SNS COLLEGE OF TECHNOLOGY
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COIMBATORE-35
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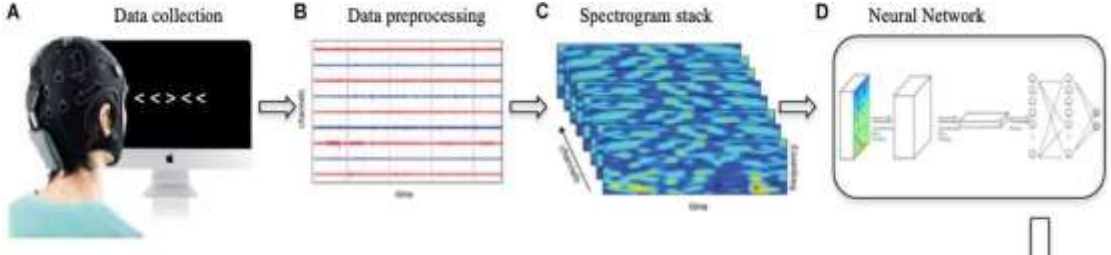
ARTIFICIAL INTELLIGENCE FOR ELECTRICAL ENGINEERING

UNIT III - TOPIC : KNOWLEDGE REPRESENTATION OF NEURAL NETWORK

OVERVIEW

What is meant with learning?



