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Applications of Artificial Neural Networks in Information System of Management Accounting

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Abstract

Nature of many the humanities relationships are often nonlinear especially in the field of accounting and management processes. Management accounting as an index decision-making can be considered as a nonlinear system. Decision-making is one of the most important parameters in management accounting which requires to analyze information properly. The Information based on artificial intelligence with capabilities such as learning, prediction, classification, and extension can be considered as a solution may be considered as a support tool of management accounting. Artificial neural networks is a qualitative methods as a branch of artificial intelligence that can be as a powerful tool to analyze complex information. The networks have big potential to solve problems which cannot be solved by logical, analytical techniques with the standard software. In this paper, applications of these networks in the field of information system and management accounting are explained. In addition, some structures of the networks that more use in accounting and humanities problems are presented. The main objective of this paper is to identify the function of artificial neural network for decision-making. Results show that using soft computing techniques such as in artificial neural networks can improve effectiveness of information system.

Keywords: *Accounting, ANNs, Information System, Management, Nonlinear System*

1. Introduction

Information in the financial and accounting systems[1] often have two major characteristics: first, the Information are dependent on many variables and second, accounting data have very complex relationships between components that makes them very difficult to analyze[2]. This problem has caused an error in the accuracy of prediction of the conventional analysis. Artificial Neural Network (ANNs) is a computational technique in artificial intelligence which uses as a new method for solving complex problems in fields of machine learning, system engineering, complex systems, market forecast, optimization, nonlinear systems, financial analysis, humanities, and economy[3-6]. Power learning is one of the most important features of an ANN that is closer to human performance[7]. A key element of this idea, creating new structures for the information processing system. The system consists of a large number of extra processing elements called neurons, which are integrated in unison to solve a problem, and by synapses transmit information[8]. Neural networks with its remarkable

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ability deducing conclusions from complex data to identify patterns and trends can be extracted from a variety of human-computer is used to identify them is very difficult[9].

According to the applications of ANNs and soft computing tools in the field of accounting and management are increasingly on the rise [1, 3]. Recently titles such as neural networks, genetic algorithms and fuzzy logic are the issues that has attracted the attention of many researchers in the field of humanities[10]. These methods as a powerful tool in solving complex problems which could not be solved by traditional methodologies have been used. ANNs extract knowledge to the network structure by processing of experimental data that is called learning. ANNs in addition to applications in various fields, their position have found in accounting and finance since a long time ago. Researchers have used different ways of technologies and techniques ANNs in accounting. Basically, the ability to learn the most important feature is an intelligent system. A system that is more flexible and simple to learn more is planned so it can be responsive about new problems or equations.

Recently, managers demand the use of computer tools that enable to predict or structured raw data[5, 11]. Today, with the use of "automated decision" with the help of expert intelligent systems can be simple. Accounting has burden of additional information, such as audit and internal control volume and complexity of a lot of information. The main subject of this study is to identify network applications in the form of management accounting information systems to assist management decisions on economic units.

2. The Structure of Artificial Neural Network

An ANN included number of layers and weighing components[7, 12]. Network behavior also depends on communication between members[13]. Figure 1 shows the structure of an ANN. In general, there are three types of neurons in neural networks:

1. Input layer: Get the raw data that was fed into the network.
2. Hidden layers: the performance of the layers is determined by inputs and the relationship between layers weight and the hidden layer. Weights between input and hidden units determine when a hidden unit to be activated.
3. The output layer: output unit the performance of depending on activity and body weight of the hidden connection between hidden and output units.

