

Will Artificial Intelligence Overcome Natural Intelligence

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INTRODUCTION

Neural networks, is closely related to symentic analysis. A trained neural network can think as an "expert" in the category of information processing. Traditional computer programming was doing the job of Data processing. This expert (natural or artificial) can give predictions about new situations of interest.

The study of Neural Network includes:

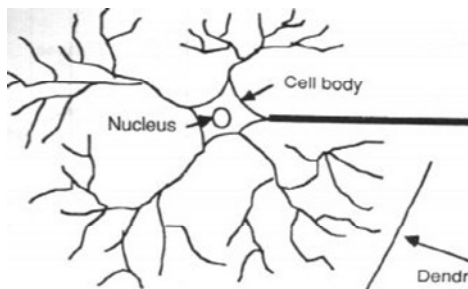
1. Adaptive learning: This is an ability to learn new phenomenon by observing given data and training or initial experience.
2. Self-Organization: An ANN can create its representation of the information it receives during learning time.
3. Real Time Operation: ARTIFICIAL NEURAL NETWORK computations uses concept of parallel processing, and special hardware(multi-core microprocessor) are being used for fast calculations and response.
4. Fault Tolerance: Partial destruction of a Neural Network leads to the corresponding degradation of performance. This can be reduced by using various techniques.

2. NATURAL VERSES ARTIFICIAL INTELLIGENCE:

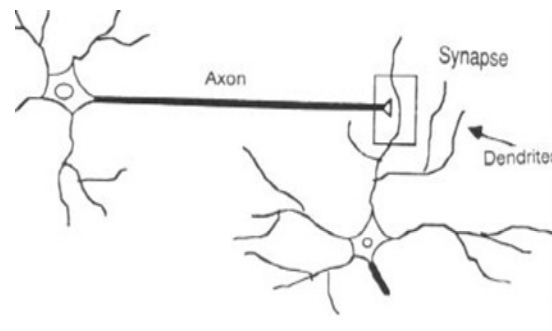
2.1 How the Human Brain Learns?(Neural Network.html)

Human brain is a great magic created by creator of the world. Which is still unknown about how the brain stores many instructions, data and trains himself to process information. As per the theories available the human brain, a typical neuron collects signals from others through a host of fine structures called *dendrites*. The neuron sends out electrical signals activity through *axon*, which splits into thousands of branches. At the end of each branch, a structure called a *synapse* converts the action from the axon into electrical effects that restrain activity from the axon into electrical effects that inhibit activity in the connected neurons.

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.



Components of a neuron

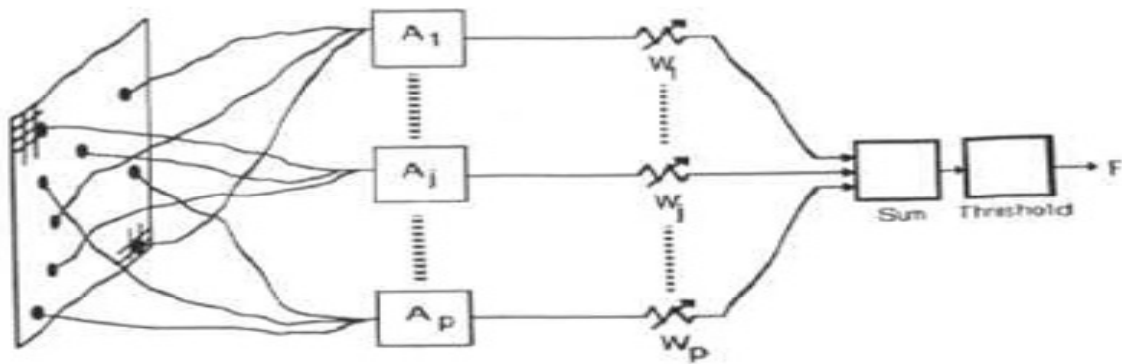


Neuron-Neuron communication

2.2 Perceptrons(Neural Network.html)

The most influential work on neural network in the 60's went under the heading of 'perceptrons' a term coined by Frank Rosenblatt. The perception turns out to be an MCP model (neuron with weighted inputs) with some additional, fixed, pre--processing. Rectangles A1, A2, Aj ,A_p in the figure below, are called association units and their task is to extract specific signals, localized featured from the input images. They were mainly used in pattern recognition.