E Leave-Pair-Out Cross Validation

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REPEAT N=400 times (folds):
1- Choose (random, balanced) training and test subject sets (leave-pair-out)
3- Train the NN using Adam optimizer with frames as inputs
4- Evaluate per-frame performance on training and test set
5- Evaluate per-subject performance averaging frame outputs
END
Compute mean and standard deviation of performances over the N folds
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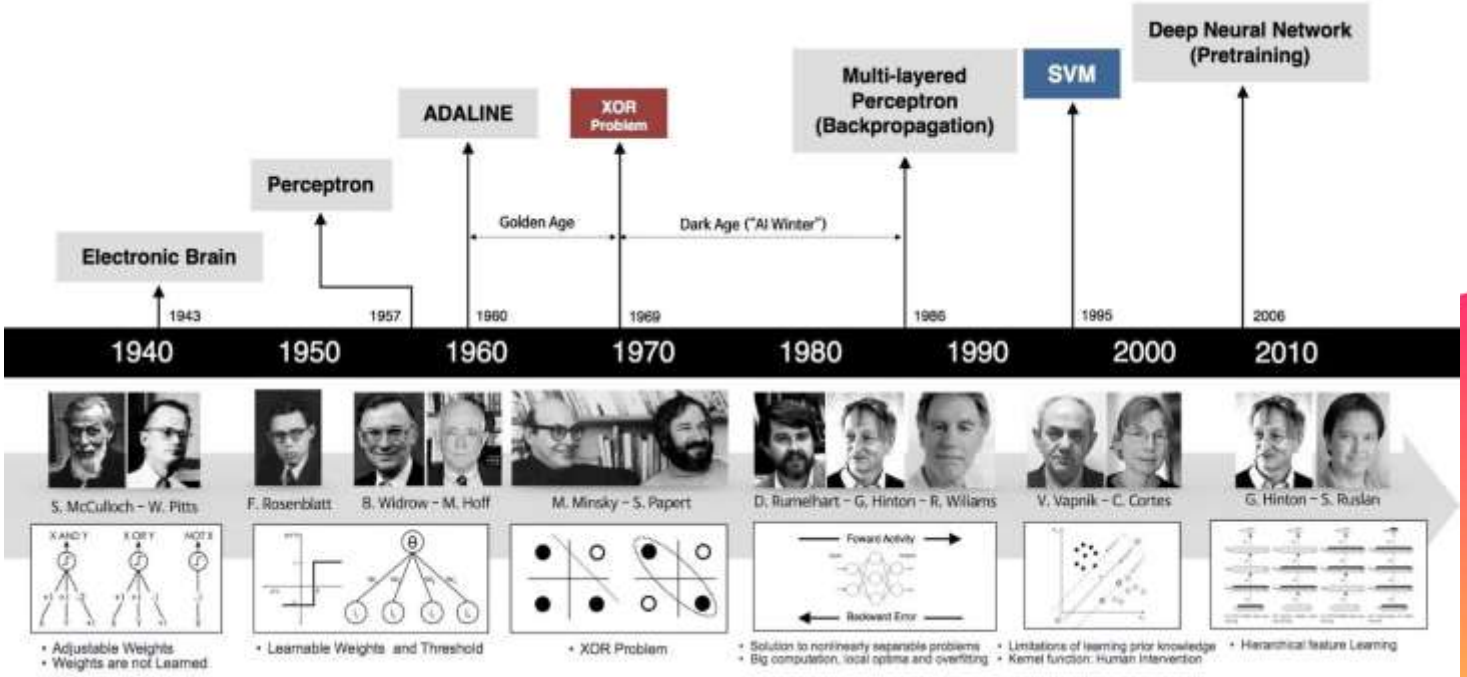
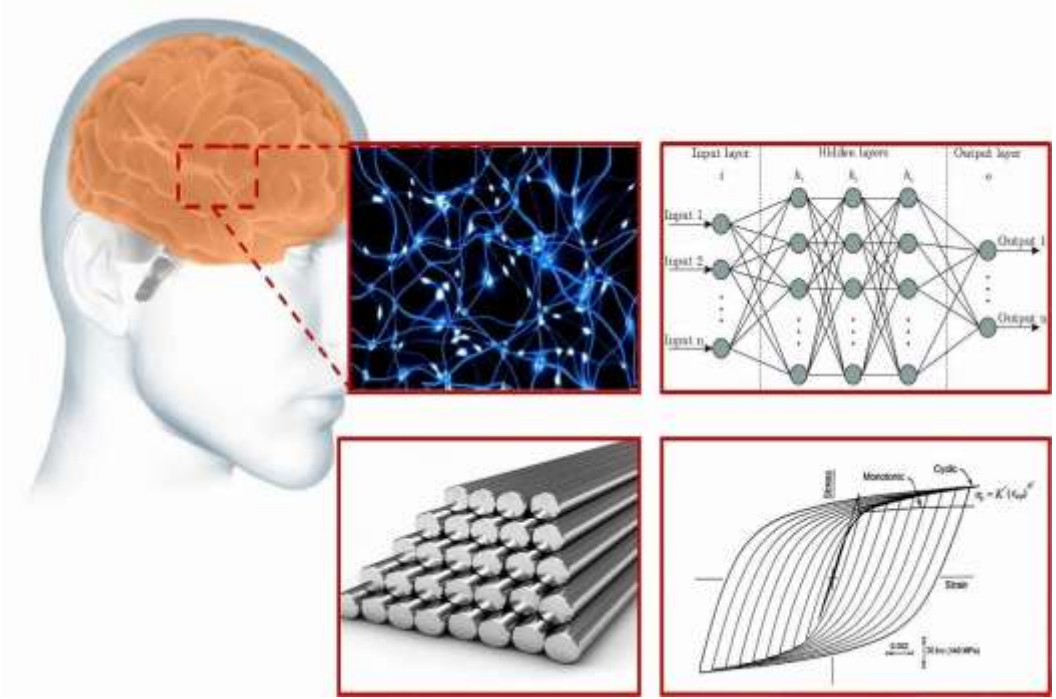
The ability of the neural network (NN) to learn from its environment and to improve its performance through learning.

