



The Applications and Prospects of Neural Networks

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ABSTRACT

On behalf of an extensive multiplicity and diversity of predicaments and for forecast and categorization of such tribulations or predicaments, “Neural network” is such a commanding authority. Neural network is far and wide brought into play for speech recognition and handwriting and in forecasting/prediction of stock market. Assortments of unusual fields and of applications are pointed out where exploitation of neural network bestows outstanding fallouts. From deliberated/measured or simulated data we can develop Neural network models. It can also be brought into play to progress the precision of contemporary on hand archetypes. In this article we will give a general outline of Neural network with its future prospects.

Keywords

Networks, Fuzzy Logic, Neural network

1. INTRODUCTION

Neural network is an information processing archetype that is enthused and motivated from biological nervous systems, e.g. the brain process information. The key constituent of this model is the innovative structure/framework of the information processing system. It is made up of a huge number of exceedingly unified processing elements referred as “neurons” exerting in harmony to work out explicit dilemmas. It is configured for a particular application, like pattern recognition or data categorization/taxonomy, all the way through a learning procedure. In biological systems learning entails fine-tunings to the synaptic connections that subsist flanked by the neurons. Neural network mock-ups come out to be an up to date expansion. But, this idea or area was recognized prior to the beginning of computers, and has endured in any case one foremost hold up and numerous epochs. Scores of significant progression has been mounted by the utilization of low-cost emulations of computers. Subsequent a preliminary era of eagerness, the field continued to exist an age of dissatisfaction and disgrace. Throughout this stage when financial support and professional hold up was negligible, significant progression were carried out by somewhat a small number of researchers/scientists. These pioneers were talented to build up persuasive technology which goes beyond the restrictions acknowledged by Minsky and Papert. In late 1986, with manifold layered neural networks in the news broadcast and reports, the setback was how to pull out or broaden the Widrow-Hoff rule/law to manifold layers. An autonomous group of three researchers, one among them was David Rumelhart, an ex-associate of Stanford's psychology division, came up with related thoughts/notions which are at present referred as back propagation networks [1] for the reason that it gives out pattern recognition slip-ups or faults all over the network. [2] Brought into play merely two layers as compared to this back-propagation networks which utilized scores of layers. The upshot is that back propagation networks are “slow learners,” requires probably thousands of iterations to learn or gain

knowledge of. At this moment, neural networks are utilized in a number of applications. The original initiative following the temperament of neural networks is that if it maneuvers in nature or environment, it has got to be intelligent to perform in computers. The prospect of such networks, however, hidden in the hardware expansion. Similar to the sophisticated chess-playing machines resembling Deep Blue [3], prompt, well-organized neural networks rely on hardware being précised for its ultimate exercise. Study that focuses on budding neural networks is comparatively sluggish. Just because of the processors restrictions, it takes week to learn by the neural networks. Various companies are demanding to construct whatsoever referred as a “silicon compiler” [4] to engender a detailed form of incorporated circuit that is best favorable for the neural networks application. Analog, Digital and optical/ocular chips are the unusual form of chips being fashioned. One might instantly mark down analog signals as an obsession of the ancient times. Nevertheless neurons in point of fact effort more similar to analog signals than digital signals in the brain. Whereas digital signals have two individual states either 1 or 0/on or off, analog signals fluctuate amid smallest and highest values. It may possibly be a short time, however, prior to optical/ocular chips can be utilized in business applications.

2. WHY DRAW ON NEURAL NETWORKS

In regards to its outstanding capacity to originate meaning from complex or inaccurate data, can be utilized to take out patterns and identify inclinations that are excessively multifarious to be perceived by both humans and computer methods. A qualified neural network can be reflected of as a connoisseur/skilled in the class of information it has been agreed to scrutinize. This expert can afterward be employed to endow with protrusions specified novel states of attention and reply.

Further merits comprise:

- Adaptive learning: The aptitude of learning on the basis of given data for preliminary experience or training.
- Self-Organization: The ability of can creating its individual organization or demonstration of the information it entertains at some point in learning time.
- Real-Time Operation: Computations may possibly be conceded out in parallel, and extraordinary hardware devices are being planned and feigned which seize benefit of this potential.
- Fault-Tolerance through superfluous Information Coding: fractional obliteration of a network shows the way to the equivalent deprivation of performance/recital. But, a number of network



qualifications may perhaps be hang on to even with main network smash up.