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2.3 The Learning Process

The memorization of images, patterns, audio signals and the subsequent response of the network can be categorized as follows:

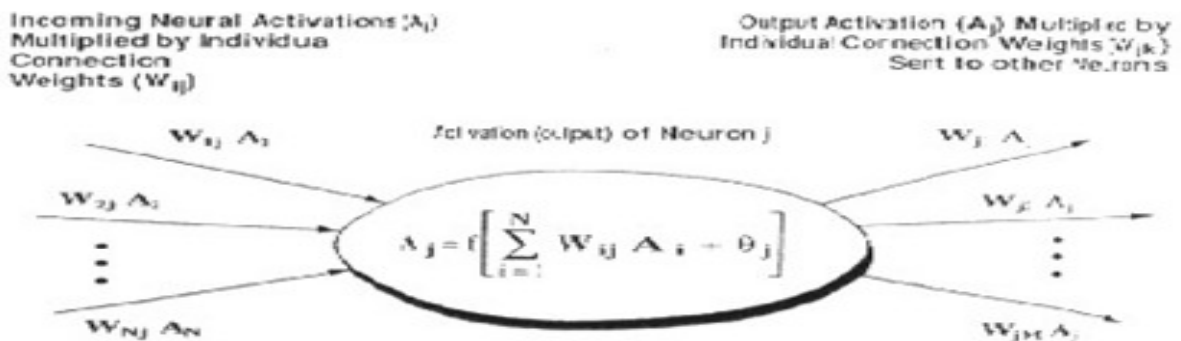
2.3.1 Associative mapping in which the network learns to produce a particular pattern on the set of input units whenever another particular pattern is applied on the set of input units. The associative mapping can generally be broken down into two mechanisms:

- Auto-association
- Hetero-association
- Nearest-neighbor
- Interpolative recall

Machine learning techniques, Model Tuning, Recommendation Systems

2.3.2 Regularity detection in which units learn to respond to particular properties of the input patterns. Whereas in associative mapping the network stores the relationships among patterns, in regularity detection the response of each unit has a particular 'meaning'. This type of learning mechanism is essential for feature discovery and knowledge representation.

Every neural network possesses knowledge which is contained in the values of the connections weights. Modifying the knowledge stored in the network as a function of experience implies a learning rule for changing the values of the weights.



Information is stored in the weight matrix W of a neural network. Learning is the determination of the weights. Following the way learning is performed, we can distinguish two major categories of neural networks:

- **Fixed networks** in which the weights Artificial Neural Network ot be changed, $\frac{dW}{dt}=0$. In such networks, the weights are fixed a priori according to the problem to solve.
- **Adaptive networks** which are able to change their weights, $\frac{dW}{dt} \neq 0$.

2.3.3 Learning Methods :All learning methods used for adaptive neural networks can be classified into two major categories:

2.3.3.1 Supervised learning which requires an external teacher, so that each output unit is told what its desired response to input signals ought to be. During the learning process global information may be required. Supervised learning include

- Error-correction learning,

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- Reinforcement learning
 - Stochastic learning.

2.3.3.2 Unsupervised learning is based upon only local information. It is also referred to as self-organization, it is supervised and trained by himself. External entity is not needed in this case.

2.4 Neural networks versus conventional computers

There are two approaches of problem solving, First is Conventional computer programming approach in which arithmetic and logical operations were done and Second is Artificial Neural networks which emphasizes on thinking process.

As I explained above, conventional computer programming use an algorithmic and logical approach i.e. the computer executes a set of instructions in order to solve a problem. In short computers were well instructed without ambiguity to do some task by using instructions and conditions. If there some ambiguity, computer was not capable to handle the situation. Computer was able to handle huge databases arranged using some protocols, Speed of execution for arithmetic and logical operations was fast as compare to human brain. That means Computer were capable for data processing not he thinking process. Artificial Intelligence has tried to overcome this restriction(thinking and decision making) of programming.

The technique of Artificial Neural networks based programming is exactly similar to a process executed by human brain. The number of highly interconnected processing elements(neurons)network is a part and parcel of large specific problem solving network. The important difference in Conventional programming and ANN is that Conventional programming is fully instructed program, he never thinks whereas, Neural networks learn by example. They are not designed to perform a specific task (Task oriented). In ANN the examples must be selected carefully otherwise user could not be able to generate desired output. i.e. this technique should teach to computer “how to solve the problem by itself”, the operations done by him are unpredictable.

Finally, conventional computers use a rational style for problem solving; All instructions are stated in discrete unambiguous instructions. These high level instructions are converted to computer understandable machine code. These machines works in predictive environment; if anything went wrong, only the software and/or hardware is responsible.

Neural networks and conventional algorithmic computers are having advantages and disadvantages, they are not competitor of each other, but as per my opinion they are complement each other. ANN without conventional programming is impossible. Some tasks are more suited to an algorithmic approach like arithmetic operations and some tasks are more suited ANN programming. In future both will work together for betterment of life of human being.

