

BUKU AJAR

Komunikasi data

Happy Nugroho, S.T., M.T.



SEMESTER III

PRODI TEKNIK ELEKTRO

FAKULTAS TEKNIK

UNIVERSITAS MULAWARMAN SAMARINDA



➤ *Objective*

- *Understanding of artificial neural networks (ANNs), fuzzy systems, and evolutionary algorithms; and their application intelligent systems*
- *Capability in realizing an intelligent system consists of the ANN, fuzzy system, and evolutionary algorithm (programming skill)*



➤ *Contents*

- *Artificial Neural Networks*
- *Fuzzy Systems*
- *Evolutionary Algorithm*
- *Special topics of intelligent systems*

Apa Itu Intelligence....



- *The ability to solve hard problem (Minsky)*
- *Capability to learn to perform various function within a changing environment to survive and to prosper (Carne)*
- *Property in which the organism senses, reacts, learns from, and subsequently adapts its behavior to its present environment in order to better promote its own survival (Atmar)*

Capability of a system to adapt its behavior to meet its goals in a range of environments (Fogel)

Perkembangan Ilmu Kecerdasan Buatan dari Konvensional hingga Komputasional



➤ An advance computer technology which is concerned with making machines work in intelligent way, mimicking the way of human mind

	Conventional	AI	Neural networks	Fuzzy systems	Other methodologies
1940s	1947 Cybernetics		1943 McCulloch-Pitts neuron model		
1950s	1956 Artificial Intelligence		1957 Perceptron		
1960s	1960 Lisp language		1960s Adaline Madaline	1965 Fuzzy sets	
1970s	mid- 1970s Knowledge Engineering (expert systems)		1974 Birth of Back-propagation algorithm 1975 Cognitron Neocognitron	1974 Fuzzy controller	1970s Genetic algorithm
1980s			1980 Self-organizing map 1982 Hopfield Net 1983 Boltzmann machine 1986 Backpropagation algorithm boom	1985 Fuzzy modeling (TSK model)	mid- 1980s Artificial life Immune modeling
1990s				1990s Neuro-fuzzy modeling 1991 ANFIS 1994 CANFIS	1990 Genetic programming

[JSR Jang, *Neuro-fuzzy and soft computing*, 1997]

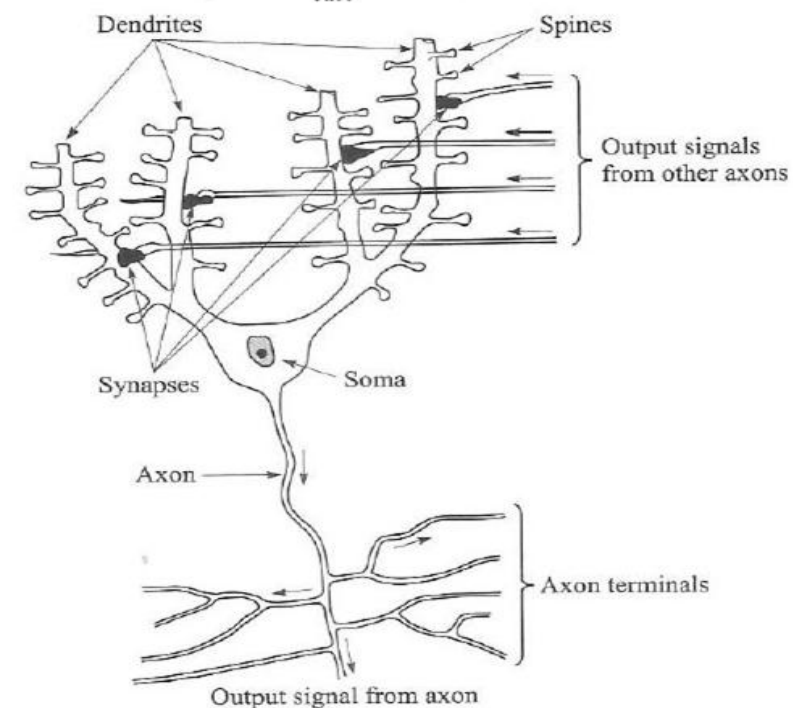
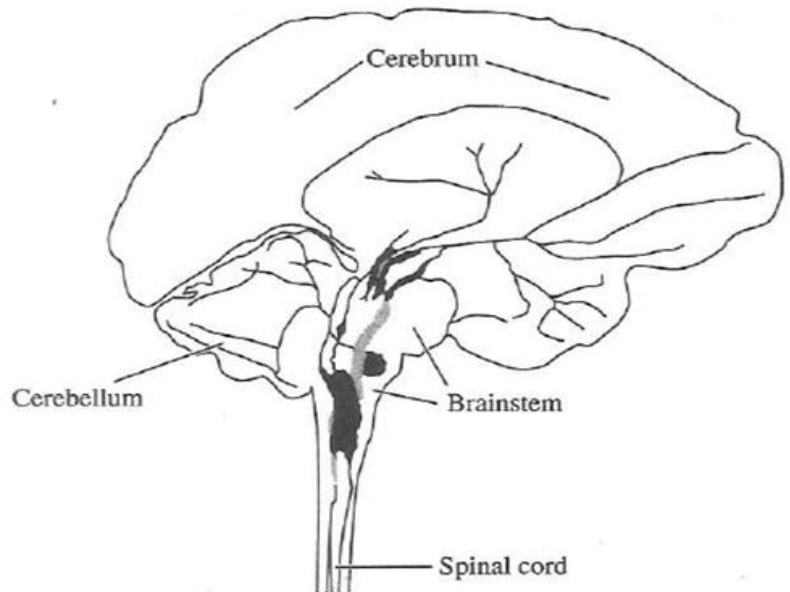