3. NEURAL NETWORKS AND AWARENESS

Hence, from diversify problems perspective, neural networks are extremely superior far and wide, the majority of which engage discovering trends in bulky amount of data. They are healthier and well-matched than conventional computer structural design that individuals are logically superior at and which computers are conventionally dreadful at image recognition, crafting oversimplifications that type of obsession. And researchers/scientists are incessantly putting up networks that are superior at these evils and tribulations. However will neural networks constantly entirely replicate the human brain? Will they be as multifarious and as practical? Will a machine increasingly be cognizant of its individual reality? Imitating human consciousness and sentiment is at a standstill the monarchy of science invention. It may possibly occur some day, or it may perhaps not this is a question we won't argue about at this point, for the reason that, certainly, there are massive theoretical point of views concerning what consciousness/awareness is, and if it can probably be replicated by a machine. Do we possess spirit or a number of unique essences that is impractical to simulate/imitate in a machine? If not, how do we leap from, while one researcher set it, "an electrical feedback in the brain to abruptly considering the globe about one by means of all its distances? Possibly Neural Networks can, however, bestow us various approaches hooked on the "straightforward evils" of consciousness/awareness: how does the human brain practice ecological stimulation? How does it incorporate or put together information? However, the authentic issue is how and why all of this processing, in humans is, go together with a veteran inner life, and does it possible for a machine to realize such a self-awareness?

4. APPLICATIONS & CURRENT PROGRESSION OF NEURAL NETWORK

Undoubtedly, the entire potential of neural networks does not exist in endeavors to imitate awareness. Undeniably, that is of reasonably minute fear at this instant; extreme critical are the concerns of how to progress the current systems. Incorporation/integration of fuzzy logic into neural networks. [5] Is a sort of logic that makes out more than straightforward true and false values, for this reason superior imitating/simulating the real world. Therefore, it out to be considered notions like -frequently, to some extent, and occasionally. Neural networks and Fuzzy logic have been incorporated for draws on as miscellaneous as applicant screening for jobs, automotive engineering, the monitoring of glaucoma and the control of a crane. Nearly all realistic applications of artificial neural networks (ANN) are computational model based and comprising the proliferation of incessant variables from one processing component to the subsequent one. In modern times, data from neurobiological testing's have made it progressively more obvious than that of biological neural networks, which correspond all the way through pulses, bring into play the timing of the pulses to send out information and carry out computation. This comprehension has encouraged noteworthy study on pulsed neural networks, together with hypothetical scrutiny and model expansion, neurobiological modeling [6], and hardware implementation or realization." Hardware dedicated for

neural networks a number of networks have been hard-coded into analog devices or chips? [7] This technology will turn out to be more practical as the networks we employ happen to more intricate. The key advantage of unswervingly indoctrinating neural networks onto chips or dedicated analog devices is SPEED! Its hardware at present runs in only some forte areas, like those areas where extremely elevated performance/recital is mandatory and in entrenched applications of trouble-free, hardwired networks.

Scores of Neural Networks these days make use of fewer than 100 neurons and merely call for infrequent training. In such state of affairs, simulation of software is typically found satisfactory. When Neural Networks algorithms build up to the peak where constructive stuff can be completed with 1000's of neurons and 10000's of synapses, soaring performance/recital Neural Networks hardware will turn out to be indispensable for realistic process. Specified this picture of neural networks and how they effort, what real world applications are they well-matched for? Neural networks have wide-ranging applicability to business concerns of real world. If truth be told, they have by now been lucratively applied in various engineering and commerce. In view of the fact that neural networks are preeminent at making out trends or patterns in data, they are sound well-matched for forecasting or prediction requirements together with:

- Data substantiation
- Sales forecasting
- Industrial development control
- Consumer research
- Target marketing
- Risk management

Nevertheless to bestow you a number of more explicit illustrations; Neural Networks are also utilized in the subsequent definite prototypes: Speakers recognition in communications; Hepatitis diagnosis; Revitalization of telecommunications from out of order software; elucidation of multi-meaning Chinese words; underwater mine recognition; texture investigation; 3D object recognition; facial recognition and recognition of hand-written word.

