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Management Mechanism For Decision Making To Generate Value In Smes

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ABSTRACT

Artificial intelligence is considered one of the phenomena of business support that can generate more profit for today's companies. With the aim of reflecting on the most outstanding aspects and advantages, the results of a bibliographic research are presented below, based on research results by authors in English and Spanish, which seek to highlight the growth opportunities for organizations in this regard. The results allow to observe different concepts and could serve as a reference or starting point for organizational and educational leaders.

Keywords: Machine Learning, Organizations, Competitiveness, Globalization

1. INTRODUCTION

Nowadays it is common to read publications where new techniques related to Artificial Intelligence (AI) and machine learning (ML) are mentioned, both in social networks and in specialized magazines and articles. This is because it is undoubtedly the most recent trend in terms of analysing patterns and discovering information that has been developing since the 1960s and that, with the advance of computer processing capacity, has managed to position itself as a high-impact alternative in the field of data science [1]. For this reason, the labor market and professionals in the management administrative field must have the necessary skills and tools to address, either from a technical point of view or not, the application and understanding of this type of data analysis techniques in modern business [2,3].

The automation of processes by artificial intelligence would, in many cases, significantly reduce costs in economic terms, increasing the productivity of human capital [4], however, it is required that the organization has the necessary mechanisms and technical resources to carry out projects of this type. Thus, the purpose of this document is to present the most important theoretical aspects related to IA and ML, to approach the impact of these techniques on the business world.

2. METHODOLOGY

Under the qualitative approach, a documentary methodology was proposed that would allow the revision of the most valuable theories and orientations on the subject studied. This design is widely supported by academic literature, as a method applicable to different research purposes and diverse areas of knowledge [5]. The usefulness of documentary research revolves around contrast, reflection, and critical analysis among the authors, thus generating a scenario in which it is possible to compare points of view and draw relevant conclusions [6].

In addition, the phases for the exploration, compilation, systematization, and analysis of the base documents were clearly defined, complying with parameters and criteria that would ensure maximum reliability and relevance of the content. For this purpose, specialized academic search engines were used for the Internet, selecting academic articles published in indexed and arbitrated journals, databases in spanish and english, such as Scielo, Elsevier, Springer, among others.

3. ARTIFICIAL INTELLIGENCE (AI)

The history of the discipline dates to the 1950s, when a conference on theoretical computer science was held at Dartmouth College in the United States, attended by numerous scientists and specialists who were able to provide a well-founded technical staff with their research. Later, in 1954, with the appearance of the IBM 704, a chain production computer, it was possible to develop a variety of programming languages aimed at the implementation of AI, where the maximum reference on intelligent behaviour in machines was proposed by Alan Turing (1950) with the intelligence test for machines, which consists of determining intelligent behaviour through the maintenance of a fluid conversation between a human and a machine without a third party not distinguishing between man and computer [7,8].

Conceptually, some authors classify AI as a branch of computer science that can emulate the human capacity to reason and make decisions based on self-learning [9]. Others have described it as a science that seeks to model, implement and design systems that have the same reasoning as human beings to solve certain complex situations [10].

3.1 Artificial intelligence approaches

Since the appearance of AI, many authors have developed their own methods and techniques to try to adapt and implement these processes in different fields of society, such as medicine, industry, economics, etc. However, there are two major currents or approaches to AI, firstly, that which aims to develop technology capable of providing the machine with reasoning capabilities comparable to those of human beings, while the second approach is more oriented towards the creation of techniques and systems capable of emulating human cognitive processes [11].

The first approach is largely based on the works of McCarthy, Minsky, Rochester and Shannon (1955), while the second is based more on the theories of Newell and Simon (1956). The deductive methods of reasoning in the field of AI were later replaced by other more efficient methods, such as induction from simpler analyses and behaviours, other more complex and robust methods are constructed, the technique that allows this type of inductive method is automatic learning or Machine Learning [12].

3.2 Automatic Learning

Automatic learning provides a set of techniques that allow computers to learn based on the results of the same process using sophisticated algorithms [13] and is an important part of the artificial intelligence branch that currently has a rapid growth and expansion, due to the diversity of potential uses and applications [14].

In addition, automatic learning can be classified into two broad segments, namely supervised, semi/supervised unsupervised and reinforcement learning [15]. Within the supervised methods, a certain amount of data, called training data, is taken from the model, and used to train and significantly improve the predictions. This training process continues systematically until the model achieves an adequate and reliable level of accuracy [16]. Unsupervised styles then contain input data that does not generate a known result, i.e., the model is structured through deduction for more general rules about the data set. Under this approach, exploration is used to find the constructs through mathematical processes such as clustering, dimension reduction, among others [17].

In semi-structured automatic learning the two approaches coexist, i.e., based on the prediction problem being studied the model must learn with a portion of the data to give a reliable result, for example, where regression and classification algorithms are used [18]. Finally, the reinforcement of learning is, in some cases, more complex and challenging, since it is not the actions to be taken that are indicated, but rather the system itself that must determine which are the most efficient through trial and error, the most relevant characteristic of this type of automatic learning style [19]. For illustration purposes, Figure 1 shows some of the most important algorithms used in both supervised and unsupervised styles.

