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PRESENTATION ON
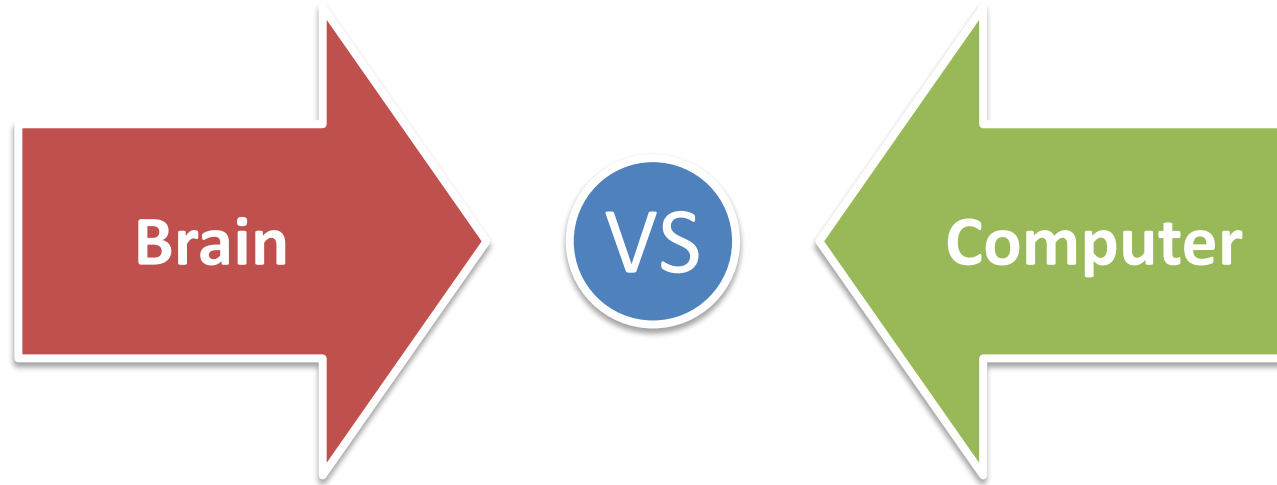
ARTIFICIAL NEURAL NETWORKS

What are Neural Networks?

Artificial neural networks are electronic models neuronal structure of the brain

Neural networks are not programmed, they learn. The opportunity to study - one neural network of the main advantages over traditional algorithms.+

Brain VS Computer

	Brain	Computer
Processing Elements	10^{10} neurons	10^8 transistors
Element Size	10^{-6} m	10^{-6} m
Energy Use	30 W	30 W (CPU)
Processing Speed	10^2 Hz	10^{12} Hz
Style Of Computation	Parallel, Distributed	Serial, Centralized
Energetic Efficiency	10^{-16} joules/opn/sec	10^{-6} joules/opn/sec
Fault Tolerant	Yes	No
Learns	Yes	A little

Characteristics of a Biological Brain

parallel computing;

learning ability and generalization;