Basics of Neuroscience and Neuron models



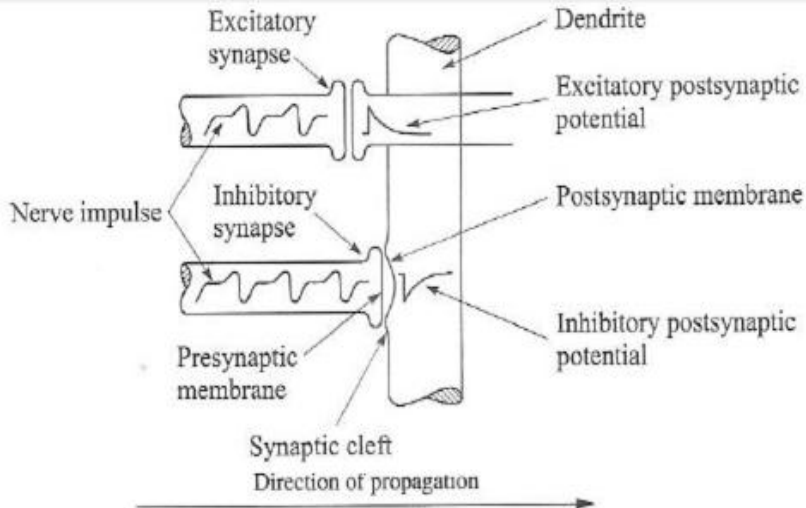
- *ANNs (also called parallel distributed processing systems) and connectionist systems are intended for modeling the organizational principles of the central nervous system*
- *Biologically inspired computing capabilities of ANN is expected to allow the cognitive and sensory task to be performed more easily*

Basics of Neuroscience



- Human nervous system is made up of a vast network of computing elements (*neuron*) with brain as a central unit.
- The brain is connected to *receptors* that bring sensory information, and it delivers command to *effectors*.
- A biological neuron consists three main components: *dendrite, cell body (soma), and axon*.
- Function of nervous system is represented by *activities of neurons, topology of the connections and their strength*.

