NEURAL NETWORKS
&
AESTHETICS

Frieder Nake
A Workshop, Summer 2020

–day2–

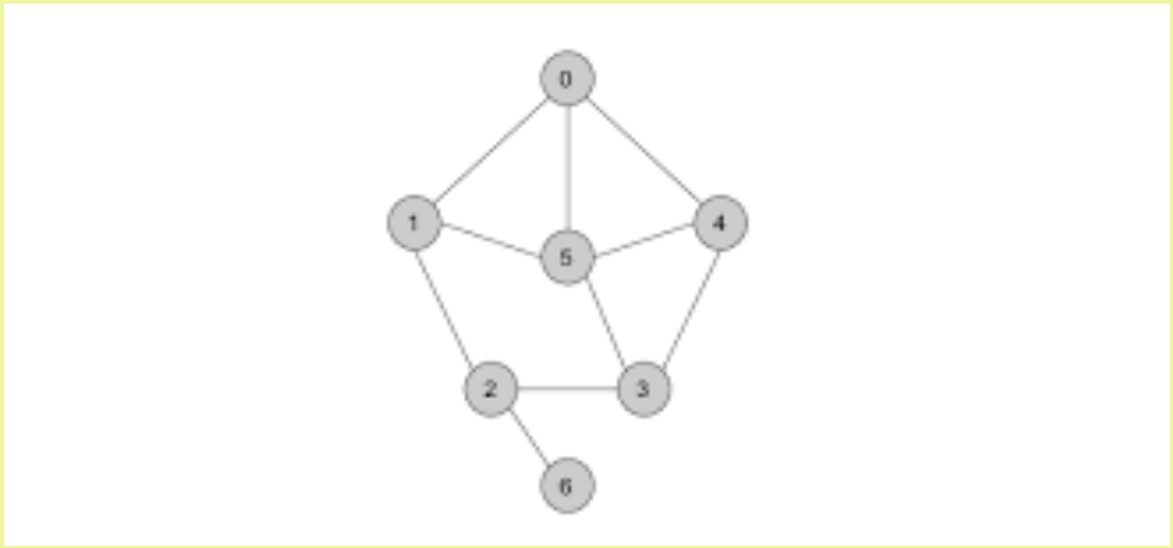
a graph is, first, a mathematical structure.

Given a set N of k "nodes", $N = \{n_1, n_2, \ldots, n_k\}$,
and given a set E of pairs of nodes from N, $E \subset N \times N$,
we call the pair (N, E) a "graph".

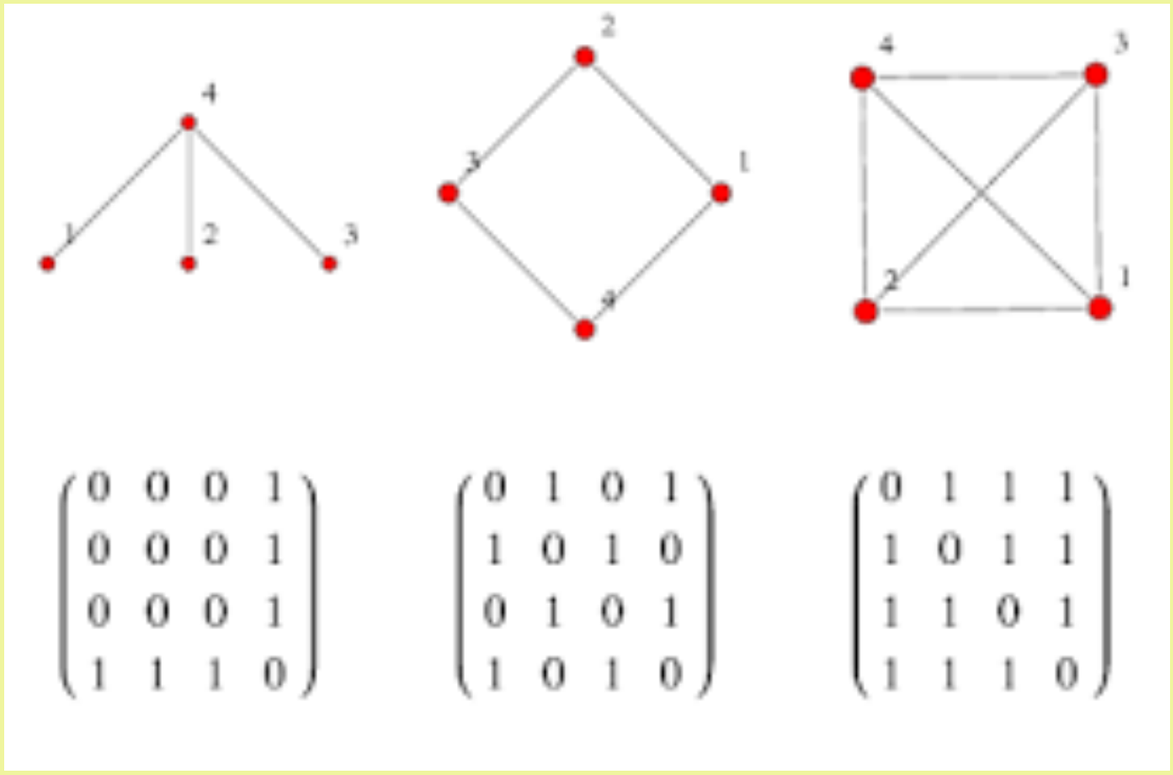
The elements of E are called "edges" or "connections"
between two nodes.