SOME HISTORICAL NOTES



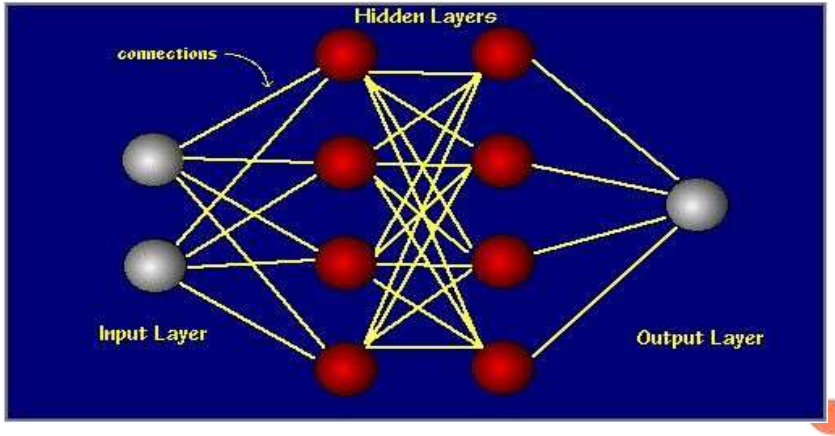
PROPERTIES



Steel is one of the essential alloys used by humans.
This alloy is widely used in the water transfer network and the architecture of buildings, especially automobiles.
As a result, it is crucial to know its properties to make the best use of this alloy.

DEFINITION OF LEARNING

Learning is a process by which the free parameters of a neural network are adapted through a process of stimulation by the environment in which the network is embedded.

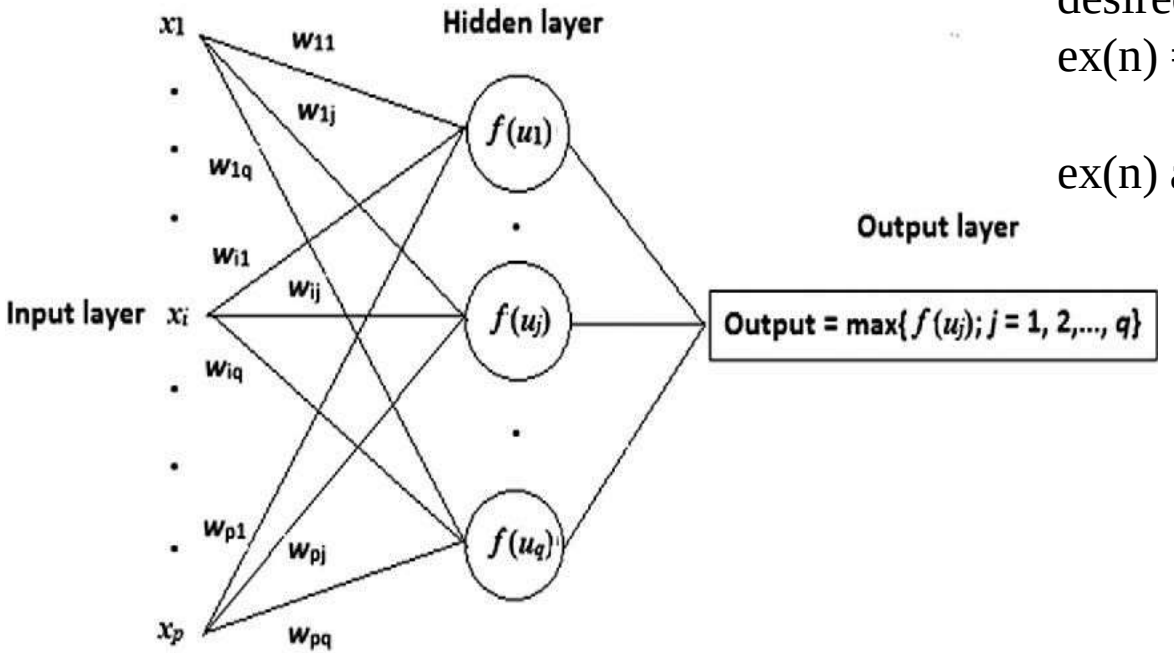


The type of the learning is determined by the manner in which the parameter changes take place. (Mendel & McClaren 1970).

