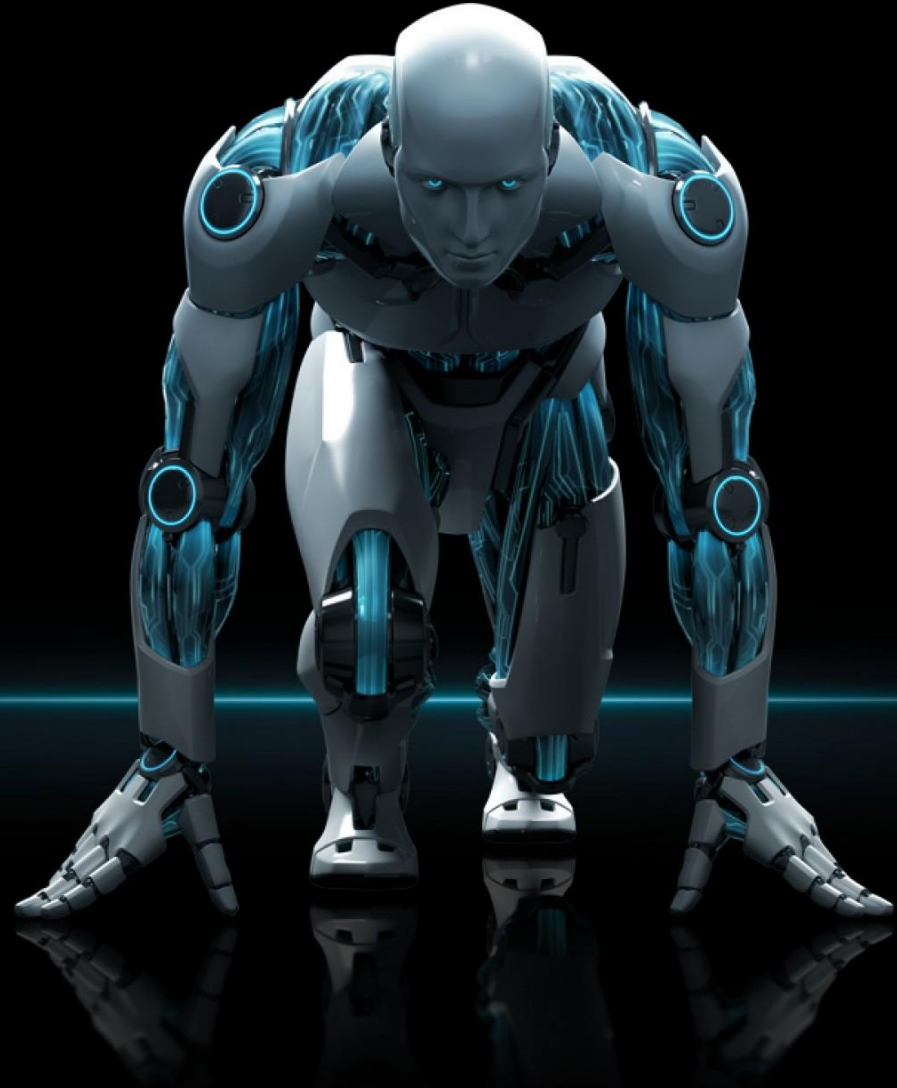
2006 – efficient training of a deep belief network

