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A Study on Artificial Neural Network

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ABSTRACT: First step towards AI is taken by Warren McCulloch a neurophysist and a mathematician Walter Pitts. They modelled a simple neural network with electrical circuits and got the results very accurate and derived a remarkable ability of neurons to perceive information from complicated and imprecise data. During the present study it was observed that trained neural network expert in analyzing the information has been provided with other advantages as Adaptive learning, Real Time operation, self-organization and Fault tolerance as well. Apart from convectional computing, neural networking use different processing units (Neurons) in parallel with each other. These need not to be programmed. They function just like human brain. We need to give it examples to solve different problems and these examples must be selected carefully so that it would not be waste of time. we use combination of neural networking and computational programming to achieve maximal efficiency right now but neural networking will eventually take over in future. We introduced artificial neural networking in which electronic models where used as neural structure of brain. Computers can store data as ledgers etc. but have difficulty in recognizing patterns but brain stores information as patterns. Further as artificial neural networking was introduced which has artificial neurons who act as real neurons and do functions as they do. They are used for speech, hearing, reorganization, storing information as patterns and many other functions which a human brain can do. These neural networks were combined and dynamically self-combined which is not true for any artificial networking. These neurons work as groups and sub divide the problem to resolve it. These are grouped in layers and it is art of engineering to make them solve real world problems. The most important thing is the connections between the neurons, it is glue to system as it is excitation inhibition process as the input remains constant one neuron excites while other inhibits as in subtraction addition process. Basically, all ANN have same network that is input, feedback or hidden and output.

KEYWORDS: Artificial intelligence, legal reasoning, decision support, multi agent systems, argumentation frameworks, humans.

I. INTRODUCTION

Artificial intelligence the future of computing is simulation of animal intelligence. Argumentation is core of artificial intelligence and it is sub divided into many branches viz; legal reasoning, decision support, multi agent systems and argumentation frameworks. we have made computers having capability greater than humans in some fields however we are not able to replace them in others. Scientists are working to develop that arena of research. Some computers are using neurons to control activities termed as neural artificial intelligence. In neural AI mimicking the human brain will remain great challenge for decades as human brain receives a large number of signals among which it processes the important ones only. Diversity and dynamicity are the main functions of human brain while it is very hard to mimic through computers and we have achieved very less success in it till date. It can be argued that that intelligence behind pattern reorganization can be mimicked through human organized feature extraction system which is heavily application dependent more ever incomplete feature is extracted or corrected but classification process is inherently limited to process. Recently neuroscience has discovered neo cortex not only pre processess sensory signals but also allows them to go through many hierarchical steps. So scientists trying to mimic neocortex are very much successful. Apart from it human brain responding to external stimuli is a matter of course to mimic but these responses are broken into fragments which are sometimes out of sense for computer systems. It is a matter of goal for deep learning systems. Assuming this goal is achieved as per assumption we can train hierarchical network on diverse observations and use it on some simple engine for calculated number of observations. We are able to recognize human voice, creating an artificially intelligent robot.

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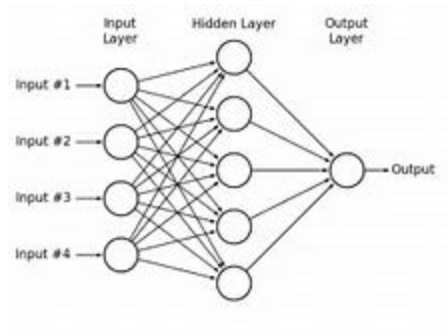


Image 1. Artificial Neural Network.

ANNS or connectionist systems, computing model of brain that learn progressively to do tasks inspired by biological animal brain. Above model is three-layer approach containing the input layer, hidden layer and output layer. There can be multiple inputs to single output. The input layer receives the input, hidden layer processes it and output layer gives the output.

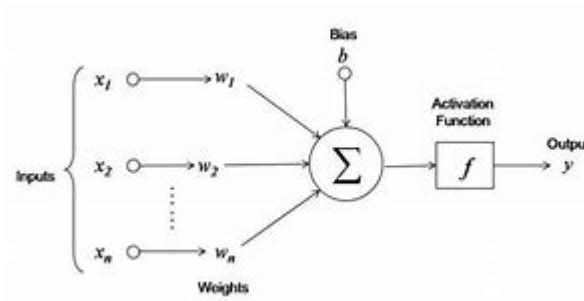


Image 2. Summation of inputs to provide output.

