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Role of Neural Network in Data mining

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ABSTRACT:

Integrating data from one or more disparate sources creates a central repository of data, **a data warehouse (DW).** Data warehouses store current and historical data and are used for creating trending reports for senior management reporting such as annual and quarterly comparisons. Companies have been collecting data for decades, building massive data warehouses in which to store it. Even though this data is available, very few companies have been able to realize the actual value stored in it. The question these companies are asking is how to extract this value. The answer is **Data mining.** There are many technologies available to data mining practitioners, including Artificial Neural Networks, Regression, and Decision Trees. Many practitioners are wary of Neural Networks due to their black box nature, even though they have proven themselves in many situations. This paper is an overview of use of neural networks by data mining practitioners.

Keywords: *Artificial Neural Network (ANN), neural network topology, Data mining, strength of Neural network, Advantages*

1. INTRODUCTION

Database is a collection of interrelated data .The first database system were implemented in the 1960's and 1970's.Many enterprises therefore have more than 30 years of experience in using database system and they have accumulated large amounts of data during that time[1].

Conventional database systems are often designed for day to day running of an organization and are called Online Transaction Processing (OLTP) systems. Many enterprises are deciding to design another separate database is needed for decision making; such databases are called **data warehouses**. A data warehouse does not duplicate an OLTP database. A warehouse is design to have summary information collected from one or more OLTP systems so that it can support complex queries, report writing and analysis of information. It does not need detail information of transaction. [1]

Data mining is the analysis of (often large) observational data sets to find unsuspected relationships and to summarize the data in novel ways that are both understandable and useful to the data owner. Data mining deals with the discovery of hidden Knowledge, unexpected pattern and new rules from large data sets.

Data mining involves the use of sophisticated data analysis tools to discover previously unknown, valid patterns and relationships in large data sets. These tools can include statistical models, mathematical algorithms (algorithms that improve their performance automatically through experience, such as neural networks or decision trees), and machine learning methods.

Out of these tools Neural network have been successfully applied on wide variety of supervised and unsupervised learning application. Neural network methods are not commonly used for data mining tasks because they often produce incomprehensible models and require long training time. [7]

2. ARTIFICIAL NEURAL (craven) NETWORK

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"A neural network is a parallel, distributed information processing structure consisting of processing elements (which can possess a local memory and can carry out localized information processing operations) interconnected via unidirectional signal channels called connections. Each processing element has a single output connection that branches ("fans out") into as many collateral connections as desired; each carries the same signal - the processing element output signal. The processing element output signal can be of any mathematical type desired. The information processing that goes on within each processing element can be defined arbitrarily with the restriction that it must be completely local; that is, it must depend only on the current values of the input signals arriving at the processing element via impinging connections and on the values stored in the processing element's local memory." [3]

A neural network is a system composed of many simple processing elements operating in parallel whose function is determined by network structure, connection strengths, and the processing performed at computing elements or nodes [4]

Artificial neural systems, or neural networks, are physical cellular systems which can acquire, store, and utilize experiential knowledge.[5]

Neural network (NN) is a brain metaphor for information processing. These models are biologically inspired rather than an exact replica of how the brain actually functions.

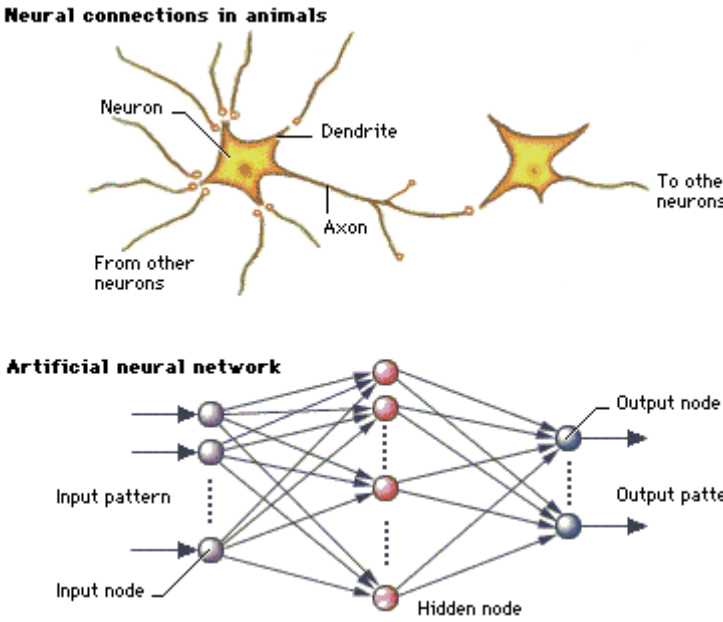

Diagram 1: Basic Structure of Neural and artificial neural network [9]

