3 weeks ago

|> Neural Net. - Computer Net. - Information <|

Brief Introduction of Neural Networks & Control centre/brain by Atieye Absalan [https://www.facebook.com/atieye.absalan] ;
|| The brain is the control centre of human's body and it sits in the skull at the top of spinal cord.
Brain is the most powerful & cleverest system in body. It acts quickly and accurately, it is too complex that scientists believe many actions of brain is unknown yet.
It collects all of the signals inside the body or from outside of body constantly and then sent a suitable order.
Hearing, tasting, smelling, touching, seeing & moving are senses which get information for brain. These information are making neural signals. Neural signals cross nerve cells all over the body when get order from brain.
Brain has three important parts:
1- The cerebrum; which has two parts, the left and right cerebral hemispheres.
This area of the brain is involved in several functions of the body, like perception, thought, judgment, imagination, and decision. It includes about 10 billion neurons, with about 50 trillion synapses! It has four areas which called Lobes. Each lobe does its special task. For example neural signals of eyes, sent to Occipital Lobes or opinion and personality processing center is Frontal lobe.
2 - The cerebellum;
The cerebellum is under the cerebrum that does some important Task like learning & body's balance. It gets the signals from muscles, Joints & skin by helping brain & spinal cord and after data processing sends an order.
3- The brain stem that controls a lot of the 'automatic' actions of the body such as breathing and heart beat, and links the brain to the spinal cord and the rest of the body.
The brain and spinal cord together make up the central nervous system (CNS).
The spinal cord has three major functions: as a conduit for motor information, which travels down the spinal cord, as a conduit for sensory information in the reverse direction, and as a center for coordinating certain reflexes.

Neuron cells
Brain and spinal cord are made a big group of neuron cells that estimated only a brain has 100 billion neurons.
A neuron is an electrochemical cell that Irritated easily. It transmits information by electrical and chemical signals. Neurons connect to each other to form neural networks, called Peripheral Nervous System (PNS).
All neurons are electrically excitable. Ions motion such as sodium, potassium, chloride, and calcium produce voltage gradients across neuron's membranes. Voltage gradients changing generate electrical Signals-called an action potential that cross all over the neuron. When action potential arrive the end of cell's axon, synaptic connections with other cells are acted. In synapses chemical molecules release and cause action potential at the next neuron.
There are 3 types of neurons:
1- Motor neurons, receive signals from the Central Nervous System to muscles, glands & elsewhere in the body.
2- Sensory neurons, respond to touch, sound, light and other sensory organs that then send signals to CNS. This neuron has long dendrites & short axon.
3- Relay Neuron, located within the brain and spinal cord, relay neurons transmit the electrical impulses generated by the stimuli to other nerves.
||

Description of Neural Network by Miriam Strauss [https://www.facebook.com/miriam.strauss1?ref=ts] ;
||Artificial neural networks are systems implemented on computer programs as specialized hardware or sophisticated software that loosely model the learning and remembering functions of the human brain. They are an attempt to simulate the multiple layers of processing elements in the brain, called neurons. These elements are implemented in such a way so that the layers can learn from prior experience and remember their outputs. In this way, the system can learn to recognize certain patterns and situations and apply these to certain priorities and output appropriate results. These types of neural networks can be used in many important situations such as priority in an emergency room, for financial assistance, and any type of pattern recognition such as handwritten or text to speech recognition.

The most basic elements of a neural network, the artificial neurons, are modeled after the neurons of the brain. The real neuron is composed of four parts: the dendrites, soma, axon, and the synapse. The dendrites receive input from other neuron's synapses, the soma processes the information received, the axon carries the action potential which fires the neuron when a threshold is breached, and the synapse is where the neuron sends its output, which are in the form of neurotransmitters, to the dendrites of other neurons. Each neuron in the human brain can connect with up to 200,000 other neurons. The power and processing of the human brain comes from a multitude of these basic components and the many thousands of connections between them.

The artificial neurons simulate the four basic functions of the real neuron. The artificial neuron is much simpler than the neuron of the brain. It takes inputs just as the real neuron but also multiplies these inputs by a weight value. Then they are sent to a processing unit which does what it needs to do to the value and then sends this value to the output path. In the simplest case, the products of these values are simply summed up and then put through a transfer process and output. This is the basic building block of all artificial neural networks, although there are many different implementations of this simple block and fundamental differences which allow for different artificial networks to be built.

The neurons are constructed in many different layers. There is an input layer which receives the inputs from the world or user, then there are hidden layers, sometimes many, that are only connected to other layers and not the real world; and finally there is the output layer which sends the results to the world or user. Neurons that are grouped into layers can be connected to other neurons on their layers and to neurons of other layers. When the input layers receives input, it produces an output, which then is the input of the neurons it is connected to, and then they in their turn produce an output to other neurons. This continues until a certain condition is met and then the results are output.

The brain basically learns from prior experience. Artificial neural networks change their connection weights, usually by training, which causes the network to learn the problem to a solution. So when a system learns a new solution, it changes the connection weights to the inputs of some or all of the artificial neurons of the system. Network systems learn this by being put through training, which usually consists of being given inputs and then feedback on how they do on the outputs. The network uses this feedback information to adjust the weights to its neurons to better solve the problem. There are a few good training methods, but the best seems to be by back propagation. In back propagation, feedback is given and then fed back through the layers so that each of the neurons involved may change their weights. This improves performance and proves to be the best form of learning. Neural networks may also be used on-line or off-line. Off-line is a form where the neurons are taught information in a domain and then when in use, they no longer change their weights. This is the most common type of neural network. In the on-line form, the neural networks are taught originally and then continue to learn while in use. This design is much more complicated in design than the off-line form.