GPU revolution



The spiral

A simple demo



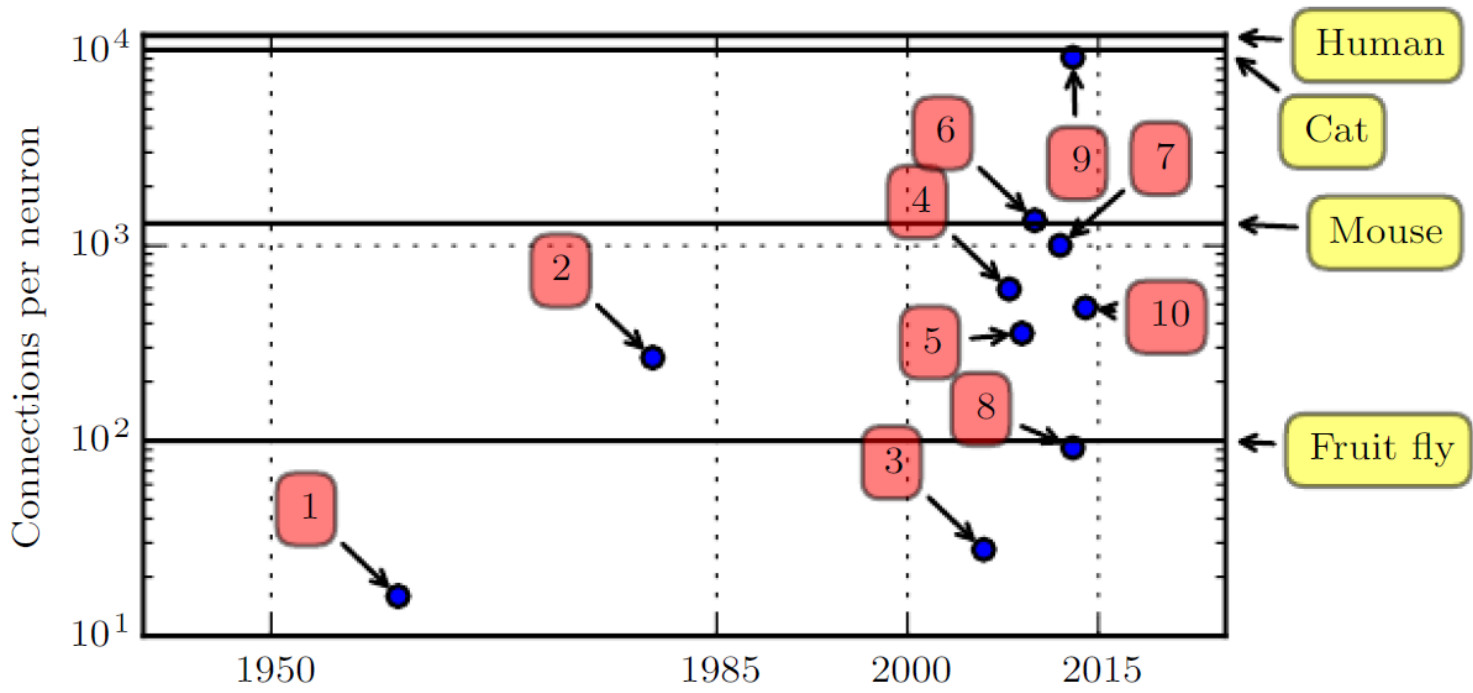
Major trends in current phase

Unsupervised + small -> supervised + (very) large

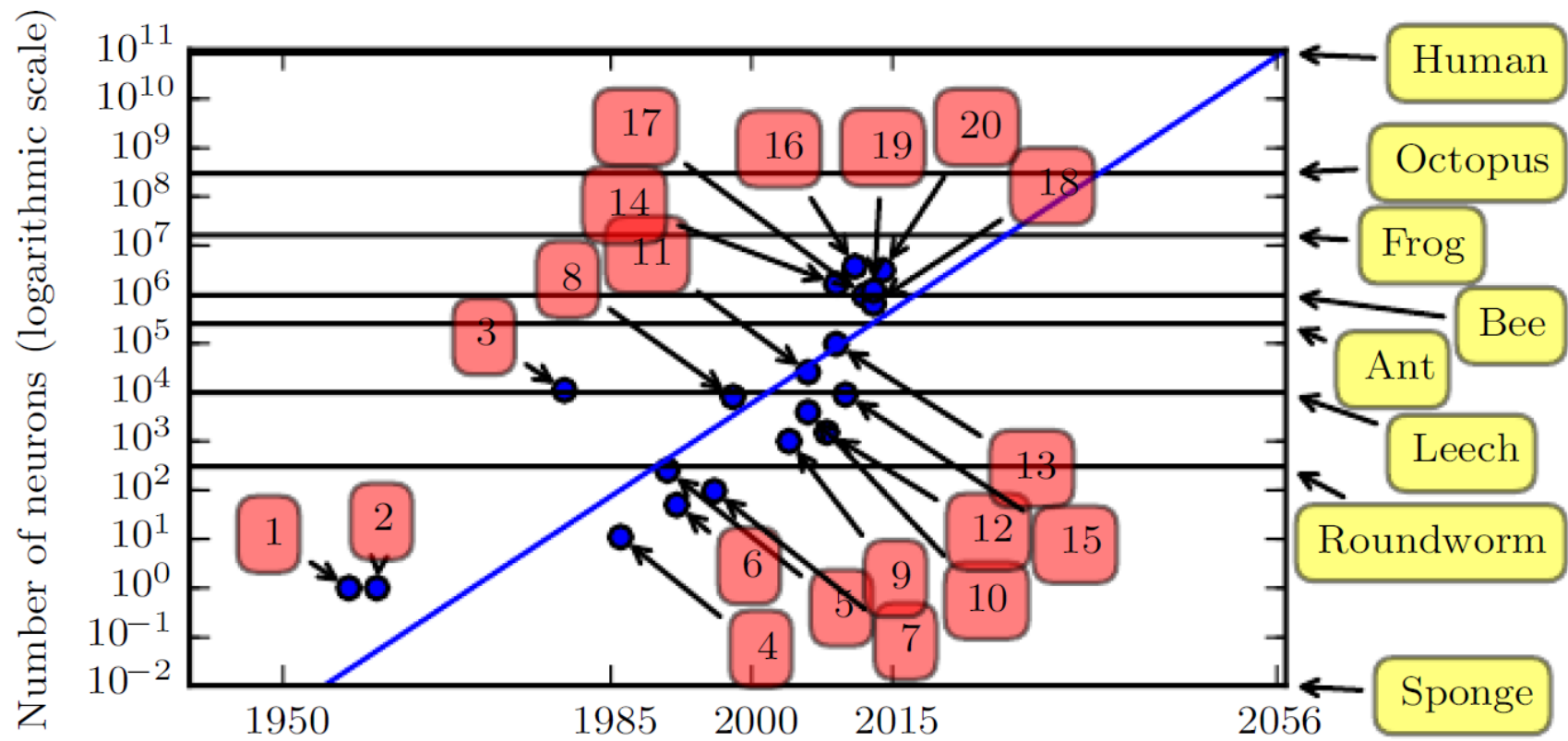
Increasing data set sizes