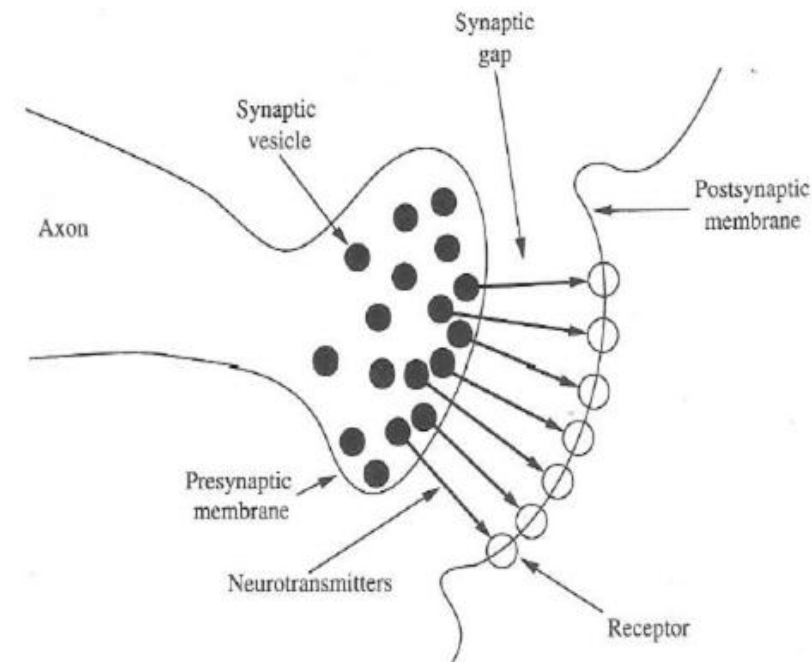
Synapses



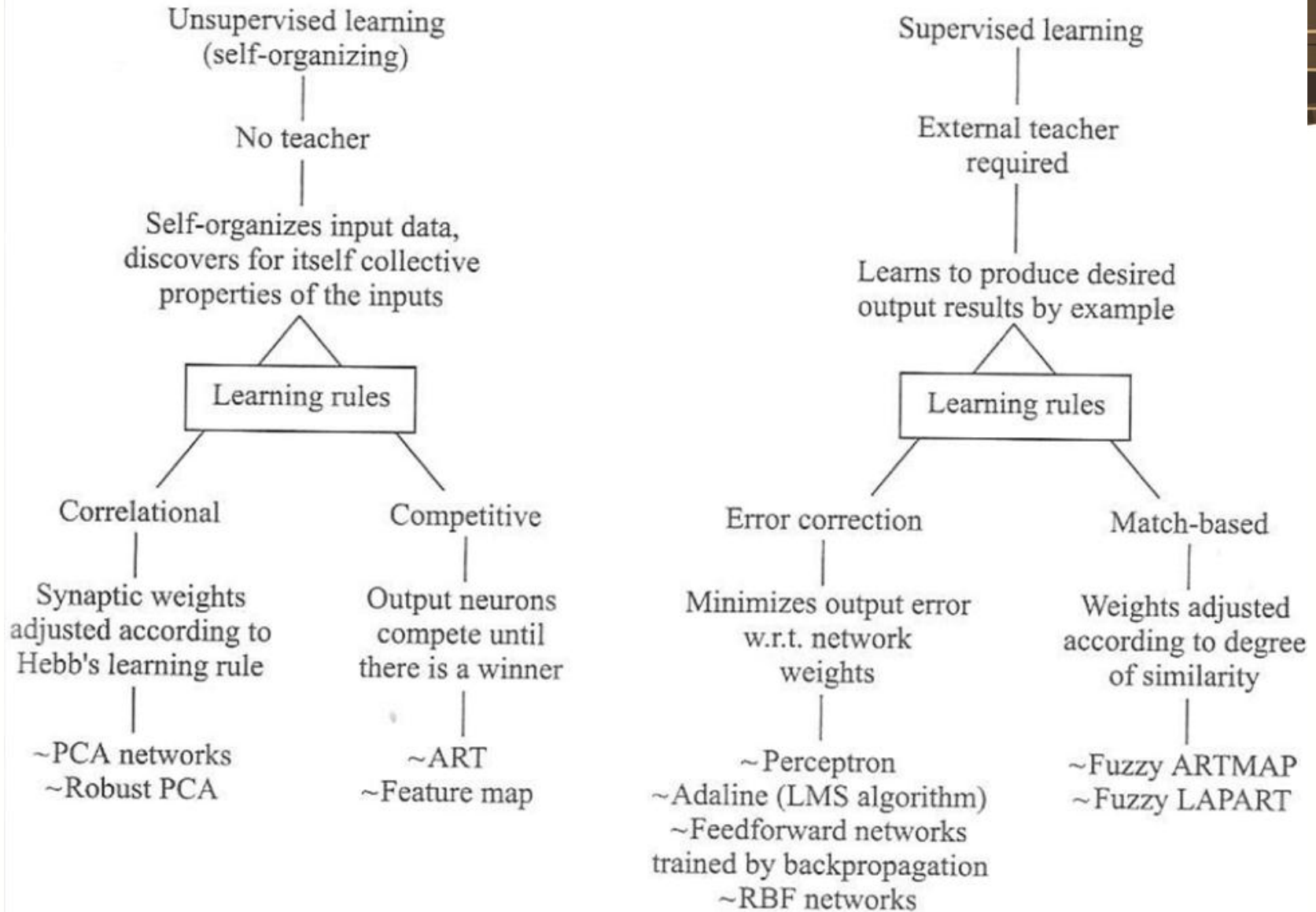
➤ *The excitation of a neuron affects other neurons through contacts of synapses.*

