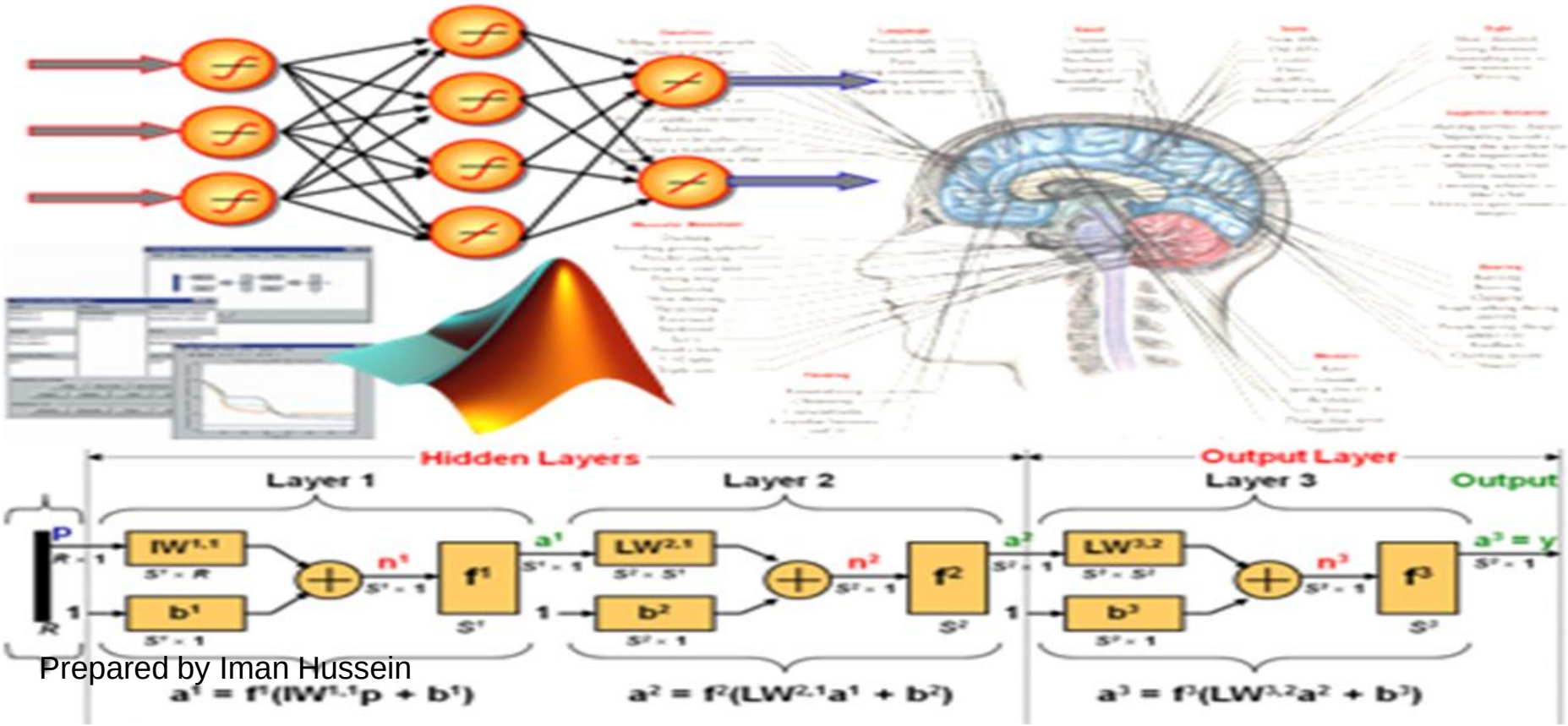
Fundamentals of Artificial Neural Networks (ANN)



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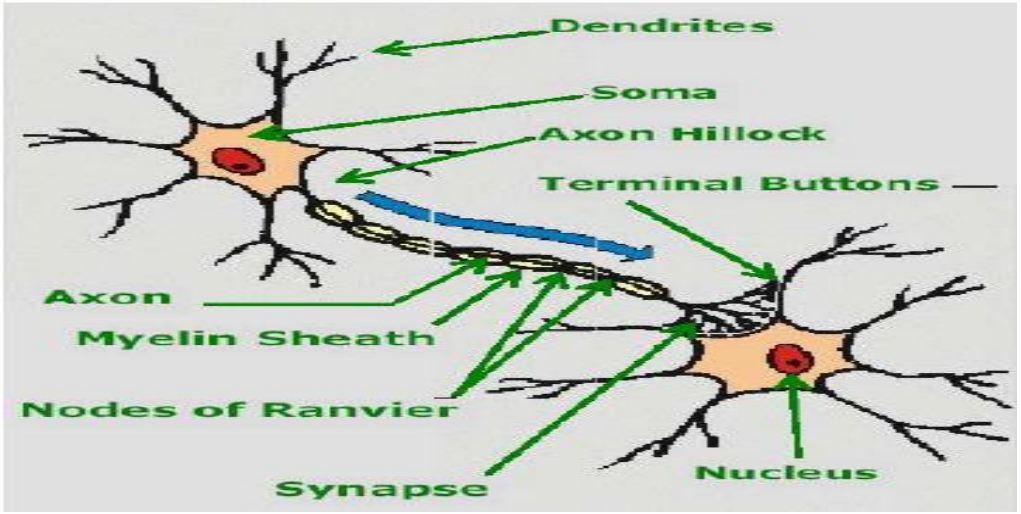
Introduction