The edge (n_i, n_j) is called the "edge from node n_i to n_j".
Edges are directed.

a graph is a model of a network.
or: a network is a realization of a graph.
usually, networks are "labelled";
i.e., their nodes and edges may have "labels" attached to them.



a graph with 6 nodes
and 10 undirected edges



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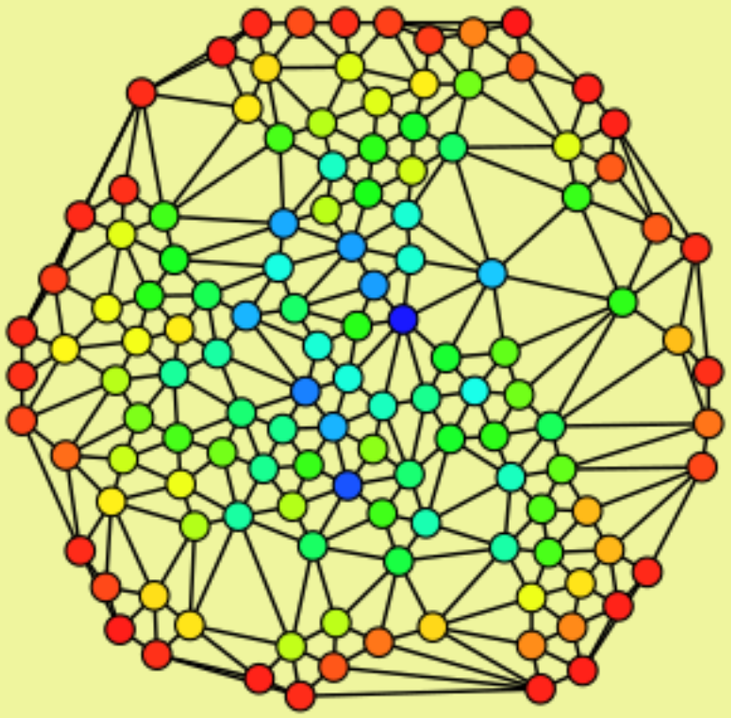
three graphs of 4 nodes
and 3, 4, or 6 undirected edges,
given by their adjacency matrices