➤ *Small space between presynaptic membrane and postsynaptic membrane is called synaptic cleft.*

➤ *Communication between neurons is facilitated by the release of small packet chemicals (neurotransmitter) into the synaptic cleft.*



Classification on NN



Neuron Models



- *McCulloch and Pitts, 1943. They presenting 5 assumptions governing the operations of neurons. No learning, but their neuron model can act a certain logic function. Their model laid the foundation for future development in neural networks.*
- *Donald Hebb, 1949. he describes learning process that was postulated from neurological viewpoint. He stated that information is stored in the connection of neuron and postulated a learning strategy for adjustment of connection weight.*
- *Von neumann, 1958. he mentioned about importance of memory in biological system as in the electronic one.*
- *Frank Rosenblatt, 1958. Perceptron, first precisely defined computationally oriented neural network.*
- *Widrow and Hoff, 1960. LMS learning rule, ADELPHI, MADLINE.*
- *Minsky and Papert, 1969. they doubted about limitation and improvement of perceptron.*



- *Werbos, 1974. First description of backpropagation algorithm.*
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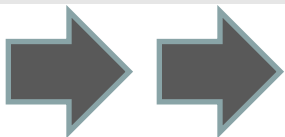


dari Konvensional

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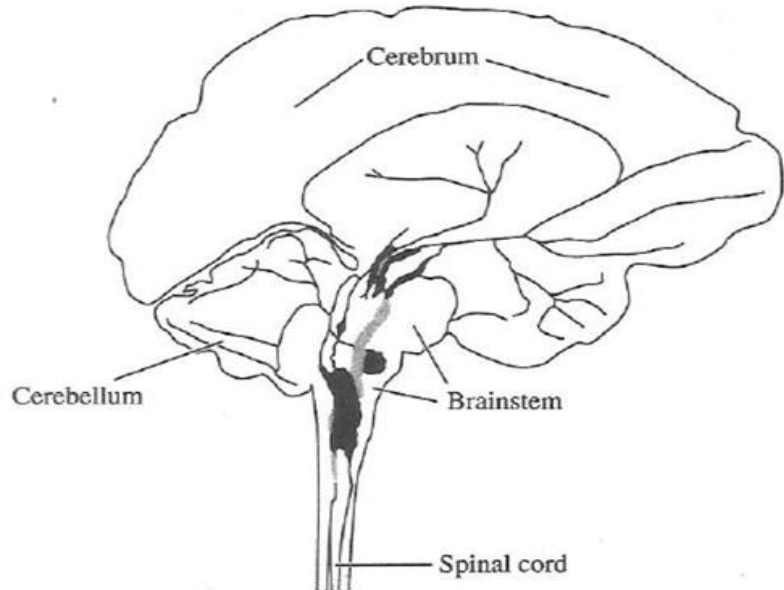