Learning is based only on local information

Connections get reorganized based on experience
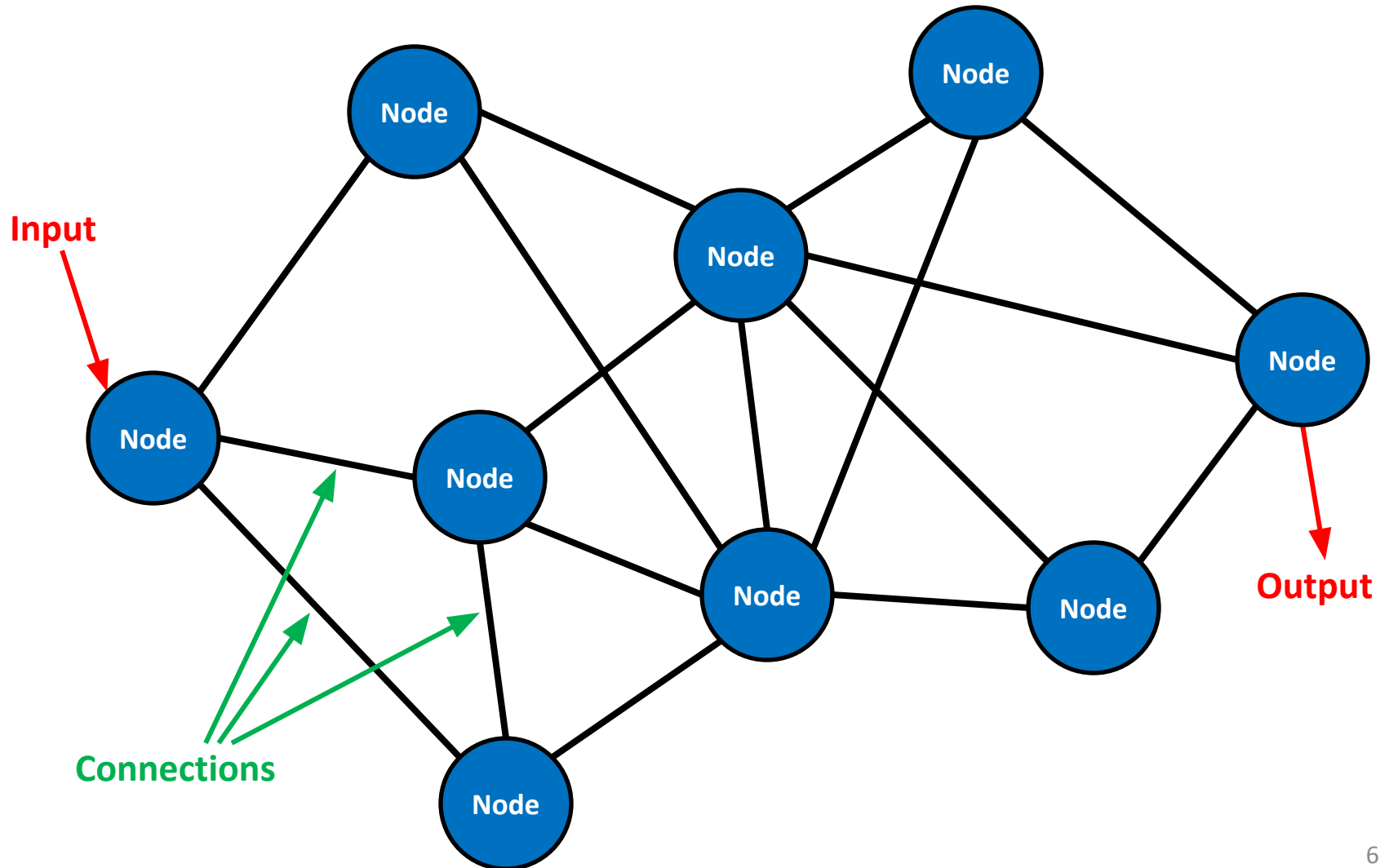
Learning is constant and usually unsupervised