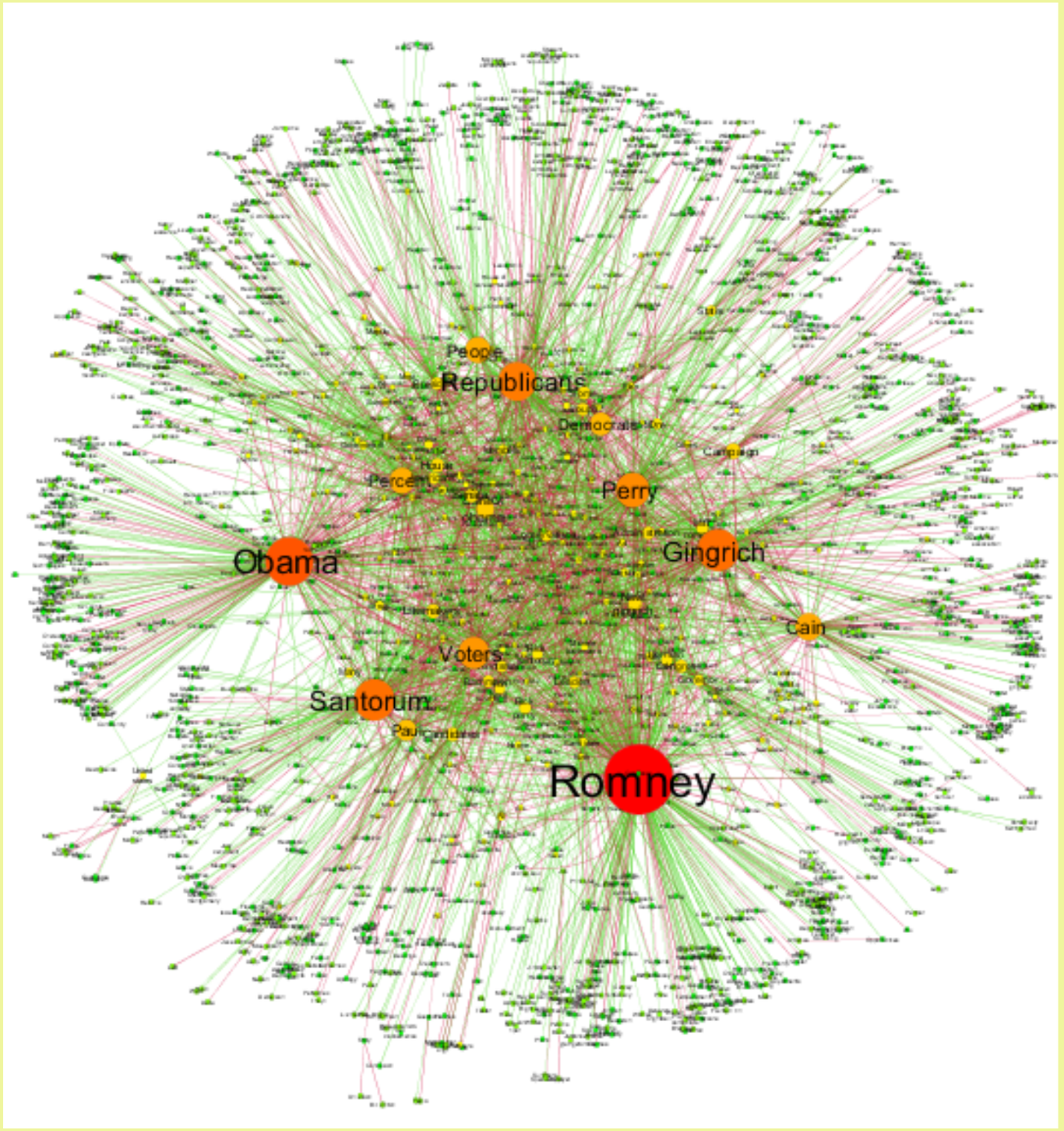
a graph is a model of a network.

or: A NETWORK IS A REALIZATION OF A GRAPH.

usually, networks are “labelled”;
i.e., their nodes and edges may have “labels” attached to them.



schematic graph



graph from US elections, 2012

Artificial neural networks (ANNs),
(usually simply called neural networks (NNs), or connectionist systems)
are computing systems vaguely inspired
by the biological neural networks that constitute animal brains.

The data structures and functionality of neural nets
are designed to simulate associative memory.

Neural nets learn by processing examples,
each of which contains a known "input" and "result,"
forming probability-weighted associations between the two,
which are stored within the data structure of the net itself.

(The "input" here is more accurately called an input set,
since it generally consists of multiple independent variables,
rather than a single value.)

(from Wikipedia)

Thus, the "learning" of a neural net
from a given example
is the difference in the state of the net before and after processing the example.

