Self Learning Machines using Artificial Neural Networks, Genetic Algorithms and Fuzzy Logic

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Abstract:-

One of the buzzword in the Information technology is Artificial Intelligence (AI)

The future is Artificial Intelligence, which will transform the real world objects into highly intelligent virtual objects. We aim to come up with highly advanced sophisticated technology that can boost the machines with intelligence and also keeping us informed of the state of things. The main objective of this paper is to provide advanced real time usage of combining.

Keywords: - two technologies Artificial Neural Network and Genetic Algorithm.

Introduction

"The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are undistinguishable from it" was mark weiser's central statement in his seminal paper. There is a sea that changes human life as well as working conditions in organisations after the arrival of IT and ITeS technologies. This is becoming well known concept across many horizontal and vertical markets including a common man's everyday life in the society, as it has several applications.

Neural Network

[1]A computing system made up of a number of simple, highly interconnected processing elements, which process information by their dynamic state response to external inputs. In information technology, a neural network is a system of hardware and/or software patterned after the operation of neurons in the human brain. Neural networks -- also called artificial neural networks -- are a variety of deep learning technologies

i)How the Human Brain Learns?[3]

Much is still unknown about how the brain trains itself to process information, so theories abound. In the human brain, a typical neuron collects signals from others through a host of fine structures called
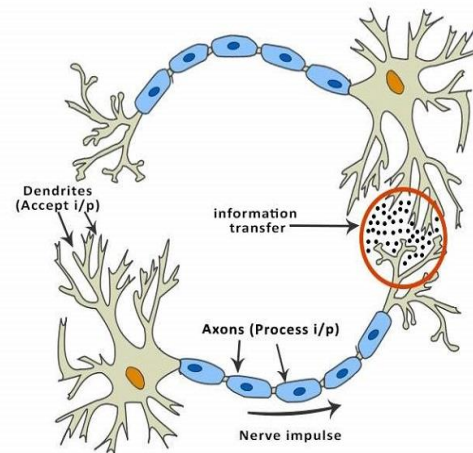
dendrites. The neuron sends out spikes of electrical activity through a long, thin stand known as an axon, which splits into thousands of branches. At the end of each branch, a structure called a synapse converts the activity from the axon into electrical effects that inhibit or excite activity from the axon into electrical effects that inhibit or excite activity in the connected neurones. When a neuron receives excitatory input that is sufficiently large compared with its inhibitory input, it sends a spike of electrical activity down its axon. Learning occurs by changing the effectiveness of the synapses so that the influence of one neuron on another changes.

ii)How Neural Networks Learn?

Artificial neural networks are typically composed of interconnected "units", which serve as model neurones. The function of the synapse is modelled by a modifiable weight, which is associated with each connection. Each unit converts the pattern of incoming activities that it receives into a single outgoing activity that it broadcasts to other units. It performs this conversion in two stages:

It multiplies each incoming activity by the weight on the connection and adds together all these weighted inputs to get a quantity called the total input.
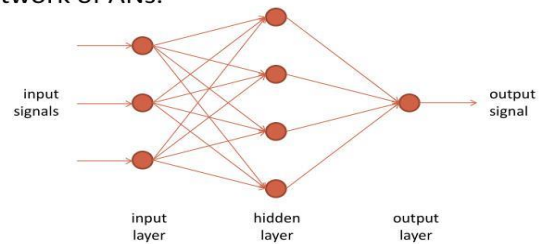
A unit uses an input-output function that transforms the total input into the outgoing activity.
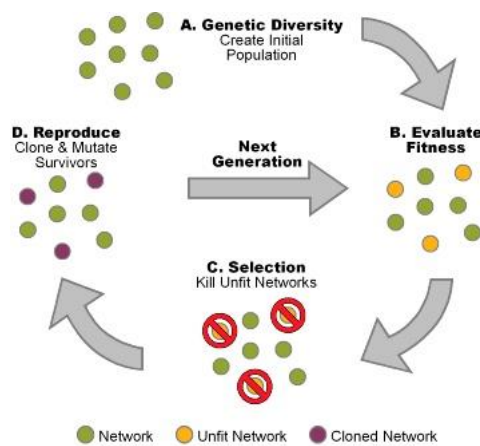

Learning To Walk. ... Simulated bipedal creatures can use the Genetic Algorithm learn to walk naturally without any input as to how they should do it. They even learn to adopt different gaits according to the speed they are trying to move at. The technique is simple in theory but the difficulties are in the detail.