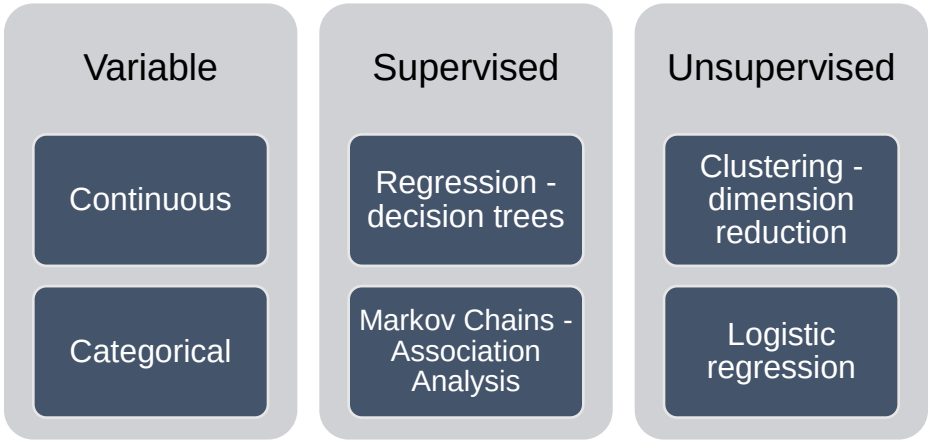

Fig. 1. Automatic learning algorithms

According to this general classification, there are several automatic learning schemes, which are structured in a way that is homologous to human processing and reasoning systems:

- Knowledge-based systems (KBS): This type of system is an integral part of artificial intelligence and consists of automation in the analysis of problems by applying specialized knowledge of a specific field of application [20]. In this way, the system will be able to perform the tasks of a human specialized in an area based on a set of experiences, requirements and parameters defined, therefore, it presents properties oriented to solve problems of great complexity that require the investment and use of important computational resources.
- Elements of an SBC: For an SBC to function properly, some important elements are required, such as the knowledge base consisting of facts and rules, inference system and interface, each of which together make up the SCB. According to Garcia [21], the knowledge base is the key to the system, since it is there where all the information related to concepts, relationships, symbols, and representations is found, in turn, the facts, form the logical conditions, normally associated with the expression of true value (if), condition, then - statement.

On the other hand, the rules correspond to the parameters that must be met within the model and present the general restrictions of reasoning. The inference engine will allow you to explore the knowledge base in search of the most pertinent result according to the problem, based on facts and rules. Finally, the interface is the one that facilitates the interaction with the users, which must have the basic and manageable characteristics so that it can be used. The interaction of all these elements of the SBC can be seen in Figure 2.

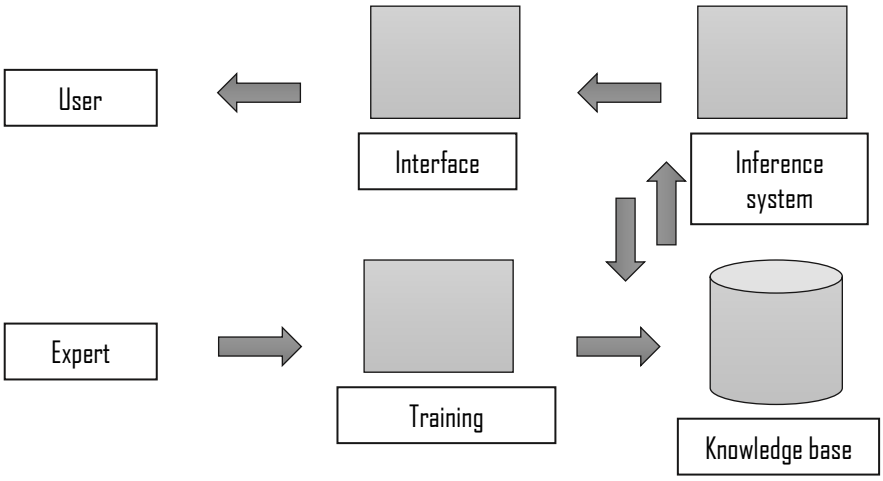

Fig. 2. Elements of the SBC

➢ Expert artificial intelligence systems: They are part of the SBC and can be understood as those systems that have a reasoning process like that of a human specialist in an area to solve a specific problem [22]. In addition, they simulate learning processes, which allows logical conclusions to be generated, coherent decisions to be made, information to be stored and experience to be learned, this type of system starts from a knowledge base, unlike those methods that work with databases.

➢ Artificial Neural Networks (ANN): One of the most important expert systems within the artificial intelligence toolkit, whose structure attempts to homologate the neuronal structure of the human brain to, based on input data, generate a unique, logical, and coherent response, and has the faculty to recognize patterns and learn from the data [23]. The architecture of an ANN basically consists of a set of input, connection, and output data, all of which is called perceptron, and can be easily represented in Figure 3.