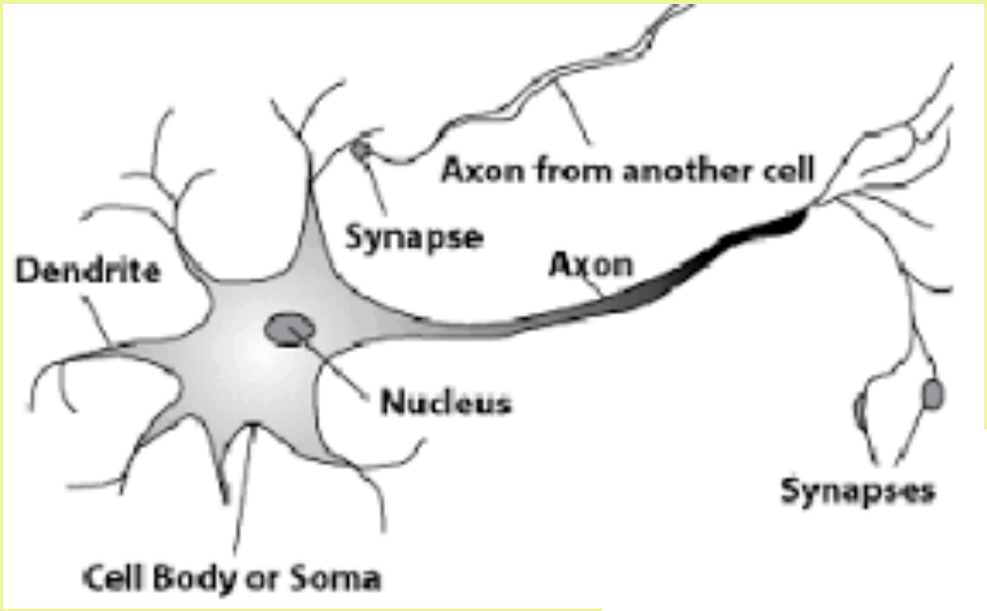
After being given a sufficient number of examples,
the net becomes capable of predicting results from inputs,
using the associations built from the example set.

If a feedback loop is provided to the neural net
about the accuracy of its predictions,
it continues to refine its associations,
resulting in an ever-increasing level of accuracy.

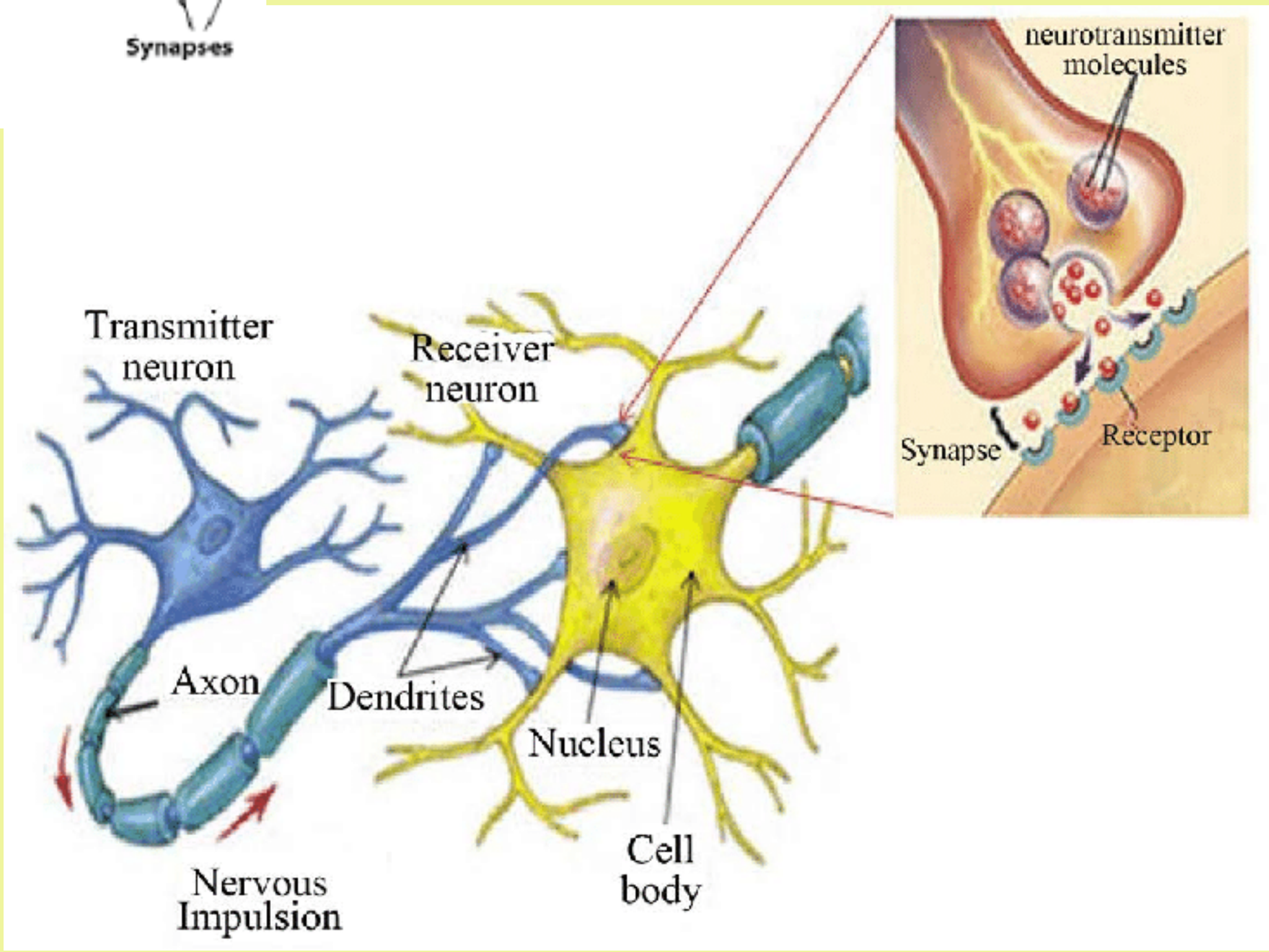
In short, there is a direct relationship between the number and diversity of examples
processed by a neural net
and the accuracy of its predictions.