ARTIFICIAL NEURAL NETWORKS

- An artificial neural network (NN) is a layered network of ANs.

An artificial neural network

iii)**Fuzzy Logic**

Fuzzy logic is an approach to computing based on "degrees of truth" rather than the usual "true or false" (1 or 0) Boolean logic on which the modern computer is based. The idea of fuzzy logic was first advanced by Dr.Lotfi Zadeh of the University of California at Berkeley in the 1960s.

Fuzzy logic is a form of many-valued logic in which the truth values of variables may be any real number between 0 and 1. ... Fuzzy logic has been applied to many fields, from control theory to artificial intelligence.

Fuzzy logic is logic where state membership is, essentially, a float with range 0..1 instead of an int 0 or 1. The mileage you get out of it is that things like, for example, the changes you make in a control system are somewhat naturally more fine-tuned than what you'd get with naive binary logic.
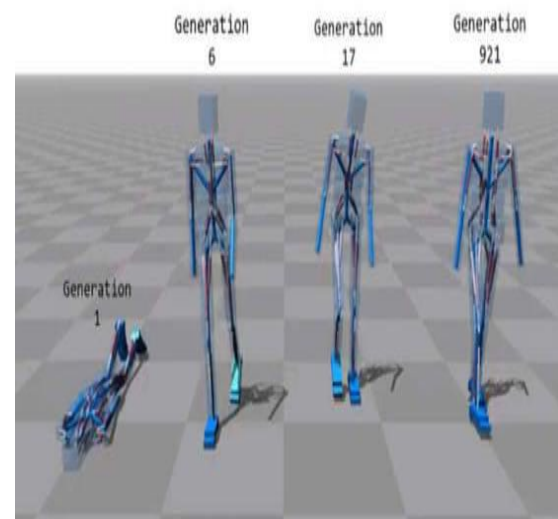
An example might be logic that throttles back system activity based on active TCP connections. Say you define "a little bit too many" TCP connections on your machine as 1000 and "a lot too many" as 2000. At any given time, your system has a "too many TCP connections" state from 0 (<= 1000) to 1 (>= 2000), which you can use as a coefficient in applying whatever throttling mechanisms you have available. This is much more forgiving and responsive to system behaviour than naive binary logic that only knows how to determine "too many", and throttle completely, or "not too many", and not throttle at all.

Genetic Algorithm

Genetic algorithms stimulate the survival of the fittest among individual individuals over consecutive generation for solving a problem. Each generation consists of a population of character strings that are analogus to the chromosome that we see in our DNA.
Each individual represent a point in a search and a possible solution .The individuals in the population are then made to go through a process of evolution.

The program or robots (object) works as humans command it to do certain task or d compiler which results in 80-95% effeciencymaximum,but if we let the

artificial neural networks to do the work it self it may try to fetch the complete 100% percent effiency which the programmers are trying to fetch from so many years.

Applications

Character recognition[1]:To recognise the handwritten character.

Image Compression[1]:They are useful in image compression.

Stock Market Prediction[1]:The day to day business of the stock market is market is extremely complicated which can be predicted accurately.

Conclusion

If we combine fuzzy logic, genetic algorithms and artificial neural networks we can create something which may help us to develop and also can change the future how programming works or real world objects works, as well as it could improve the efficiency of any machine or programming technology, restoring any kind of lost data and to get well advanced robotic technology.

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