

Artificial intelligence report

[Technology](#), [Development](#)



Introduction

The modern era is becoming so demanding to the human being and hence man has been working tirelessly in trying to come up with ways of doing things faster, efficiently and accurately. Development of man like-machine is one of the technological advancement that has resulted from such efforts. It involves the application of the concept of Pattern recognition in designing a machine that can emulate the various action of human being. Pattern recognition is a concept whereby machine is designed in a manner whereby it can act according to certain pattern this concept was established when the mechanism of human brain became clear and hence the researcher thought that by applying the same principle, a machine with some of the capabilities can be designed. In addition, these new ideas lead to the advent of computers.

Robots were also designed from the same principle. The development of these man-like machines was based on the emulation of the working of human brain. Therefore, the success of the researchers involved in this discipline majorly relies on their ability to master the concept of brain and learning. The main aim of artificial intelligence is to develop machines or equipments that are in a position of acting like human being. To ensure that a given program acts like a human, we need to get inside the actual workings of human mind. This report is therefore going to explain the mechanism of human brain as well as how these mechanisms can be used to in the field of artificial intelligence to develop man-like machines.

The Human brain

Human brain is composed of several sections each of which has specific role to play. For the purpose of this work, we shall only concentrate on cerebellum and hippocampus region of the brain. Brain is basically made up of basic units called neurons. A neuron is the functional unit of the brain. It is a cell that on electrical excitation can process and transmit information by electrical and chemical signaling. The two section of the brain that is responsible for learning are the hippocampus and cerebellum. I would not dwell on these specific regions but would focus my discussion on the actual mechanism of nerve transmission at these regions.

Researchers have shown that the ability of the nerves from these two regions to take part in learning and memory is based on a concept referred to as synaptic plasticity. This term was coined by one of the great neuroscientist called Hebbi. This term is used to describe the ability of the impulse to get more efficient as a result of repeated stimulation (Hebb 1949, p. 70).. During the transmission, the resultant increase in the electrical potential is what it determine the memory and degree of learning. In other words, the efficiency of human brain depends on the frequency of stimulation as well as the kind of stimulation (Hebb 1949, p. 70).. Those stimulations, which are highly sensitive, are also bound to result in longer memory than less sensitive events. This is why a person is likely to remember the highly sensitive events than less sensitive ones. The main reason is that for such events, there is high concentration in the brain and that several nerves are all stimulated for one thing.

Concentration of these neurons is what leads to longer memory. For the case

of highly sensitive events, the amount of electrical potential generated is so high and hence the person would tend to remember such events for a long time (Hebb 1949, p. 70).. These highly sensitive events include sex. The memory of the brain depends also on the frequency of occurrence of particular event. If a certain concept is taught repeatedly, it will reach a time when that concept gets permanently embedded in the minds of the learners. Another principle that influences the problem solving skills is the environment. A child raised in an environment composed of various objects and ideas is likely to be more creative than a child raised in an environment composed of less dendritic connection. While designing machines that are expected to emulate human action, this concept should be placed consideration.

Literature review

The concept of biological neuron network is used to describe those mechanisms that underlie the impulse transmission on the brain of the living organism and how the impulse transmission process can result in appropriate action. The term synapse must be described before the actual mechanism of biological neuron network could be dealt on. Synapse is a junction between two neurons (Hebb 1949, p. 70). During impulse transmission, an impulse is supposed to move from presynaptic to post synaptic section of the neuron. The rate and frequency of impulse movement along the synapse varies. Synaptic efficacy therefore is a term used to describe this rate. According to Hebbian theory, the learning processes involve the synaptic plasticity. The synaptic plasticity is a term used to describe an increase in synaptic efficacy as a result of repeated and

persistent stimulation of postsynaptic cell by presynaptic cell. This idea can be put in a layman's language this way (Hebb 1949, p. 70).

Let us assume that the persistence or repetition of a given activity tends to bring about cellular changes that add to its steadiness. If an axon of cell Y is near enough to excite a cell X and repeatedly or persistently takes part in firing it, it will provide conducive conditions for development or metabolic change to take place in one or both cells such that Y's efficiency, as one of the cells firing X, is increased (Hebb 1949, p. 70). In other words, this theory tries to explain how association among certain stimuli may strengthen the learning process. It believes on the fact that cells that fire together work together in other words, "The general idea is that any two cells or systems of cells that are stimulated at the same time will tend to become related, so that action of one of the neuron facilitates the way the other act." (Hebb 1949, p. 70)

Artificial neuron network

Artificial neuron network is the interconnection of encoding constructs that mimic the properties of biological neurons in an attempt to bring out a given output (Hebb 1949, p. 70). Actually, it is difficult to design equipment that exactly resembles the real biological nervous system since it is very complex, composed of millions of neurons (Hebb 1949, p. 70). However, the process involves the application of artificial neural network to mimic this complexity.