Because neural nets are indiscriminate
in the way they form associations,
they can form unexpected associations,
and reveal relationships and dependencies that were not previously known.

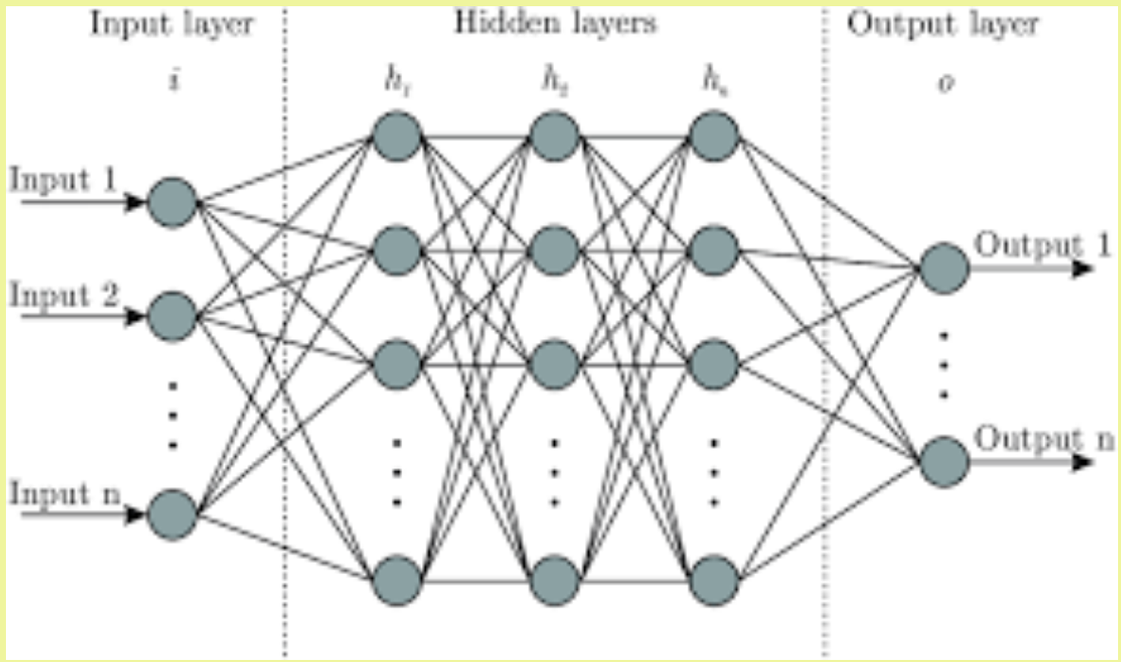
(from Wikipedia)



schematic drawings
of brain neurons



This is not my brain.



This is not my brain, either.