5. STRUCTURAL DESIGN OF NEURAL NETWORKS

5.1 Feed-forward Networks

Feed-forward NNs consent signals to pass through one way merely from input to output. There is no feedback loop i.e. the output of any layer doesn't impinge on that identical layer. Feed-forward NNs be liable to be uncomplicated networks that combine inputs with outputs. They are broadly utilized in pattern recognition. This sort of organization is also known as bottom-up or top-down.

5.2 Feed-back Networks

Feedback networks can comprise signals passing through in equally directions by bringing in loops within the network. These networks are exceptionally influential and can get enormously complex. Feed-back networks are self-motivated; their 'state' is shifting incessantly till they get in touch with a symmetry point. They hang about at the equilibrium/symmetry point until the input shifts and a fresh equilibrium requests to be initiated. These structural designs



are also known to as recurrent or interactive. Even though the concluding term is frequently employed to indicate feedback relations in single-layer associations.

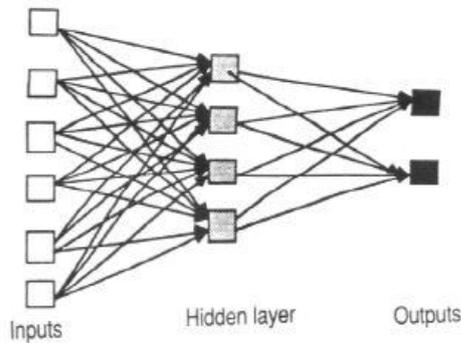


Figure 5.1 An example of a simple feed-forward network [8]

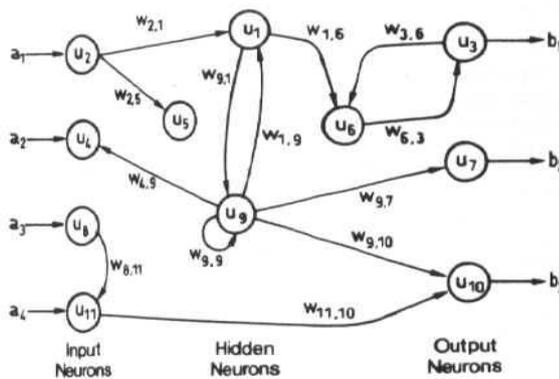


Figure 5.2 An example of a complicated network[8]

6. CONCLUSION

From Neural networks, the computing world at standstill a lot to gain from. Their aptitude to find out by example constructs them extremely supple and commanding. In addition there is no call for intending or planning an algorithm for the reason to act upon on an explicit task. There is no call for realizing the interior methods of that concern task. They are in addition incredibly sound matched for real-time systems, for the reason that of their swift comeback and computational times which are just because to their analogous structural design.

These networks also have a say to further areas to delve in, like psychology and neurology. They are on a regular basis

brought into play to mock-up parts of livelihood organisms and to look into the interior mechanisms/methods of the human brain. Conceivably the most exhilarating facet of neural networks is the likelihood that sooner or later cognizant networks may possibly be fashioned. Loads of scientists/researchers are in contention that consciousness is a mechanical aspect and that 'conscious' neural networks are a pragmatic prospect. Neural networks are brought into play in quite a lot of applications, as few of them illustrated in this article. The hardware of Neural Network is able to be planned in a few niche areas where the system performance is most important question or topic. Therefore Neural Network is ready to lend a hand for mounting a system which is extremely vigorous, consistent, swift and precise. The entire contemporary Neural Networks technologies will most probable is immeasurably enhanced ahead in the upcoming future. The whole lot from handwriting and speech recognition to stock market prediction will turn out to be extremely classy as researchers/scientists build up superior working out techniques and network structural designs. In conclusion, we would like to utter that though neural networks have an enormous prospective we will barely get a hold the preeminent of them when they are integrated with computing, AI, fuzzy logic and associated themes.

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