Increasing model sizes

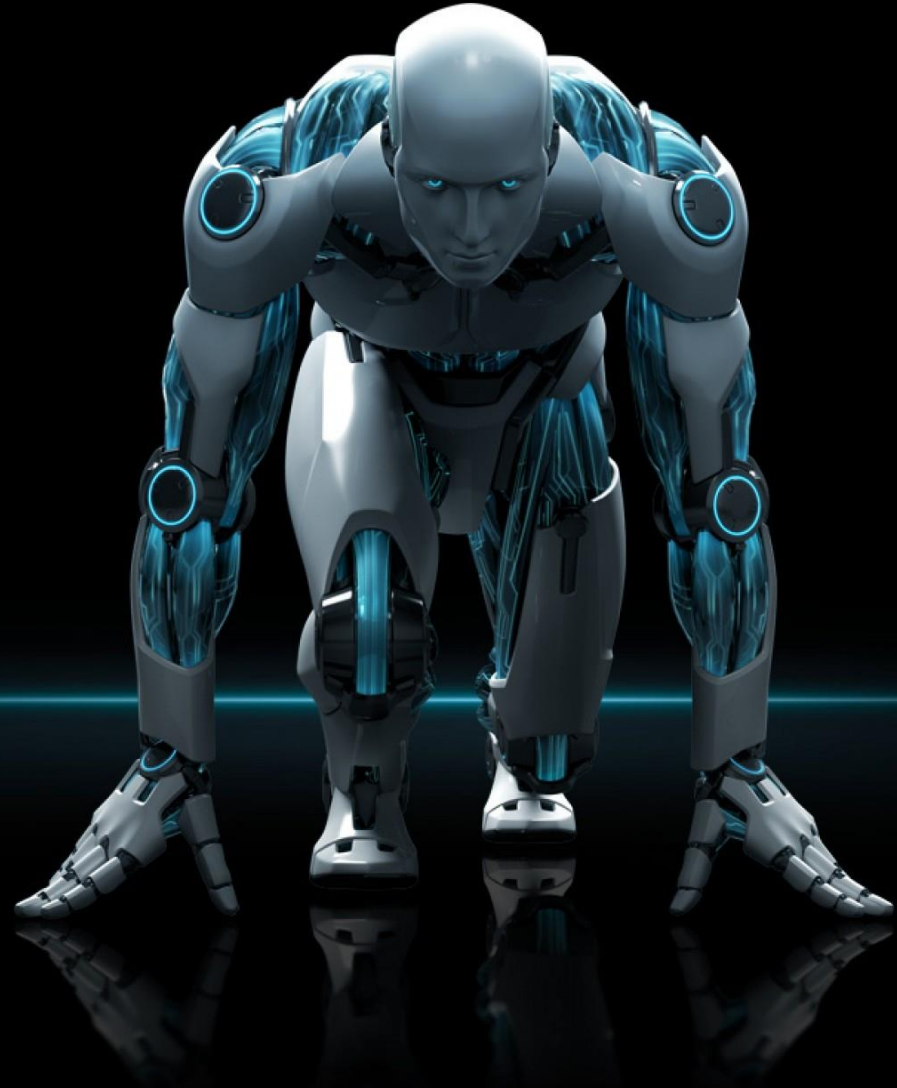
Increasing accuracy, complexity, and impact



- 1 – Adaptive linear element (1960)
- 2 – Neocognitron (1980)
- 3 – GPU-accelerated convolutional (2006)
- 4 – Deep Boltzman machine (2009)
- 5 – Unsupervised convolutional (2009)
- 6 – GPU-accelerated multilayer perceptron (2010)
- 7 – Distributed autoencoder (2012)
- 8 – Multi-GPU convolutional (2012)
- 9 – COTS HPC unsupervised convolutional (2013)
- 10 – GoogLeNet (2014)