The brain, neural networks, and computers

Von Neumann, a great scientist is well known for his effort of coming up with ideas of instructing computers to do certain work. His architecture was based on sequential processing and execution of overt instructions. There is a very close relationship among the brain, the neural networks, and the computer. The concept used in development of neural network is inspired by how biological neural system works. The only difference between the brain and neural networks is that whereas the brain is very complex, the neural network is simpler. As stated earlier, the processing of information in biological system, which may rely largely on parallel processing as well as oblique instructions based on identification of patterns of sensory input from external sources. Therefore, neural network is just a model designed to mimic the way brain works (Hebb 1949, p. 70). Computer on the other hand is actually an example of this model. It is a product of the neural networks.

There are various Applications of pattern recognition. Some of these applications would be discussed below.

Supervised versus unsupervised learning

As seen earlier, artificial learning involves modeling inputs to behave or act like the biological neural systems. In supervised learning the modeling process, involve a clear understanding of the desired output after which a function that maps input to this desired result or output to be generated. Unsupervised learning on the other hand involves organizing some given data in a particular manner that can result in an anticipated goal or output. This form of learning is actually a branch of machine learning. The main idea behind unsupervised learning is that it involves a specific a logarithm

designed that allow computer to come up with certain behaviors based on empirical data. . A major focus of unsupervised learning research is to automatically learn to recognize multifaceted patterns and make intelligent decisions based on data. Clustering on the other hand is grouping a set of observations into clusters so that observations in the same cluster are similar in some sense. In market research for example, Market researchers use cluster analysis to screen the general population of consumers into market segments. Cluster analysis is also used to better understand the relationships between different groups of consumers/potential customers.

Facial recognition

A facial recognition is an application of the concept behind the biological neural network in computers to identify and authenticate a person or thing from a digital image. This is done by comparing the chosen facial features from the image with facial catalog. In this case, appropriate facial identification algorithms are used to identify superficial characteristics through drawing out of features, from an image of the subject's face (Willing, 2003). During the identification process, involve the use of algorithm designed to analyze different features of the image. The image would then be identified by matching features from the existing catalogue with the features in the image.

Alternatively, the classes of face images is first normalized and then later compressed. This would depend on the kind of alogarithm used. During these processes, only the data in the image that is useful for face detection is saved. The image being searched then compared with the data which have been created. Comparison may be done using the model matching

techniques. This technique has an advantage as it provides a sort of compacted face representation (Willing, 2003).

Voice recognition

To date, the success in speech recognition has been obtained using pattern recognition paradigms (Junqua & Haton, 1995). The use of pattern recognition techniques were applied to the problems of secluded word recognition, related word recognition, and incessant speech recognition. (Junqua & Haton, 1995).

Hand writing recognition

Handwriting recognition is based in the ability of a computer to receive and interpret comprehensible handwritten input. The ability of computer to interpret depends on the original images that were introduced into the computer during the designing process (Dewdney, 1997). Model designing process involves development of training images. The trained artificial neural network then makes the character identifications. Like the brain neurons, each neural network must uniquely learn the properties that differentiate images. It then looks for similar properties in the target image to be identified. To enhance the accuracy, the neural networks are designed to learn the properties related to the target data.

Consumer behavior recognition

Stock market exchange

Computer assisted stock market exchange is done through a process referred to as technical analysis. This is a security analysis discipline for forecasting the direction of prices through the study of past market data

(Dewdney, 1997). The indices used are the price and volume of products sold or exchanged. In the analysis process, the artificial intelligence adaptive software systems have been designed basing on how biological neural network works. They can learn to detect complex patterns in data (Dewdney, 1997).

Conclusion

From the above discussion, we have found that the field of artificial intelligence is advancing at a very fast rate. We have also seen several applications of these new fields. There are several advantages of these applications. Artificial learning has enabled one to learn more on the genetics. In other words, the application of artificial learning has enable scientists know more of genetics. Secondly as mentioned above, the knowledge and application of artificial learning has enable accurate and faster stock market analysis. Thirdly, this field has improved the bioinformation sector. Other areas which have developed as a result of artificial learning and its application includes medical diagnosis, detecting credit card frauds, computer vision, game playing, object recognition and development of brain-machine interface. On the other hand the field of artificial learning is still faced with problems such as financial constraints; few skilled personnel can understand and use this concept. Since this discipline of artificial intelligence is still young, more needs to be done (Fukunaga, 1990). The future era may become so competitive and busy and hence the need of computer-assisted work may be the only way of coping with the situations.

Therefore, the neuroscientist and those specialists from the department of

artificial intelligence should work hard to come up with better models such as robots. Additionally, some occupations are very risky to be handled by human being. These occupations include the mining occupation. However, if the neuroscientists would cooperate with those specialists from artificial intelligence department, robots which can complement the work of human being can be easily designed(Fukunaga, 1990).

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