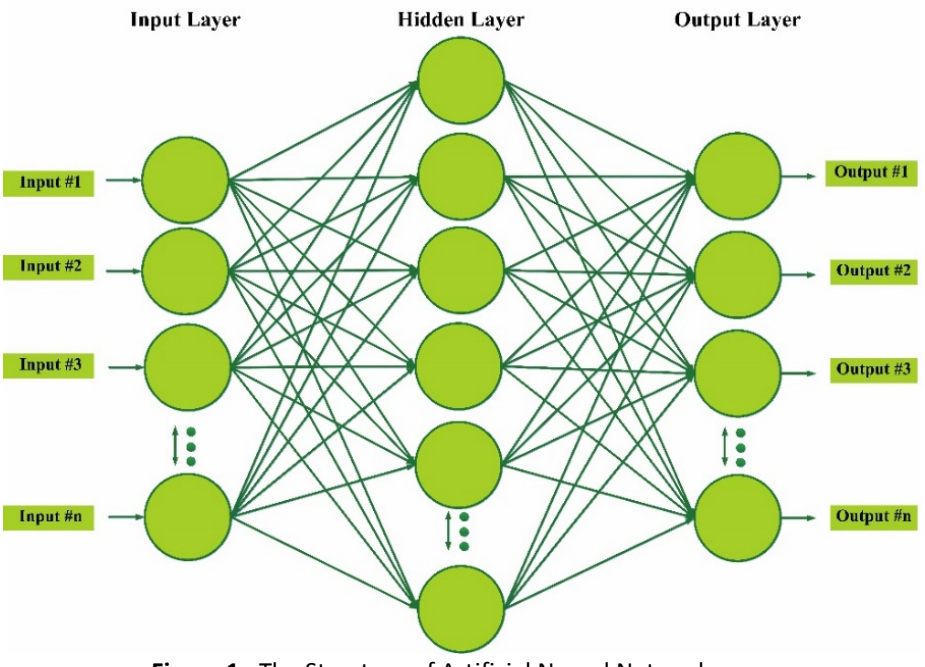

Figure 1: The Structure of Artificial Neural Network.

The advantages of neural networks are as follows:

1. Adaptive learning: the ability to learn how your tasks based on information given to it early experiences do or say the correct network.
2. Self-Organizing: an artificial neural network automatically organizes presents data that is received during training. Neurons changes with the principle of compatible learning and response to input.
3. Real-Time Operators: computing in parallel with hardware neural network can be specially designed and built for optimal results artificial neural network capabilities is done.

Both layers of a network communicate with each other by weights and connections. In neural networks, there are several connections or link weight:

1. Forward: the highest links are from this type which signals move in only one direction and does not have any feedback.
2. Backward: data are feedback from higher layers to the bottom layers as node to node.
3. Side: output nodes per layer, the layers are used as input nodes.
4.

A neural network and computer have a generally differences. Neural networks have a different way to solve the problem. Traditional methods use computer algorithms to solve the problem is to solve the problem of unambiguous set of instructions followed. If the computer does not have solving way of problems previously or there is no specific algorithm, the system does not have the ability to solve the problem. Based on training divided into four categories:

1. Constant weight: There is no training and it has application in information optimization, reducing the volume, resolution and compression.
2. Unsupervised training: weighing only based on correct inputs and outputs. However, there are not appropriate to compare the output and determine the amount of error to be corrected weights. Weights only synchronize based on information input patterns. The purpose is extracting features of input patterns based on the strategy of clustering or classification and diagnosis of similarities, without an output corresponding to the input patterns are already known. This method of learning is usually based on the best match is performed. The unsupervised network changes weights based on the output from the input because in next deal is an appropriate response to this input. Thus the network learns how to respond to input. So networks of unsupervised, to find neurons is one of the most important case. The Unsupervised training in an ANN is shown in figure 2.
3.