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INFORMATION
KNOWLEDGE
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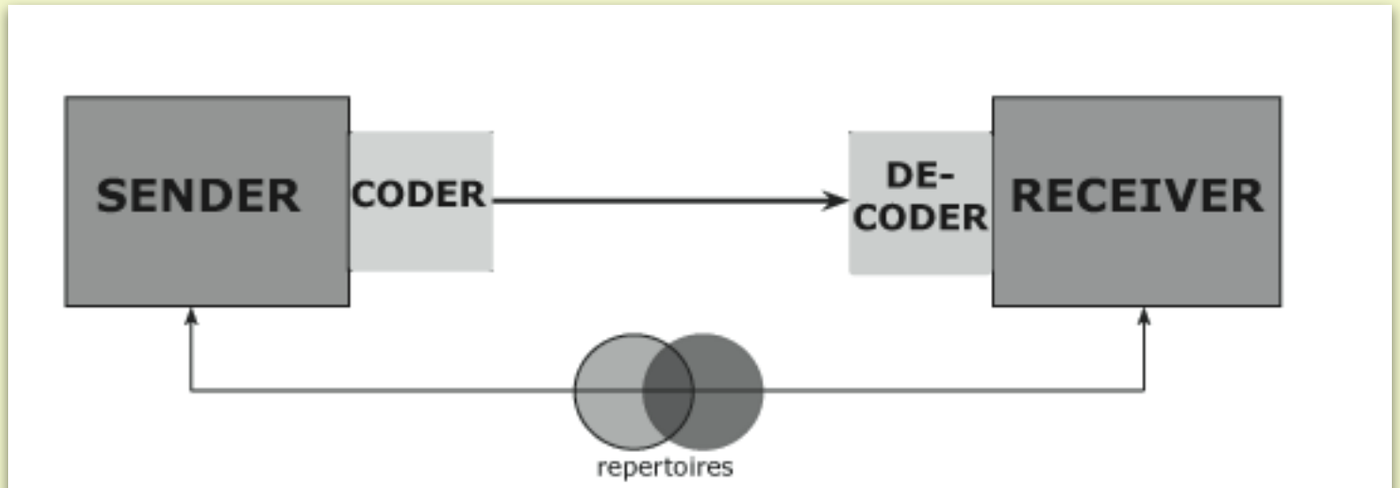
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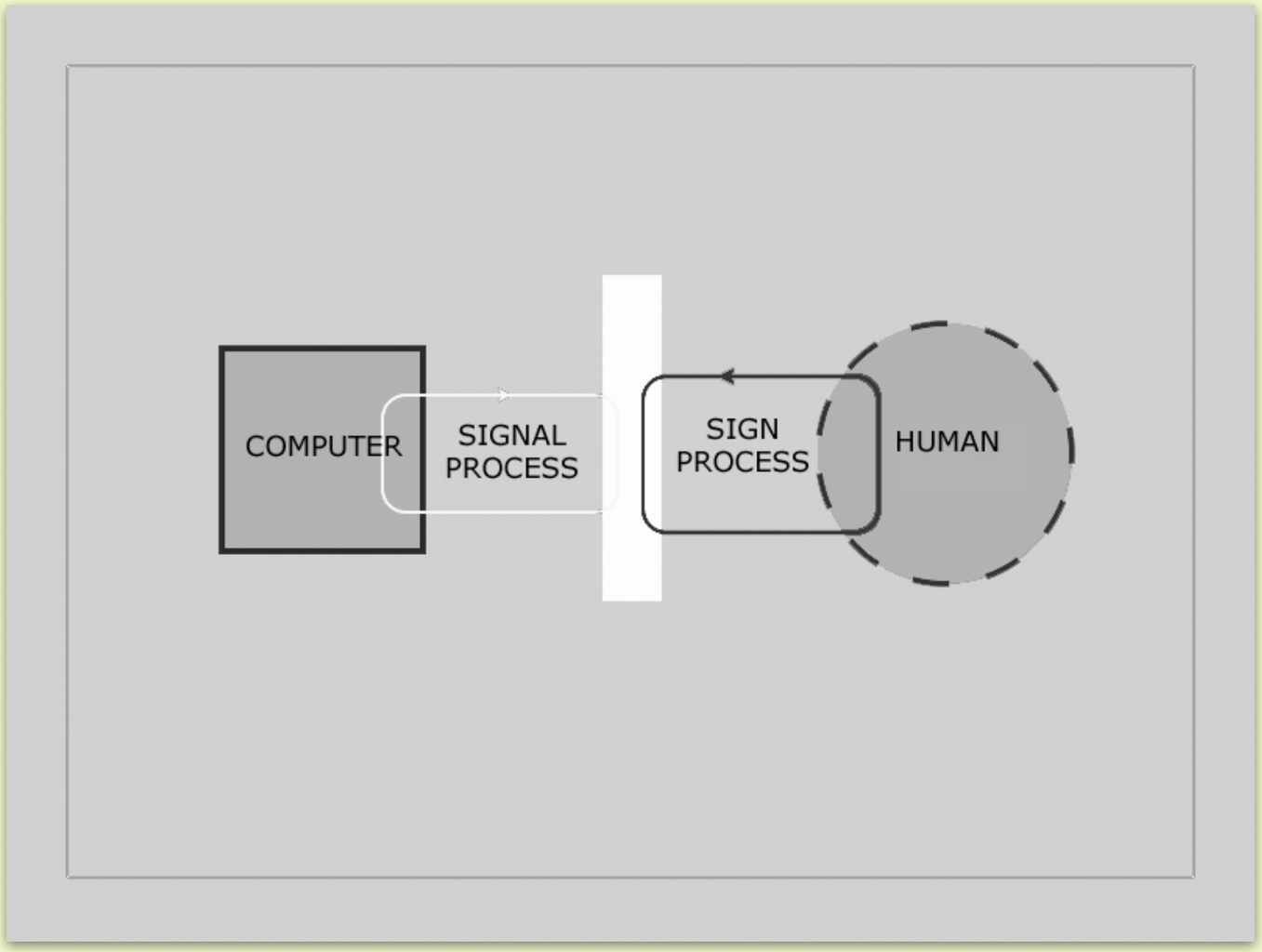