3. MODEL OF A NEURON

• A neuron has three basic elements:

1. A set of *synapses or connecting links*, each with a weight or strength of it own. A positive weight is *excitatory* and a negative weight is *inhibitory.*
2. An *adder* for summing the input signals.
3. An *activation function* for limiting the range of output signals, usually between [-1, +1] or [0, 1].

• Some neurons may also include:
– a ***threshold*** to lower the net input of the activation function.
– a ***bias*** to increase the net input of the activation function[6]

Table 1: Biological Verses Artificial Neuron:[2]

BIOLOGICAL NEURON	ARTIFICIAL NEURON
Soma	Node
Dendrites	Input
Axon	Output

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Synapse	Weight
Slow	Fast
Many Neurons	Few Neuron

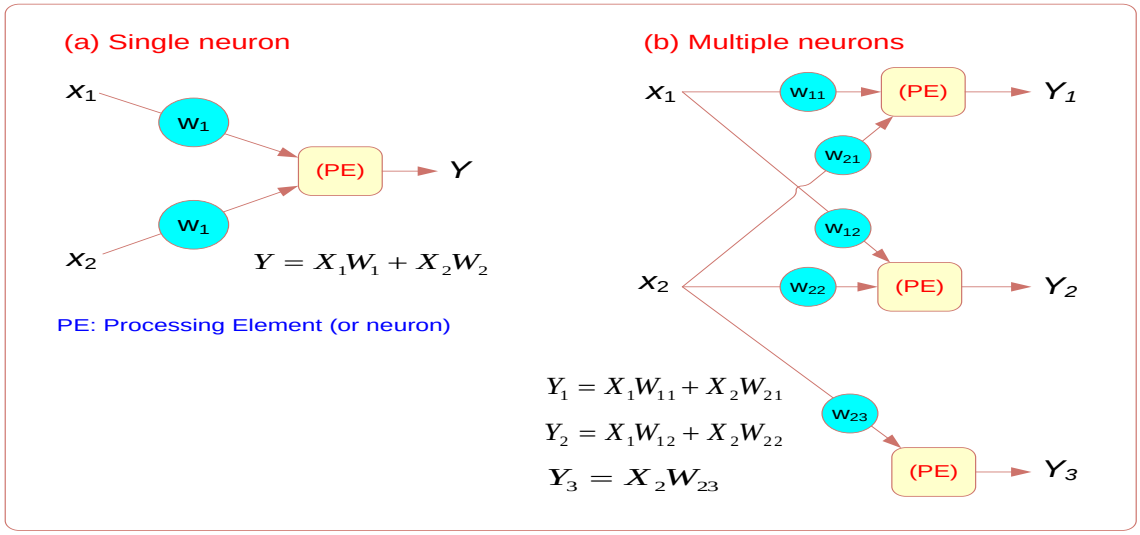

Diagram 2: Structure of single Neuron and Multiple Neurons.

4 . CHARACTARASTICS OF NEURAL NETWORKS:

- Neural Network is composed of a large number of very simple processing elements called neurons.
- Each neuron is connected to other neurons by means of interconnections or links with an associated weight.
- Memories are stored or represented in a neural network in the pattern of interconnection strengths among the neurons.
- Information is processed by changing the strengths of interconnections and/or changing the state of each neuron.
- A neural network is trained rather than programmed.
- A neural network acts as an associative memory. It stores information by associating it with other information in the memory. For example, a thesaurus is an associative memory.
- It can generalize; that is, it can detect similarities between new patterns and previously stored patterns. A neural network can learn the characteristics of a general category of objects on a series of specific examples from that category.
- It is robust; the performance of a neural network does not degrade appreciably if some of its neurons or interconnections are lost. (distributed memory)
- Neural networks may be able to recall information based on incomplete or noisy or partially incorrect inputs.
- .A neural network can be self-organizing. Some neural networks can be made to generalize from data patterns used in training without being provided with

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specific instructions on exactly what to learn.[6].