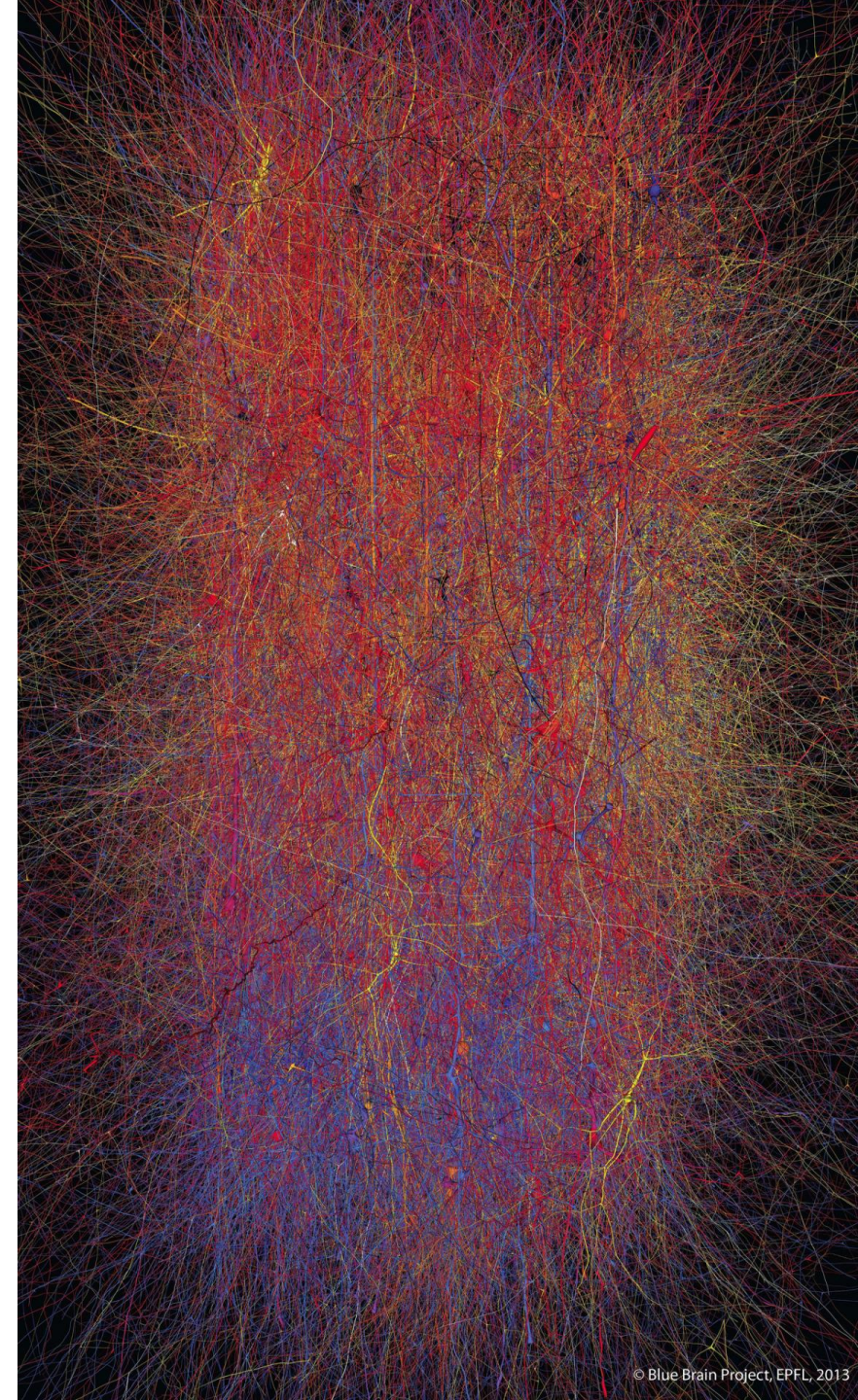


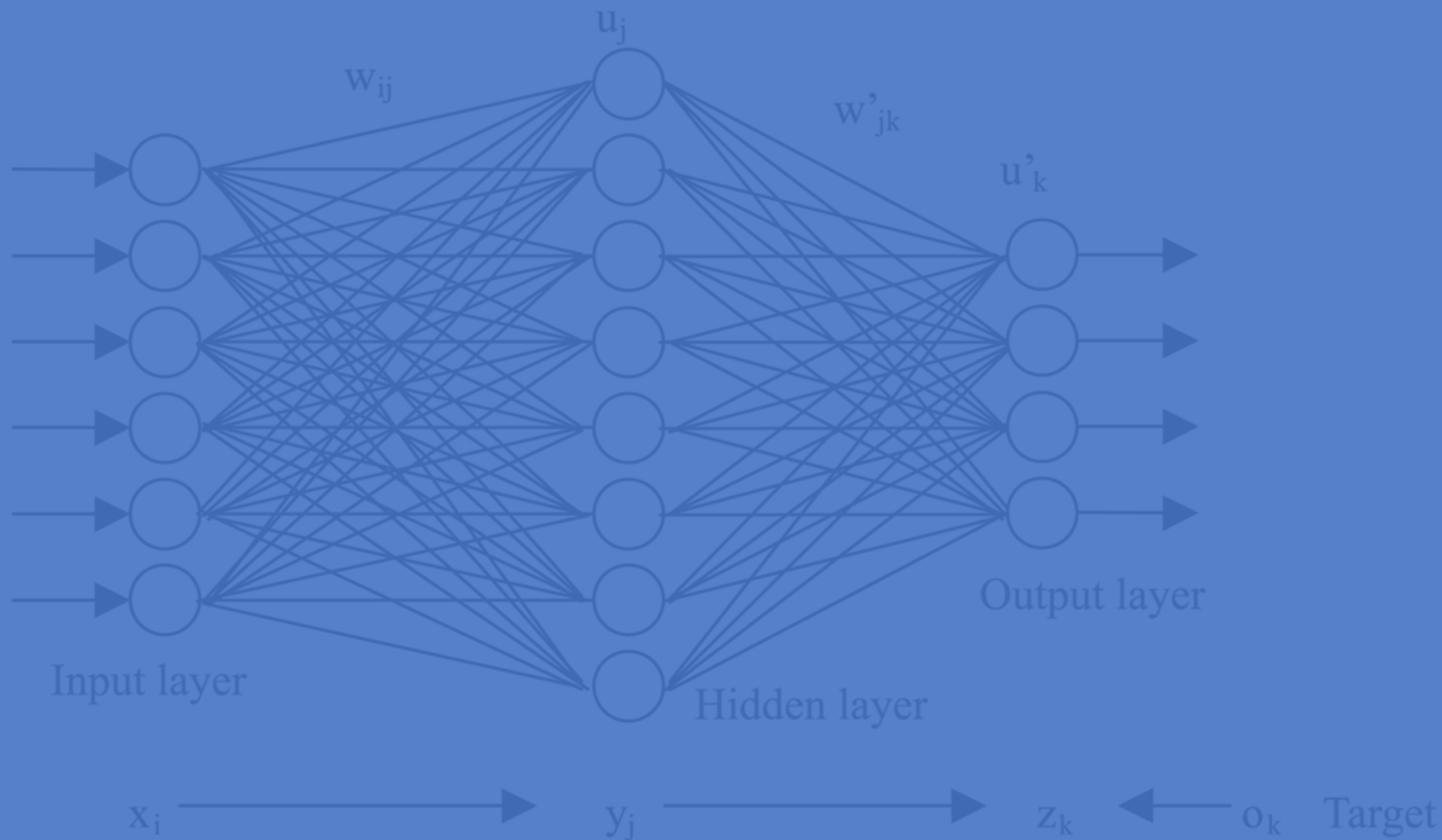
It's not all
cool and smooth
in Deep Learning
land



The human brain has
100 billion neurons and
1,000 trillion synaptic
interconnections

10,000 neurons and 30,000,000
interconnections from a mammalian