Performance degrades if some units are removed (i.e. some nerve cells die)
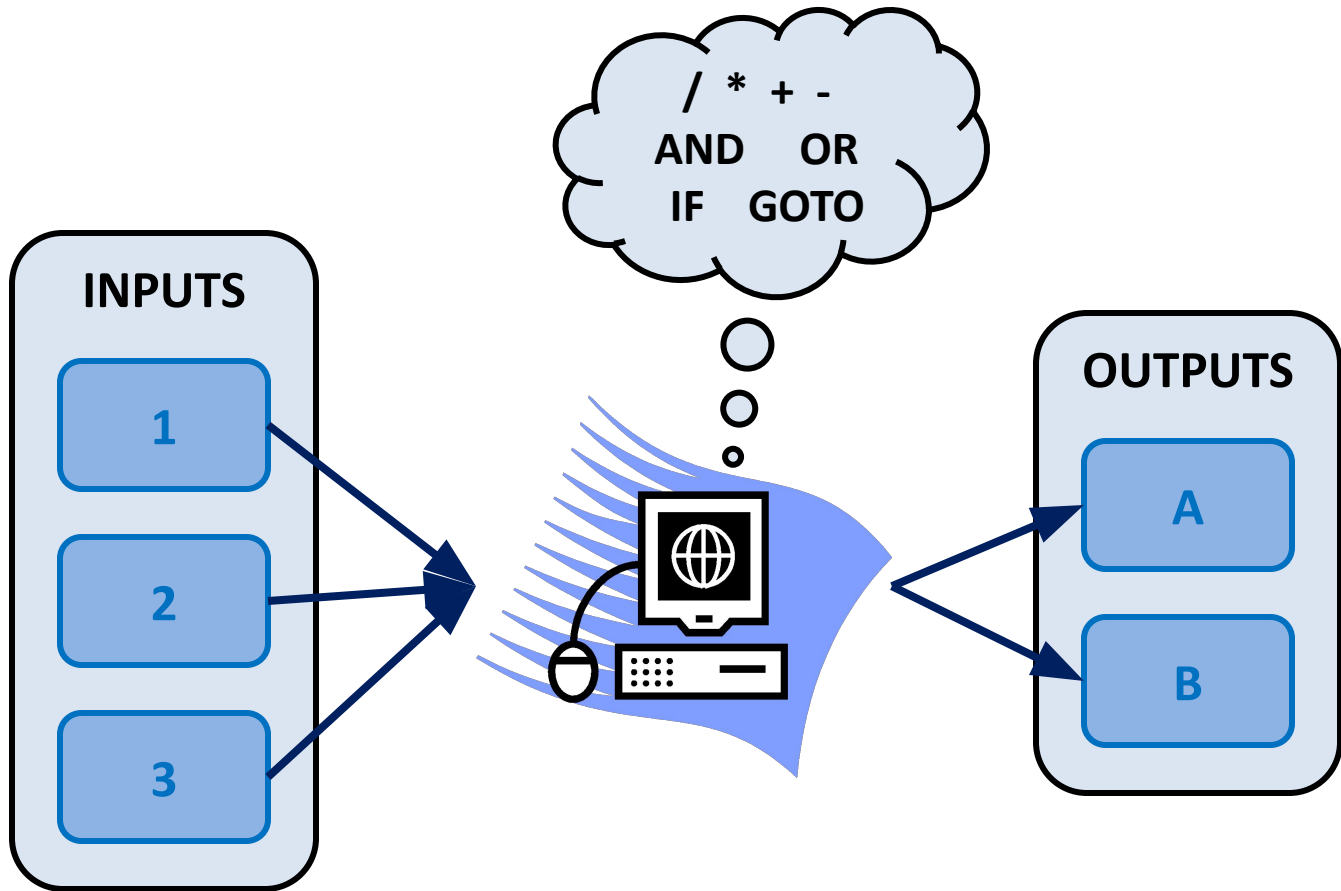
Characteristics of Neural Networks