The following diagram represent the general model of processing ANN. For the above model of ANN the net input can be calculated as follows:

Let the output of summation be y_{in} , therefore

$$Y_{in} = x_1w_1 + x_2w_2 + \dots + x_nw_n.$$

The output can be calculated by applying the activation function over net input.

$$Y = F(y_{in})$$

$$\text{Output} = \text{function}(\text{net input calculated})$$

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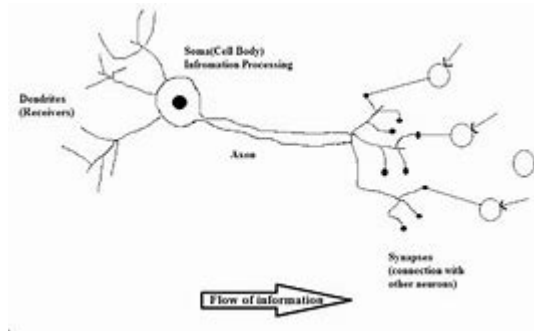


Image 3. Basic Unit of ANN

Working of basic unit of ANN(NEURON).

As shown in above diagram, A typical neuron consists of following four parts with the help of which we can explain its working:

DENDRITES: They are tree like branches, responsible for receiving the information from other neurons it is connected to, In other sense, They are like ears to neurons.

SOMA: It is cell body of neuron responsible for processing of information, they have received from dendrites.

AXON: It is just like a cable through which neurons send information.

SYNAPSES: It is connection between axon and other neuron dendrites.

The ANN wheretrained manually by dividing their training into two parts; supervised and unsupervised. In supervised training inputs where given to network which are being memorized by it and then responses by this network where provided according to that memory. However, some of them remain untrained either of irreluctant input or by neural incapability. During unsupervised way in which distinct inputs where given and outputs where received without caring for what they where. Theywhere used for lab purposes.

II. ASPECTS AND USES OF NEURAL NETWORKING

NATURAL LANGUAGES AND ASPECTS OF BELIEF

My natural language revolves around how human brain naturally reacts to languages and reason between them. We can artificially mimic it through semantic network processing system (SNePs). Another aspect is belief system which wascategorized into temporal and spatial beliefs, spatial beliefs can be mimicked through some neural network systems while it is hard for temporalones.

RISE OF DIGITAL ECONOMY

With the rise of digital economy ANN has changed because it need large amount of data to be stored processed and developed which can be only through ANN as I presume it will become a wide trend in future.

LARGE SCALE MACHINE LEARNING

In modern days large amount of information has to be processed and it can be processed through AI at one go.

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DEEP LEARNING AND COLLABORATIVE SYSTEMS

Deep learning is important aspect of AI as people are looking for voice recognition etc. Collaborative systems are systems which can work in collaboration in each other and with humans which will be a modern trend for the days now off.

CROUDSOURCING AND HUMAN COMPUTING

Croudsourcing is important aspect of AI as computers alone can't solve the problems but with human intelligence it can. So we can combine two and can be used for gathering information. In croudsourcing we receive information from vast no. of sources and authenticate it and provide it to users e.g Wikipedia.

ALGORITHM GAME THEORY AND COMPUTATIONAL SOCIAL CHOICE

It has been a trend in AI to get implemented in computational mechanism design, computational social choice, incentive aligned information elicitation and the famous game theory.

INTERNET OF THINGS(IoT)

Many researchers are working on devoted idea that many number of devices can be interconnected and collect and share their sensory information which is not possible through convectional programming. AI can process and use this information hence climb this Tower of Babel.

III.LITERATURE SURVEY

Some key developments of ANNs are as follows:

- 1943-It has been assumed concept of neural network started with work of physiologist, Warren McCulloch, and mathematician, Walter Pitts, When they modelled a simple neyralnetworkusing electrical circuits in order to describe how the neurons in the brain might work.
- 1949 – Donald Hebb's book, The Organization of Behavior, put forth the fact that repeated activation of one neuron by another increases its strength each time they are used.
- 1956 – An associative memory network was introduced by Taylor.
- 1958 – A learning method for McCulloch and Pitts neuron model named Perceptron was invented by Rosenblatt.
- 1960 – Bernard Widrow and MarciType equation here.an Hoff developed models called "ADALINE" and "MADALINE".
- 1961 – Rosenblatt made an unsuccessful attempt but proposed the "backpropagation" scheme for multilayer networks.
- 1964 – Taylor constructed a winner-take-all circuit with inhibitions among output units.
- 1969 – Multilayer perceptron (MLP) was invented by Minsky and Papert.
- 1971 – Kohonen developed Associative memories.
- 1976 – Stephen Grossberg and Gail Carpenter developed Adaptive resonance theory.
- 1982 – The major development was Hopfield's Energy approach.

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- 1985 – Boltzmann machine was developed by Ackley, Hinton, and Sejnowski.
- 1986 – Rumelhart, Hinton, and Williams introduced Generalised Delta Rule.
- 1998– Kosko developed Binary Associative Memory (BAM) and also gave the concept of Fuzzy Logic in ANN.

The historical review shows that significant progress has been made in this field. Neural network based chips are emerging and applications to complex problems are being developed. Surely, today is a period of transition for neural network technology.

IV. CONCLUSION

As we have perceived the importance of artificial intelligence paradigm we came to the facts of its vivid nature, diverse use and complicated designing. We came to know about the facts of its development, science and natural tendency to observe vivid patterns as well as its classification. So we derived it to be of important use in future and present.

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