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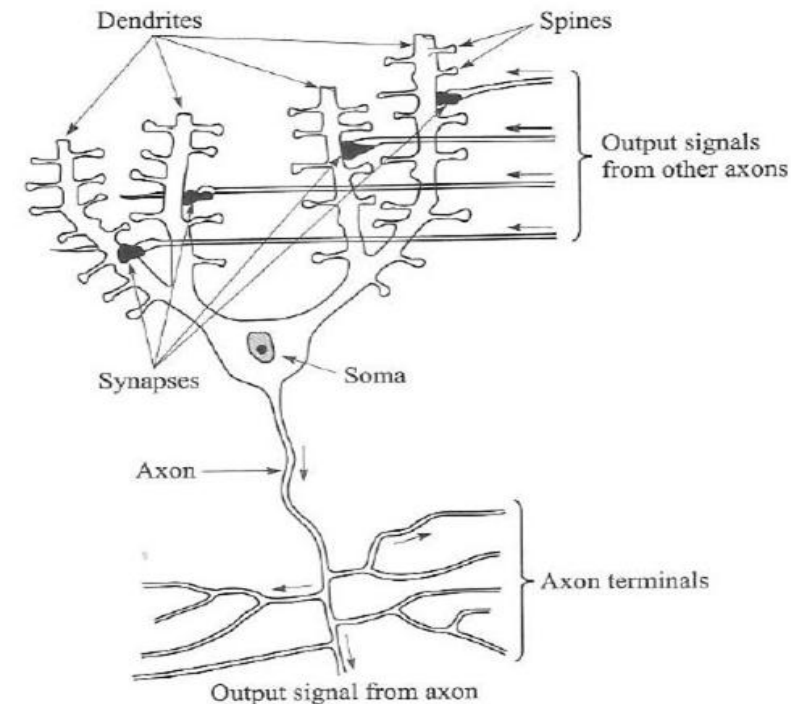