5. DEVELOPM ENT PROCESS OF AN ARTIFICIAL NEURAL NETWORK

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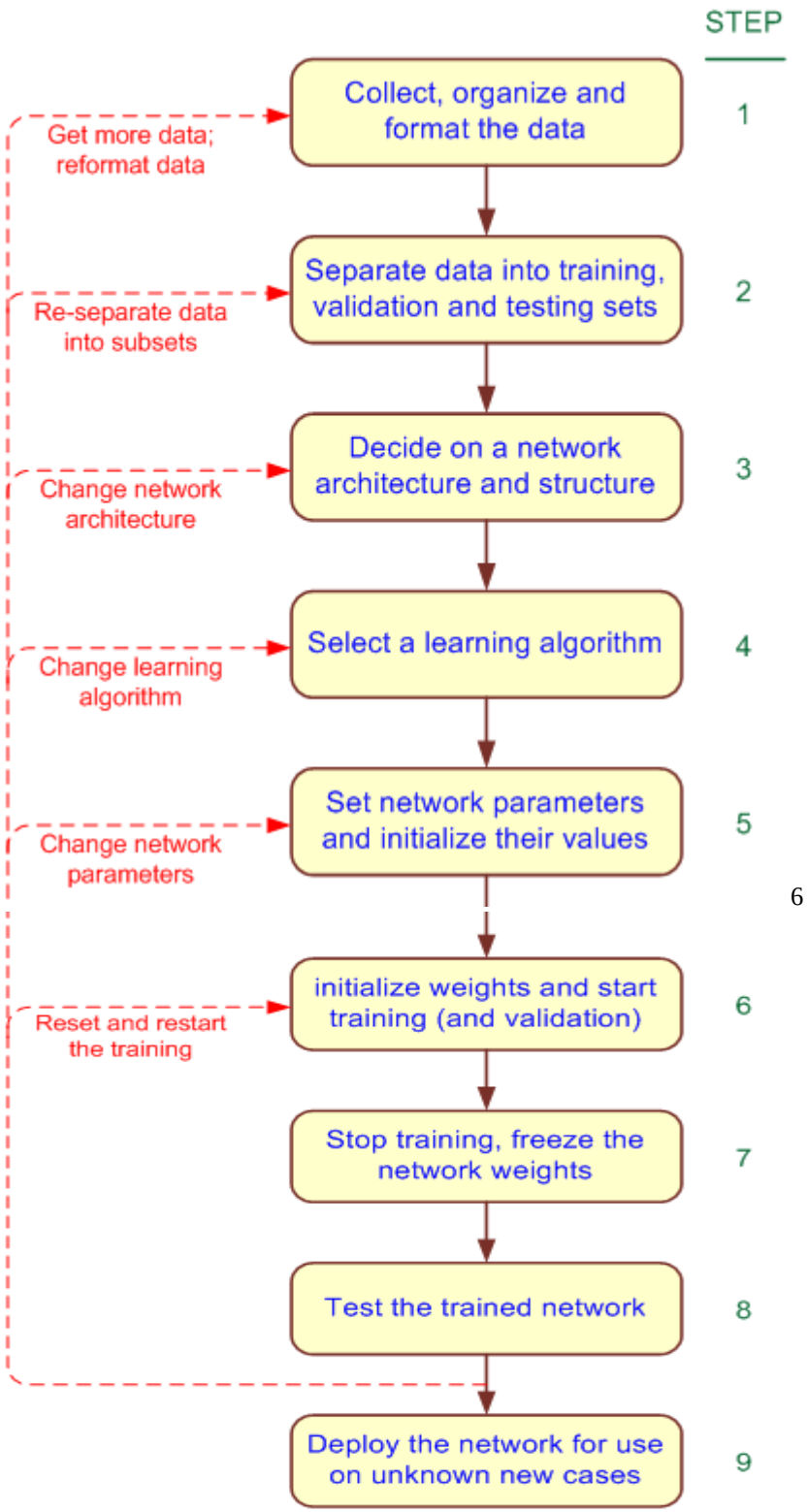