FIVE BASIC LEARNING RULES

- Error-correction learning <- optimum filtering
- Memory-based learning <- memorizing the training data explicitly
- Hebbian learning <- neurobiological
- Competitive learning <- neurobiological
- Boltzmann learning <- statistical mechanics

ERROR-CORRECTION LEARNING

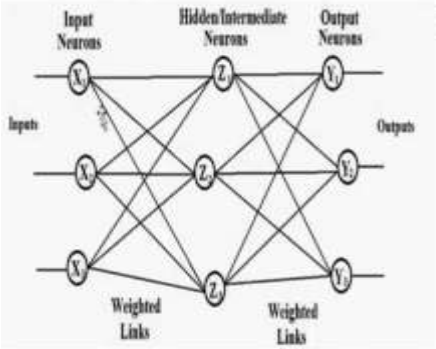


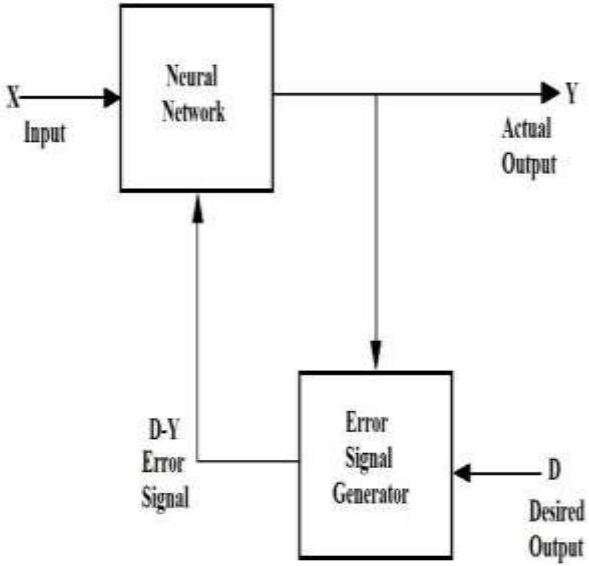
error signal =
desired response – output signal
ex(n) = dx(n) - yk(n)

ex(n) actuates a control mechanism to make the output signal yk(n)

MEMORY-BASED LEARNING

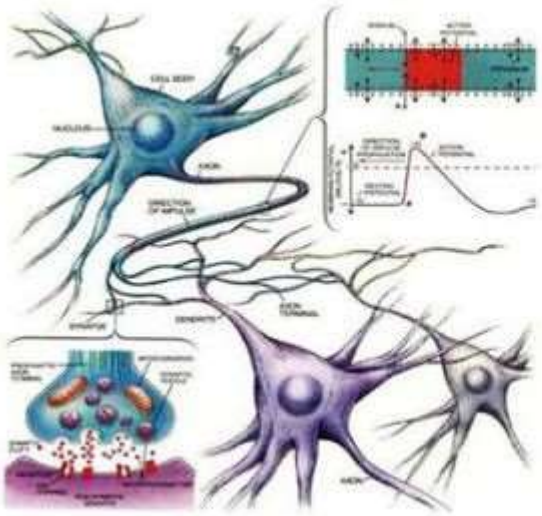
All of the past experiences are explicitly stored in a large memory of outlie correctly classified input-output examples





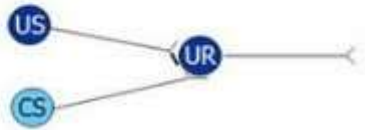
HEBBIAN LEARNING

If two neurons on either side of synapse (connection) are simultaneously, then the strength of that synapse is selectively increased.