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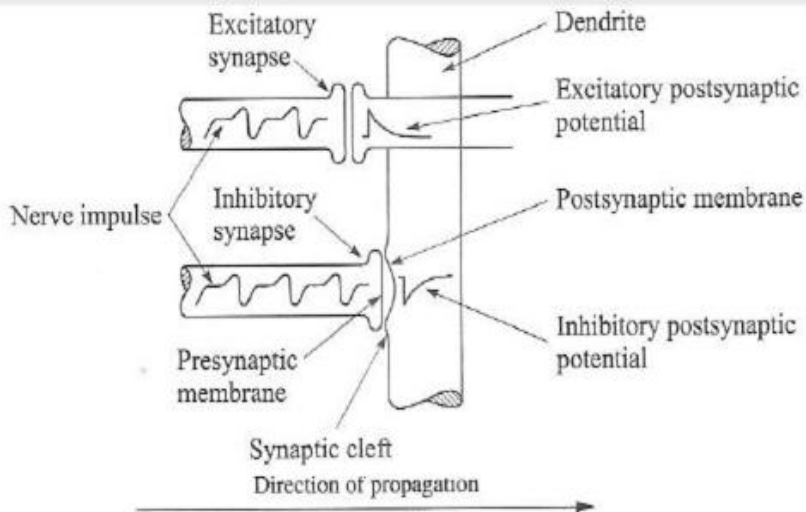
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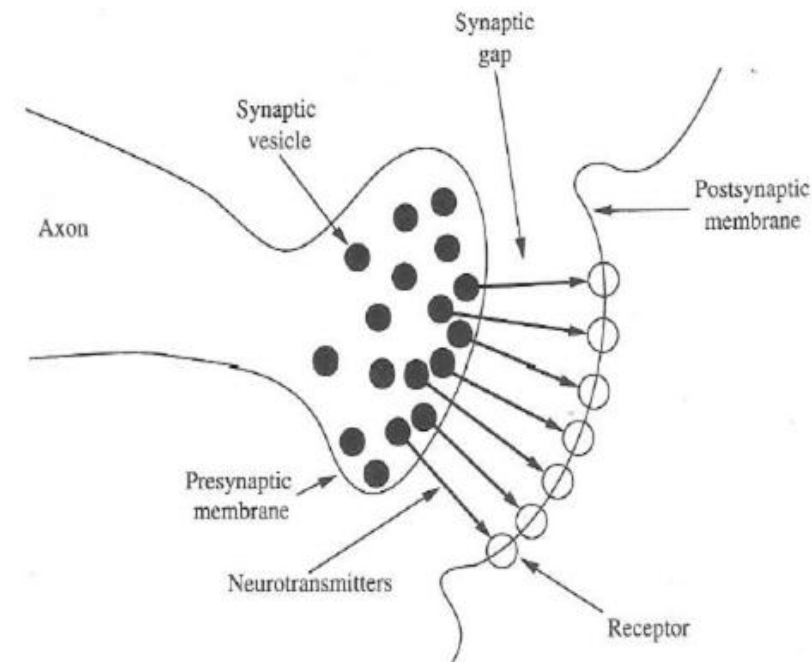
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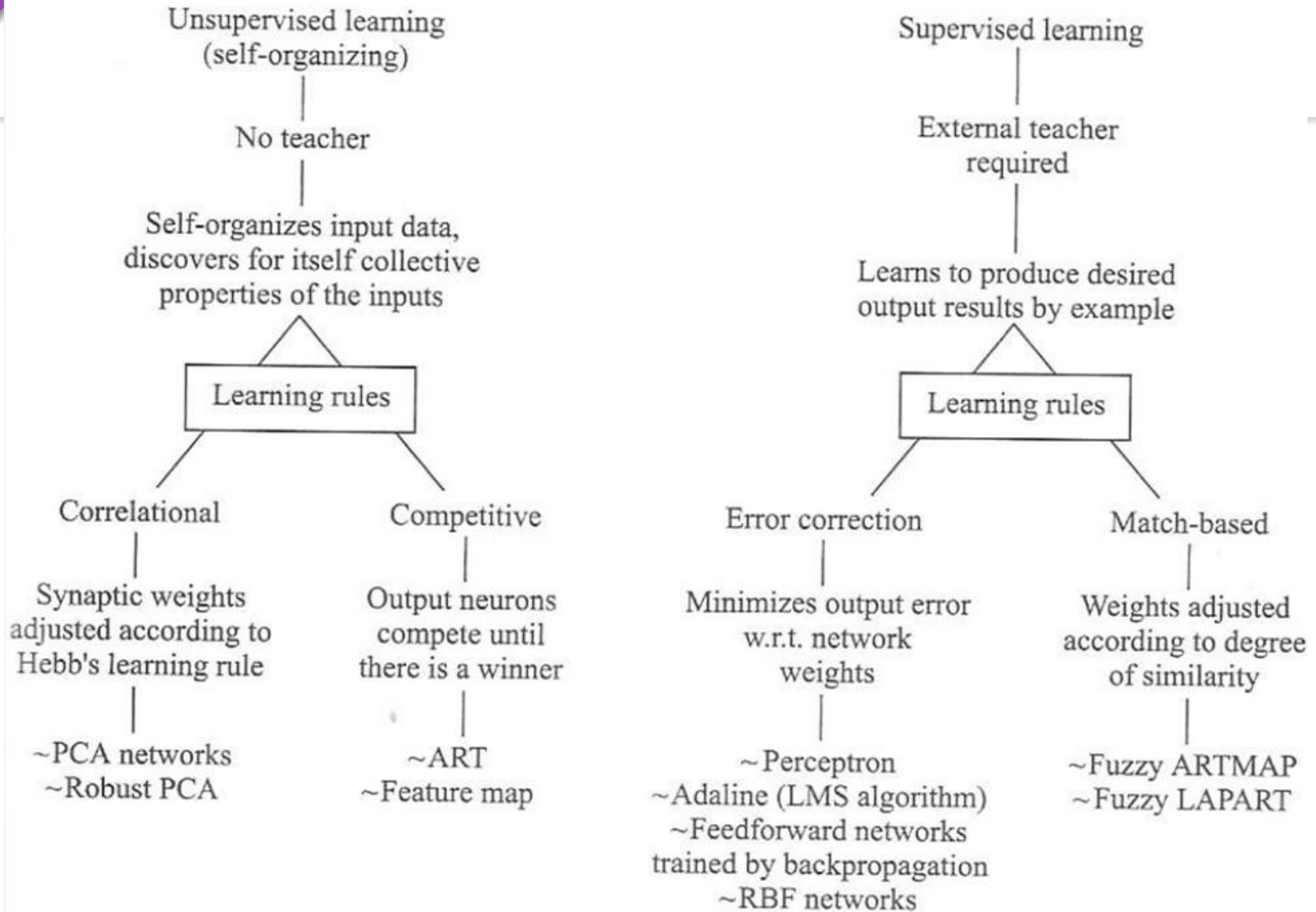
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