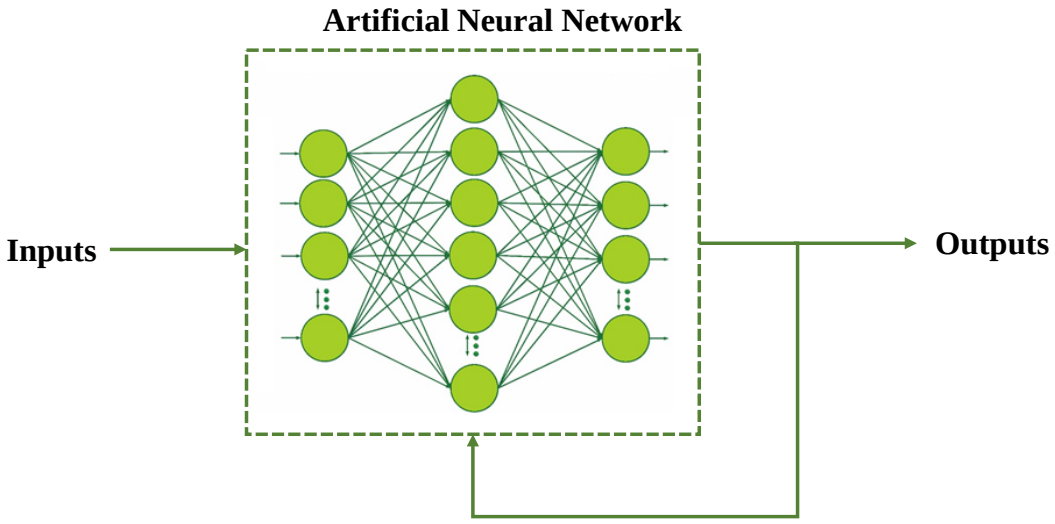

Figure 2: The Unsupervised training in Artificial Neural Network.

4. Supervised training: for each group of outputs corresponding to the input patterns is displayed and changing the weights to be done when the difference output for optimal output level training patterns has an acceptable error. In these methods, outcomes are associated to weights or gap for the release of the film has been distributed input and output weights are modified. The aim is designing a network which firstly is trained by training data available, then class networks are recognized by providing input vector. This network is widely used for pattern recognition functions. Figure 3 shows the supervised training in an ANN.
5.

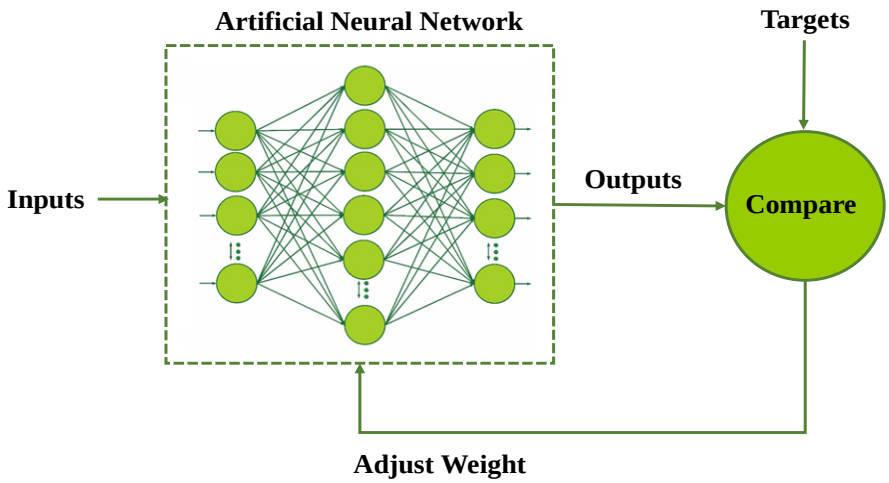

Figure 3: The supervised training in Artificial Neural Network.

3. Management Accounting

Management accounting is definition process of measure, aggregate, analyze, prepare, interpret and share information used by management to plan, Assessment and control of an entity and to assure appropriate use of and accountability to their Sources[14]. Management accounting are also included to provide financial reporting for non-manager groups such as shareholders, creditors, regulatory agencies and tax authorities[11]. The management accounting is considered timely information when they need an information system is a necessary response. Management accounting on the use of accounting information to managers within organizations, In order to provide for informed business decision affirms that allows them to better equip their control and management functions. In contrast, financial accounting information, management accounting information have these characteristics:

1. Look forward rather than historical.
2. To support decisions generally are based on a model with a degree of abstraction, rather than being based on the case.
3. Designed and intended for use in the organization, rather than for stakeholders, creditors, and is intended legislator.
4. Usually it is confidential and used by managers.
5. It is calculated by reference to the needs of managers, and often is used by management information systems, not by reference to general standards of financial accounting.