Massive parallel processing - Many neurons simultaneously during data processing

Robustness – All system can still perform well even if some neurons "go wrong"
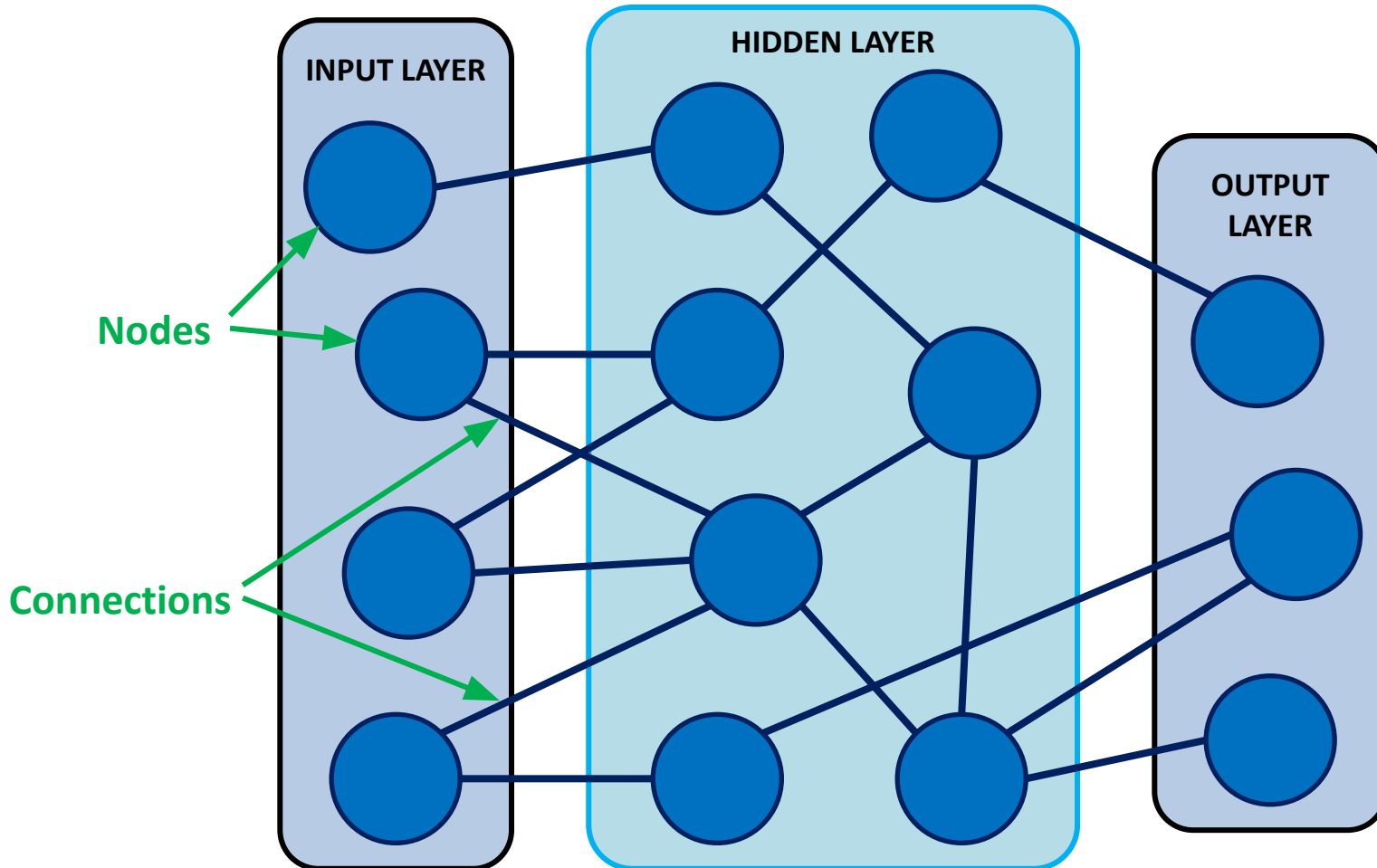
Representation of Neural Networks

Conventional Computer Model

INPUTS

1

2

3

/ * + -
AND   OR
IF   GOTO

OUTPUTS

A

B

Neural Network As A Computer Model

Training artificial neural network

There are three general paradigms of learning:

"The teacher" - neural network has the correct answer (output network) for each input sample. Weights are adjusted so that the network produced a response as possible close to the known correct answers.

"Without a teacher" (self) - requires knowledge of correct answers for each sample training set. In this case reveals the internal structure of the data and the correlation between samples in the training set that allows you to distribute samples by category.

mixed - part weights determined by means learning from the teacher, while the other is determined by means of self-study. LOGO

What are neural networks used for?