- ***A neural net*** **is an artificial representation of the human brain that tries to simulate its learning process. An artificial neural network (ANN) is often called a "Neural Network" or simply Neural Net (NN).**

- **Traditionally, the word neural network is referred to a network of biological neurons in the nervous system that process and transmit information.**

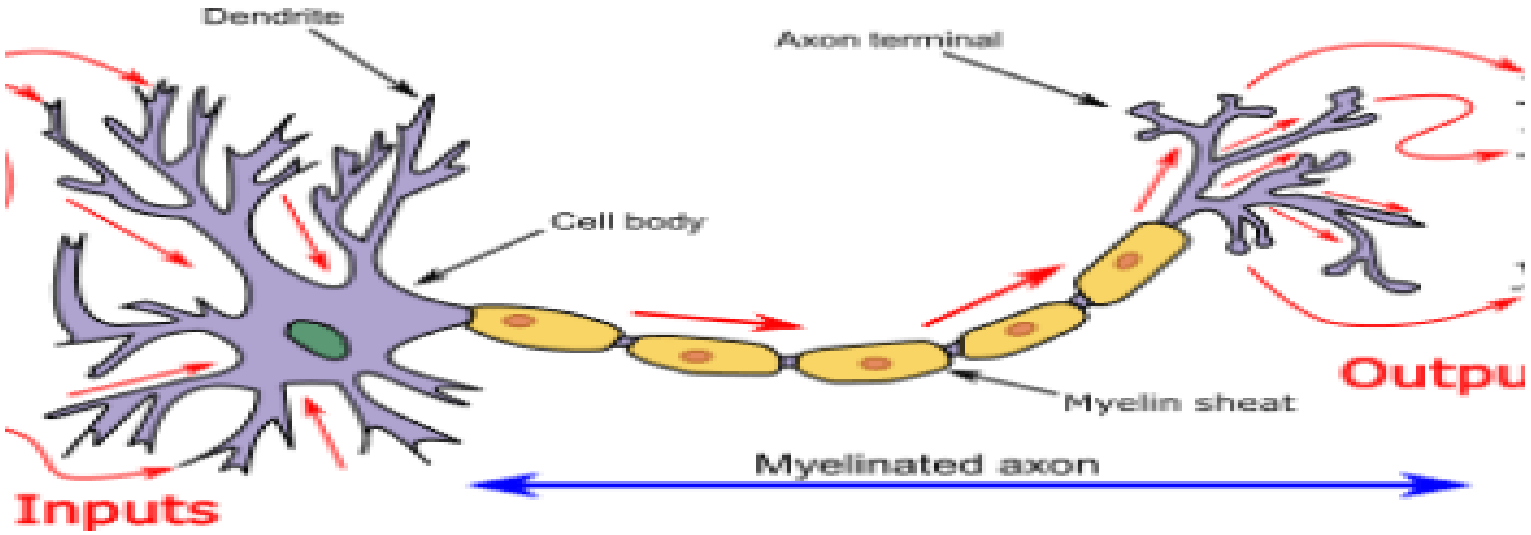
- ***Artificial neural network*** **is an interconnected group of artificial neurons that uses a mathematical model or computational model for information processing based on a connectionist approach to computation.**
- ***Artificial Neural Networks (ANNs),*** **like people, learn *by example*.**

Biological Neuron Model



- **Dendrites:** are branching fibers that extend from the cell body or soma.
- **Soma or cell body** of a neuron contains the nucleus and other structures, support chemical processing and production of neurotransmitters.
- **Axon:** is singular fiber carries information away from the soma to the synaptic sites of other neurons (dendrites and somas), muscles, or glands.
- **Synapse:** is the point of connection between two neurons or a neuron and a muscle or a gland. Electrochemical communication between neurons takes place at these junctions.

Information flow in a Neural Cell



- **Dendrites:** receive activation from other neurons.
- **Soma or cell body** processes the incoming activations and converts them into output activations.
- **Axon:** act as transmission lines to send activation to other neurons.
- **Synapse:** the junctions allow signal transmission between the axons and dendrites.

idioms Biological Neural Network & Artificial Neural Network

Biological Neural Network	*Artificial Neural Network*
Soma	Neuron
Dendrite	Input
Axon	Output
Synapse	Weight

Areas of Artificial Neural Networks (applications)

The areas in which neural networks are currently being applied are:

1. **Signal Processing**
2. **Pattern Recognition (Examples: Fingerprint Image, Handwritten Word, Human Face)**
3. **Control Problems**
4. **Medicine**
5. **Speech Production**
6. **Speech Recognition**
7. **Business**

Properties of Artificial Neural Networks

1. **Parallelism**
2. **Capacity for Adaptation "Learning Rather Programming“**
3. **Capacity of Generalization**
4. **No Problem Definition**
5. **Abstraction & Solving Problem with Noisy Data.**
6. **Ease of Constriction & Learning**
7. **Distributed Memory**
8. **Fault Tolerance**

Any Question?

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