brain (The Blue Brain Project)



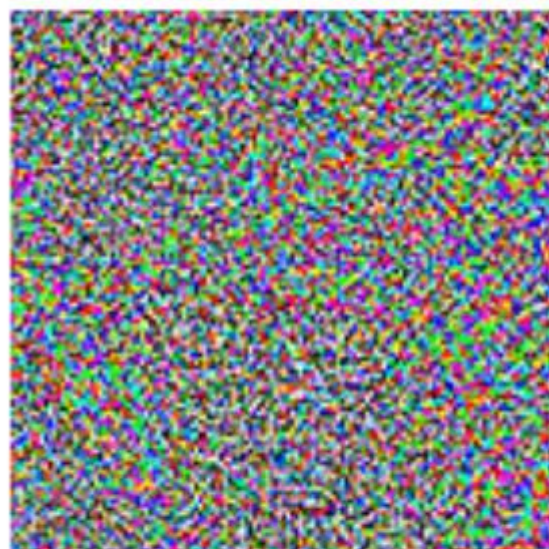




"panda"

57.7% confidence

+ ϵ



=



"gibbon"

99.3% confidence



0



3



5



8



THANK YOU!

Ciprian Jichici

General Manager, Genisoft

Microsoft Regional Director, Romania

Most Valuable Professional, Artificial Intelligence