4. Accounting Information System

Information system is a database for storing, processing and analyzing the results that regular reports are done. Accounting process are supported by applications designed to process high volumes of data. Big companies can do millions of transactions in a month, while medium-sized companies with the traditional system can process up to one hundred thousand to over a month. Big companies like Amazon or Dell can be processed thousands of sales orders in one day. The market services to specific customers that use this information using IT tools for decision making, planning activities, and turning

data into business intelligence. Now accountants can extract the business intelligence in their firms by plan and control marketing activities. The real value of information is customer oriented type which it is reached from the stored information and application intelligence to strategy development. Accountants and financial managers consider four areas of activity to assist management decisions for customer oriented. First of all, the information are needed and necessary should be identified such as financial information because accountants are familiar with the financial data collected. Secondly, in many cases, data can be collected from large multi-database because it has already provided the required data. Thirdly, the data can studied using advanced analysis techniques. Finally, the information is used for planning and decision-making activities. The four areas of activity will become the primary information into business intelligence. Financial experts can use the database as a consultant to the management for the benefit of cost or as observers. Accountants in this new role to achieve information stored in the database. Structure of an accounting information system as simply is shown in Figure 4.

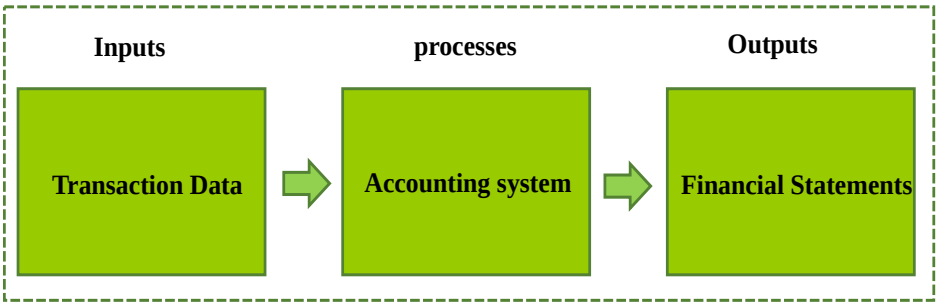

Figure 4: The Structure of an accounting information system.

According to the achievements of modern information technology, accounting information system, decision support, there are no significant growth. Companies which want to use these systems, they can use from the experiences of others in the field to buy expert system to take advantage. The application of information systems, decision support and business intelligence to create competitive advantage based accounting is a new approach in the accounting profession. There are less systems that expose with making decision for accountants by logical reasoning, analysis and structural analysis based on scientific methods. However, some are also expected to use their imagination magic that can do decision-making process and management accountants with such systems, but such capability is merely an illusion. But this kind of attitude at the same time be suitable for accounting, so that very often, accountants are faced with complex problems. In these cases the only solution would be the use of artificial intelligence and decision support techniques such as ANNS. However, companies and researchers interested in business intelligence seems to slow grow in using decision support systems in accounting. Another interpretation of this it can be seen that accounting decision support systems are as expert systems. Principal reasons are limitations of the system and loss of interest in it, the lack of knowledge and difficult to implement for the other problem.

5. Applications of ANNs in the Case Study

Neural networks is growing in the analysis of structure and in the implementation and development of hardware, terms of quantity and quality in the development and neural computing techniques [15-17]. ANNs are valuable tool for managing a wide range of fields as A vital component of most data mining systems, will change the way organizations look at the relationship between the data and the company's strategy. The ANNs methods have been used in many contexts, some of which include a wide range of medical, accounting, Accounting, process control, human resources, financial services, and GIS. Scope of financial analysis is one of the most thriving areas of application of ANNs. One of the best fields of application of this system is the field of accounting and finance[10]. Today, a large variety of ANNs are used for various applications in the branch of human knowledge which is used by different groups of decision-makers, such as managers and organizations, accountants, financial analysts, tax

experts and the public[16]. Experts in different fields of accounting and financial knowledge use this attractive approach to find "second guess" the reliability of the findings and judgments of their own[1, 9]. Figure 5 shows Information system based on ANNs for management accounting. Some of the applications of such information systems In the field of management accounting include the following:

5.1. Price prediction

Price prediction or stock returns is not easy because many market factors are involved in determining that all these factors cannot be used in technical analysis[18, 19]. Only historical data on prices and trading volume to predict the future movement of the price.