Neural networks are performing successfully where other methods do not recognize nor match complicated, vague, or incomplete patterns. Neural networks have been applied in solving a wide variety of problems. One of the most used methods for neural networks is to tell of what will most likely happen. One use is in emergency rooms where it can become so hectic and priorities are sometimes hard to find for humans that the neural network can place priorities and enable a more successful operation in the emergency room. Neural networks are also used in financial

institutions where recommendations for financial plans can be acquired. One very important use that the government uses neural networks for is the device called Snoop. Snoop is installed as a bomb detector in some U.S. airports. It uses a neural network that can determine the presence of certain compounds from the chemical configurations of their components. This is a type of recognition system that only a neural network can perform.

Neural networks are important because they can be used in a variety of situations in which other means are not possible. They can be used for prediction analysis and recognition. Not only can they outperform other means, they also can be taught to perform on different input or even taught while performing the tasks they have already learned. In the future, they will be able to teach themselves and to learn infinitely many things. This will allow for a more generalized neural network to be created without all the trial and error processes and it will be able to be applied to any situation and can learn any other situations. This is the main idea behind building computer systems that can learn and have Artificial Intelligence.

Recently, as an example, a new research have determined the complete wiring diagram for the part of the nervous system controlling mating in the male roundworm Caenorhabditis elegance, an animal model intensively studied by scientists worldwide.

The study represents a major contribution to the new field of connectomics, the effort to map the myriad neural connections in a brain, brain region or nervous system to find the specific nerve connections responsible for particular behaviors. A long-term goal of connectomics is to map the human connectome all the nerve connections within the human brain.

The Einstein scientists solved the structure of the male worm's neural mating circuits by developing software that they used to analyze serial electron micrographs that other scientists had taken of the region. They found that male mating requires 144 neurons, nearly half the worm's total number and their paper describes the connections between those 144 neurons and 64 muscles involving some 8,000 synapses. A synapse is the junction at which one neuron (nerve cell) passes an electrical or chemical signal to another neuron.

As we can see that the structure of a network has spatial characteristics that help explain how it exerts neural control over the multi step decision making process involved in mating.

Neural networks take a different approach to problem solving than that of conventional computers. Conventional computers use an algorithmic approach i.e. the computer follows a set of instructions in order to solve a problem. Unless the specific steps that the computer needs to follow are known the computer cannot solve the problem. That restricts the problem solving capability of conventional computers to problems that we already understand and know how to solve. But computers would be so much more useful if they could do things that we don't exactly know how to do.

Neural networks process information in a similar way the human brain does. The network is composed of a large number of highly interconnected processing elements (neurons) working in parallel to solve a specific problem. Neural networks learn by example. They cannot be programmed to perform a specific task. The examples must be selected carefully otherwise useful time is wasted or even worse the network might be functioning incorrectly. The disadvantage is that because the network finds out how to solve the problem by itself, its operation can be unpredictable.

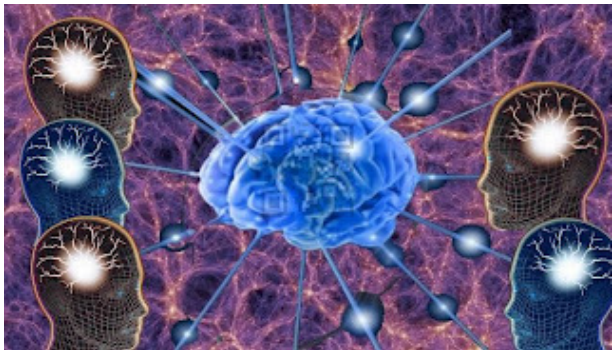
On the other hand, conventional computers use a cognitive approach to problem solving; the way the problem is solved must be known and stated in small unambiguous instructions. These instructions are then converted to a high level language program and then into machine code that the computer can understand. These machines are totally predictable; if anything goes wrong, it is due to a software or hardware fault.

Neural networks and conventional algorithmic computers are not in competition but complement each other. There are tasks are more suited to an algorithmic approach like arithmetic operations and tasks that are more suited to neural networks. Even more, a large number of tasks, require systems that use a combination of the two approaches (normally a conventional computer is used to supervise the neural network) in order to perform at maximum efficiency.

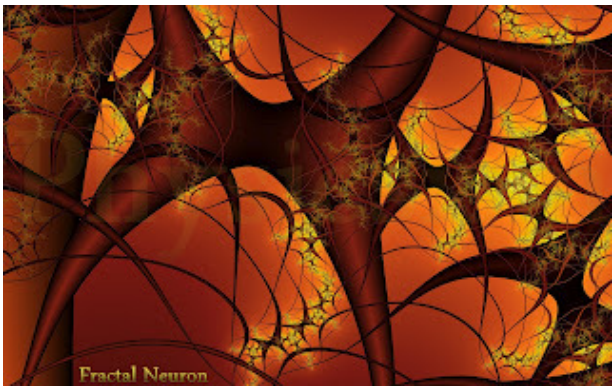
||

To be continue...
We will write more to check Computer Network & Neural Network.

Now check these Scientific explanation & compare with these two essays;
We are Quantum Computer -**Part1** [http://physicsism.blogspot.com/2012/04/we-are-quantum-computer.html]
We are Quantum Computer -**Part2** [http://physicsism.blogspot.com/2012/09/quantum-computer-operating-system-human.html]



[http://1.bp.blogspot.com/-aa1muZohiso/UFyCPv0u4dI/AAAAAAAAAjo/A0DuRruwnL0/s1600/brain6.jpg]



[http://4.bp.blogspot.com/-M-we2o2fZd8/UFsCjqgLBZI/AAAAAAAAAjQ/9GU4OD3DmFE/s1600/neuron(www.TheWallpapers.org).jpg]

Posted 3 weeks ago by daniel elias - Fazel

1 View comments