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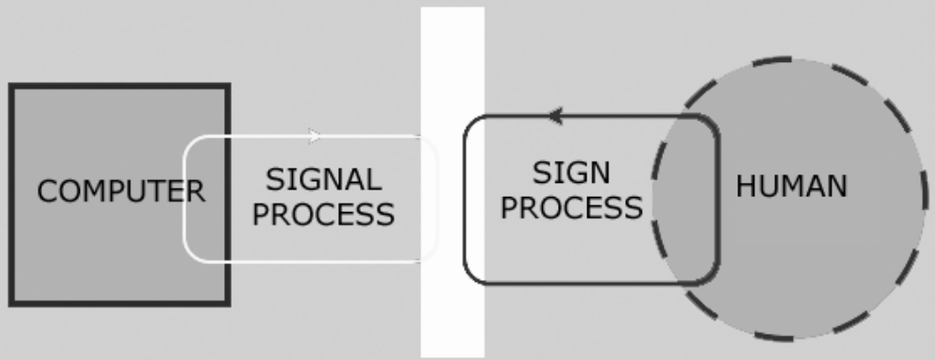
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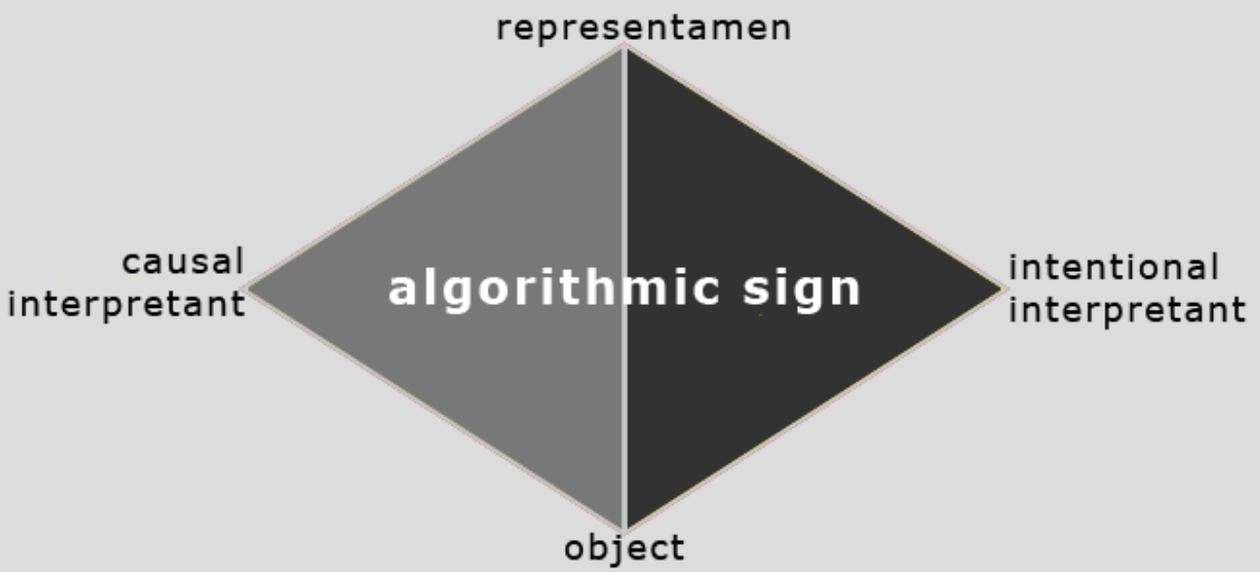
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ARTIFICIAL