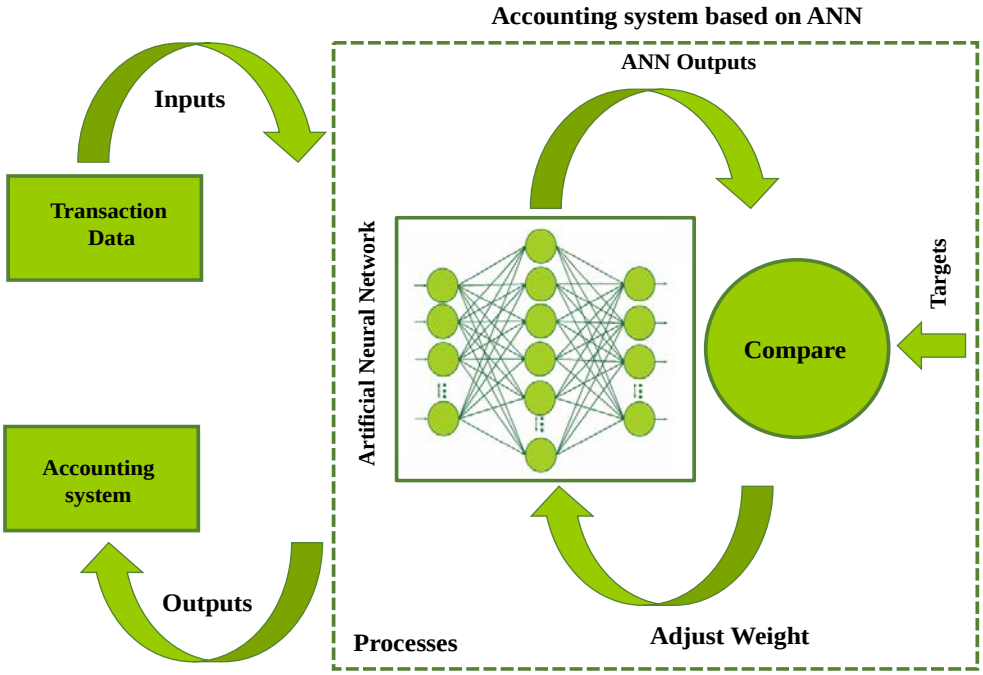

Figure 5: Information system based on ANNs for management accounting.

5.2. Accounting information system with a modern approach

Accounting information system is component and element of the company which by financial event processing give financial data and information in the decision making to all users[1]. Accounting information system can be logical intersection of two the broader theme the accounting and management information systems. What is common in both accounting and management information system is considered pivotal to information. Accounting to more trend information, while covering systems that produce information.

5.3. ANNs to predict the stock market

Predict the stock market is very complex because there is no due process and no clear estimate or predict stock prices in the stock market there. There are two methods one step tutorial and others predicted the stock price has been trained on data. The stock market, where a lot of benefits for investors for investors because it provides a financial opportunity. Until the through investing its resources on the company's stock different, their business interests. It is a chaotic system. This means that the characteristics of stock price behavior than and non-deterministic forecast is given. ANNs has the potential to detect unknown and hidden patterns in data that can be used to stock market forecast is very effective. For this type of chaotic systems, ANN approach is appropriate because we do not have to understand the solution. This is a major advantage for the method. On the other hand we have to understand algorithms inputs and outputs with full details in the traditional techniques.

5.4. ANNs to analyze auditing

One of the main reasons for using neural networks is that auditors Retire or leave himself organization[20]. Thus, experimental of knowledge audit firms that during the years of professional experience gained is lost. This problem is a large loss for a certified public accountant firm, because the most important asset of an institution is audit staff experienced. Since information and experiences are stored in an ANN will not become disappeared and data quality gradually increases due to new experiences. These networks can be used as a tool to prevent institutions losses a lot of professional and experienced experts. Reduce the cost of auditing and the ensuing reduction in audit fees is other benefits of using these systems. Some applications of ANNs in auditing contain risk assessment, the audit plan, providing technical assistance, detect fraud.

CONCLUSION

In this paper, the applications of artificial neural networks to solve information system of management accounting problems is presented. One of the biggest problem in management accounting is to analyze complex information that conventional analytic methods it is not responsible for solving it. The results show that using artificial neural network method as a soft computing approach can be as a responsible method. All relationships between variables which is discovered and or is undiscovered are covered by the networks. So ANNs can be used powerful smart tools to help management accounting. Mentioned applications of ANNs in the article show complex problems in the field of humanities and management accounting such as decision-making can be determined by helping the tools. Also, the growing use of artificial intelligence and other soft computing methods in recent years demonstrate the effectiveness of these methods.

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