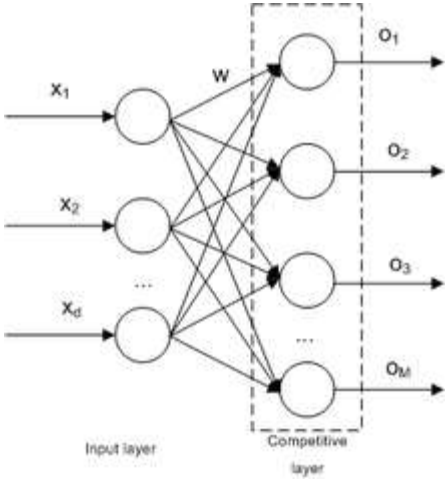
Hebbian learning:

- When two joining cells fire simultaneously, the connection between them strengthens (Hebb, 1949)
- Discovered at a biomolecular level by Lomo (1966) (Long-term potentiation).



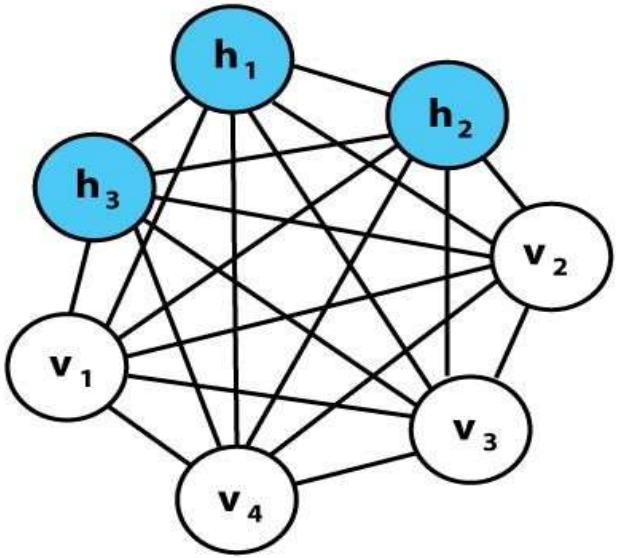
Learned assocations through the strengthening of connections....

COMPETITIVE LEARNING



The standard competitive learning rule
AWki = n(X;-Wj)
if neuron k wins the competition = 0
if neuron k loses the competition.
All the neurons in the network are constrained to have the same length.

BOLTZMANN LEARNING



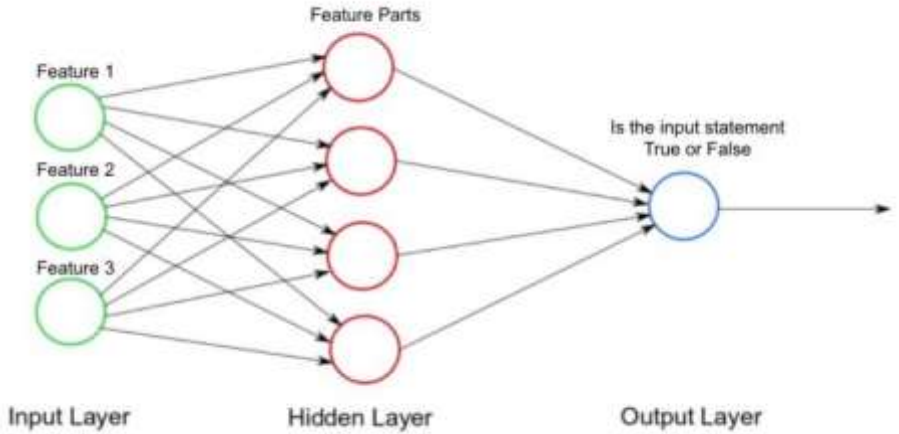
The neurons constitute a recurrent structure and they operate in a binary manner. The machine is characterized by an energy function E.

E = -1/25;Ex WkjXXX ; j# k

Machine operates by choosing a neuron at random then flipping the state of neuron k from state Xx to state - Xx at some temperature T with probability

P(X* > - Xx) = 1/(1+exp(- AE,/T))

RECAP….



…THANK YOU