Diagram 3: Development Process of an Artificial Neural network [2]

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6. STRENGTHS OF NEURAL NETWORKs:

- Generalization
- Self-organization
- Can recall information based on incomplete or noisy or partially incorrect inputs.
- Inadequate or volatile knowledge base
- Project development time is short and training
- time for the neural network is reasonable.
- Performs well in **data-intensive** applications
- Performs well where:
  – Standard technology is inadequate
  – Qualitative or complex quantitative reasoning is required
  – Data is intrinsically noisy and error-prone[6]

7 APPLICATIONS OF NEURAL NETWORKs:

- Economic Modeling
- Mortgage Application

7.1Assessments

- Sales lead assessments
- Disease Diagnosis
- Manufacturing Quality Control
- Sports forecasting
- Process Fault detection
- Bond Rating
- Credit Card Fraud
- Detection
- Oil Refinery Production

7.2 Forecasting

- Foreign Exchange Analysis
- Market and Customer Behavior

7.3 Analysis

- Optimal resource Allocation
- Financial Investment Analysis
- Optical Character Recognition
- Optimization

The following are examples of where neural networks have been used.

7.4 Accounting

- Identifying tax fraud
- Enhancing auditing by finding irregularities

7.5 Finance

- Signature and bank note verification
- Risk Management
- Foreign exchange rate forecasting
- Bankruptcy prediction
- Customer credit scoring
- Credit card approval and fraud detection
- Forecasting economic turning points
- Bond rating and trading
- Loan approvals
- Economic and financial forecasting

7.6 Marketing

- Classification of consumer spending pattern
- New product analysis
- Identification of customer characteristics
- Sale forecasts

7.7 Human resources

- Predicting employee's performance and behavior
- Determining personnel resource requirements

8. ADVANTAGES OF NEURAL NETWORK:

1. High Accuracy: Neural networks are able to approximate complex non-linear mappings
2. Noise Tolerance: Neural networks are very flexible with respect to incomplete, missing and noisy data.
3. Independence from prior assumptions: Neural networks do not make a priori assumptions about the distribution of the data, or the form of interactions between factors.
4. Ease of maintenance: Neural networks can be updated with fresh data, making them useful for dynamic environments.
5. Neural networks can be implemented in parallel hardware

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6. When an element of the neural network fails, it can continue without any problem by their parallel nature.

9. DESIGN PROBLEMS FOR NEURAL NETWORK

1. There are no general methods to determine the optimal number of neurons necessary for solving any problem.
1. It is difficult to select a training data set which fully describes the problem to be solved.[8]

10. CONCLUSION

The use of neural networks in data mining is a promising field of research especially given the ready availability of large mass of data sets and the reported ability of neural networks to detect and assimilate relationships between a large numbers of variables.
There are many technologies available for data mining, including Artificial Neural Networks, Regression, and Decision Trees. But Neural Networks are more popular in Practitioners due to their black box nature. In most cases neural networks perform as well or better than the traditional statistical techniques to which they are compared. Thus, neural networks are becoming very popular with data mining practitioners, particularly in medical research, finance and marketing.
Due to design problems neural systems need further research before they are widely accepted in industry. As software companies develop more sophisticated models with user-friendly interfaces the attraction to neural networks will continue to grow.

REFERENCES

[1] Introduction to Data Mining with case studies G.K. Gupta.

[2] Business Intelligence and Decision Support Systems (9th Ed., Prentice Hall)

[3] Svein Nordbotten (2006) . *Data Mining with Neural Networks.*

[4] DARPA Neural Network Study (1988, AFCEA International Press, p. 60)

[5] According to Zurada, J.M. (1992), Introduction To Artificial Neural Systems, Boston: PWS Publishing Company, p. xv

[6] Introduction to Data Mining Using Artificial Neural Networks ISM 611 Dr. Hamid Nemati

[7] craven, M. W. (n.d.). Using Neural Networks For data Mining. *Future genaration computer system issue on Data mining* .

[8]DR. YASHPAL SINGH, A. S. (n.d.). NEURAL NETWORKS IN DATA MINING. *Journal of Theoretical and Applied Information Technology* , 6.

[9] Journal of Theoretical and Applied Information Technology © 2005 - 2009 JATIT. All rights reserved.

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