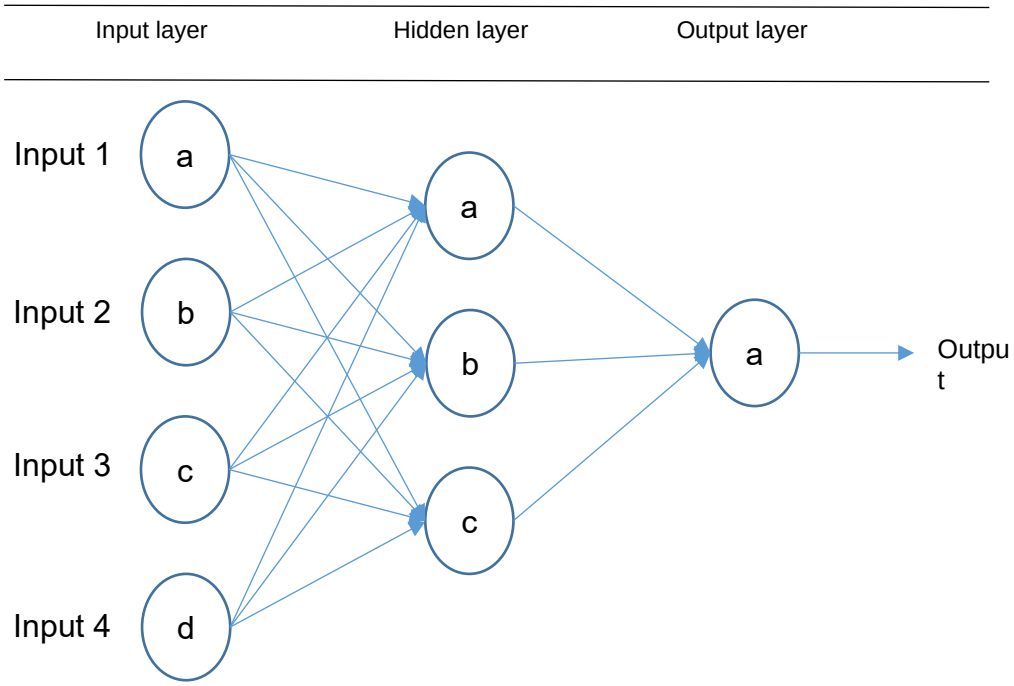

Fig. 3. Representation of a basic ANN of a layer

3.3 Stages for inserting e-learning in small and medium-sized enterprises

To incorporate e-learning in small and medium-sized enterprises, some steps are suggested that will facilitate the process in a dynamic way. These phases are shown in Figure 4 below.

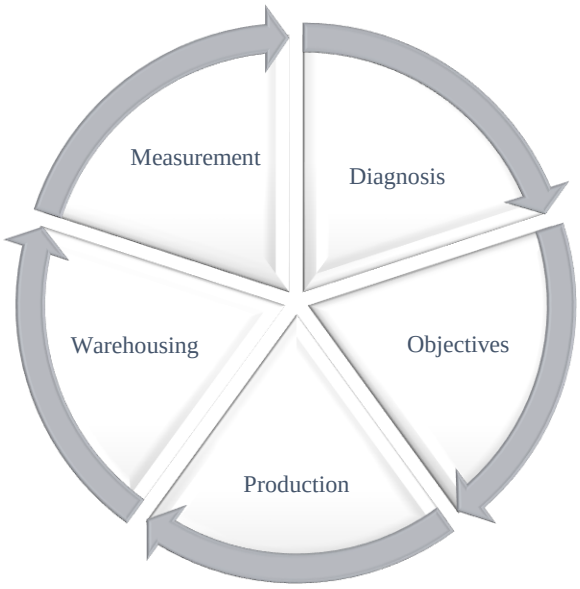

Fig. 4. Phases for automatic learning in small and medium enterprises

As illustrated, every organization must begin with a diagnosis to identify its current situation or starting point, then must define some objectives, because each entity has its own life and needs are specific. Once the phases have been completed, the processes that will give rise to automatic learning are produced or hosted, to subsequently define their custody, storage, and measurement system as appropriate [9].

4. CONCLUSION

The advance of technology has allowed the development and computing capacity of computers to be more efficient and accessible to various economic sectors [24], especially business, so organizations today are looking with greater interest at more complex predictive techniques and automated analytical processes to improve their productivity and reduce costs [25].

In this sense, artificial intelligence provides a set of solutions to complex problems in a specific way with the use of computers and specialized algorithms, based on data recorded from various sources. This generates multiple application potential for businesses, such as marketing, credit analysis, financial risk, among others.

For this reason, the approach to research on this subject must include the active participation of the academic and business sectors, which will allow the development of new, more sophisticated, flexible, and reliable analytical methods to support the organization's decision-making systems, to ultimately promote the implementation of these practices in the productive sector and thus achieve higher levels of competitiveness and innovation [26]. Certainly, the new technologies represent a substantial change in the way business is conducted worldwide [27, 28], representing a strengthening aspect for small and medium-sized enterprises [29, 30].

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