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INTELLIGENCE

MARIO KLINGEMANN
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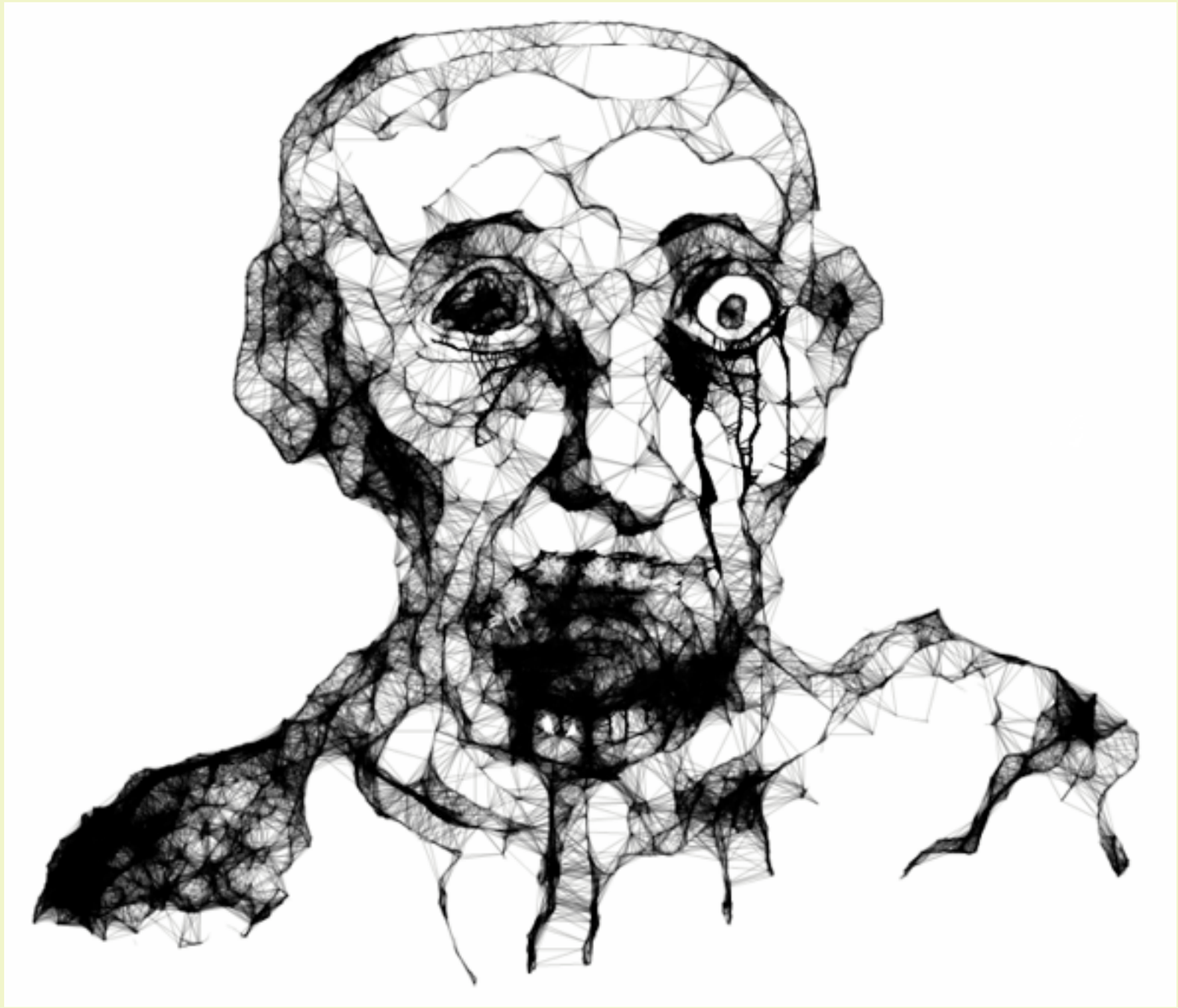

ScribblerToo (2010)
by Quasimondo
(Mario Klingemann)
February 25, 2010

This is a remix of Ze Frank's "The Scribbler" (2004).

In 2010 I wrote this little tool on a Friday afternoon as a personal challenge
to see how fluid I could make the painting process
with the technical possibilities of the time.

Astonishingly, ScribblerToo has found a huge community of fans
and people are still using it to paint and *create art with it*.

Mario Klingemann presentation
at conference “beyond tellerrand” Düsseldorf 2017

watch it! 48 minutes

https://www.youtube.com/watch?v=zrWGCDZXkeI

Artist and Neurographer working with artificial intelligence, data and systems.