2.5 Applications of ANN

Since neural networks are best at identifying patterns or trends in data, they are well suited for prediction or forecasting needs including:

Some Special applications of ANN:

1. Neural networks in medicine
 - 1.1. Modelling and Diagnosing the Cardiovascular System
 - 1.2. Instant Physician
 - 1.3. Surgery
 - 1.4. Video conferencing
 - 1.5. Complicated surgeries using robots
 - 1.6. Diagnosis
 - 1.7. Automation (sensor based electronic devices)
2. Electronic noses
3. Neural Networks in business
 - 3.1. Marketing
 - 3.2. Credit Evaluation
 - 3.3. sales forecasting
 - 3.4. industrial process control
 - 3.5. customer research
 - 3.6. data validation
 - 3.7. risk management

- 3.8. target marketing
4. The Latest Musical Hit
5. The Chef With The Most Recipes In The World
6. Self-Driving Cars
7. The Fortuneteller That Will Know It Before You
8. [visual search option on its mobile application](#)
9. The Smartest Investor
10. A Better World
11. A Superhuman Doctor
12. Life On Other Planets?
13. The Marketing Guru
14. The Sales And Customer Service Geni
15. A Non-Human Language...
16. The Best Flight...
17. In Charge Of Your Accounting And Financing
18. Understanding Intentions And Behaviors
19. Proposal Review
20. Accelerated Reading
21. Predicting Vulnerability Exploitation
22. Recruiting Automation
23. Cyber security, Defense

Some applications where deep Thinking is required

1. Trade, Management and customer care
2. Health care
3. Military
4. Cyber Security
5. Natural Language Processing
6. Research and Education

2.6 AI PROGRAMMING LANGUAGES

Artificial intelligence hasn't developed its own language yet, but even with using existing programming languages humanity has achieved great results. Just recollect the 2015 breakthrough of AlphaGo. It was the first time when a machine managed to beat a human being in the most difficult board game Go, which demands a high level of abstract thinking.

Common Languages used to implement AI:

Sr. No.	Languages	Release, Latest Release and OS	Features (can perform in AI)	Advantages
1	Python	1991, 2017, Cross platform	Neural Network Machine Learning	Simple Perfect solution for NLP Short development time, OOPS, Large variety of Libraries
2	C++	1983, 2014, Windows, Linux	Highly recommend for machine learning and Neural Network	Influenced Java and Python Highest Speed, STL
3	LISP	1959, Linux, Windows	support for symbolic expressions; automatic garbage collection which actually was invented for the Lisp language; Efficient coding due to compilers;	Second oldest Programming language. Fast prototyping capabilities
4	Prolog	1972, Windows,	Prolog programming for artificial intelligence can create	it's one of the oldest logic programming languages

		Linux	expert systems and solving logic problems. Some scholars claim that an average AI developer is bilingual – they code both Lisp and Prolog.	1. pattern matching; 2. tree-based data structuring; 3. good for rapid prototyping; 4. automatic backtracking.
5	Java	1995,2014, cross platform	Java AI programming is a good solution for neural networks, NLP and search algorithms	WORA (“write once, read everywhere”) Garbage collection Scalability
6	Haskell	1990,2019, cross platform	Haskell is a purely functional programming language that can boast about its lazy evaluation and type interface features. LogicT monads facilitate expressing non-deterministic algorithms, and algorithms can be expressed in a compositional way.	1. major algorithms available via cabal 2. CUDA binding 3. compiled to bytecode 4. can be executed on multiple CPU in cloud.
7	AIML	2001,2011, XML	AIML (Artificial Intelligence Markup Language) is a dialect of XML used to create chatbots. Due to AIML one can create conversation partners speaking a natural language.	The language has categories showing a unit of knowledge; patterns of possible utterance addressed to a chatbot, and templates of possible answers. To know how it works check out this article about building a chatbot

So, the matter of best-something is rather philosophical in any sphere, and AI development is not an exception. There are a lot of factors influencing the choice of programming languages for an AI project. It depends on functions you need to create, usage and even your taste in some cases. However, more and more AI programmers are using Python as it's a simple and powerful tool, while C++, Prolog and Lisp can be called runners-up in this race.

2.7 CONCLUSION

The digital world has a lot to gain from artificial neural networks. The ability of learning new things by example makes them very flexible and powerful. Furthermore there is no need to design an algorithm in order to perform a specific task. They are also very well suited for real time operations because of their fast response and computational times which are due to their parallel processing.

Neural networks also contribute to other areas of research such as cyber security, Robotics, Geographical survey, Palmistry, defense, space, trades, transport, neurology and psychology.

Finally, I would like to suggest that even though ANN have a huge potential we will only get the best of them when they are integrated with computing, AI, fuzzy logic and IoT, Big Data analytics.

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