Classification: Assigning each object to a known specific class

Clustering: Grouping together objects similar to each other

Pattern Association: Presenting of an input sample triggers the generation of specific output pattern

Function approximation: Constructing a function generating almost the same outputs from input data as the modeled process

Optimization: Optimizing function values subject to constraints

Forecasting: Predicting future events on the basis of past history

Control: Determining values for input variables to achieve desired values for output variables

ANN Feature Recognition (OCR Software)
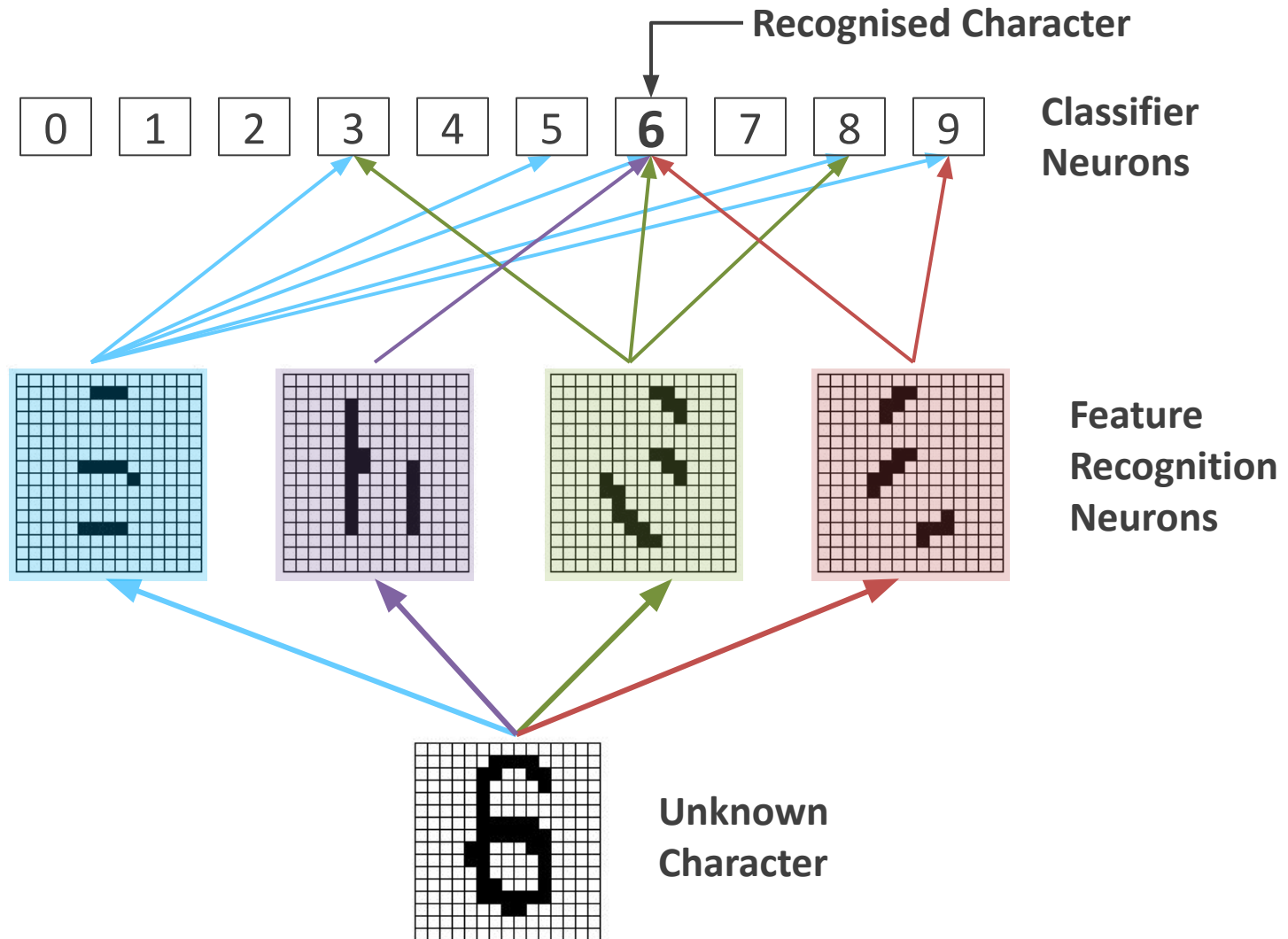
Final Words

" *Artificial neural networks are still far away from biological neural networks , but what we know today about artificial neural networks is sufficient to solve many problems that were previously unsolvable or inefficiently solvable at best.* "