

Artificial Intelligence, classification theory and the uncertainty reduction process

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Abstract

This paper deals with concepts associated to classification theory and artificial intelligence, detailing situations according to one identification term, which is extensively big to be represented, allowing its reduction to the refereed point of one established subject. The human subjectivity is considerate as a dependence element in thematic area definition process as so in the detailing and identification process of the limits of the machines applications in general.

Keywords: Artificial intelligence, Classification theory, Information systems.

Resumen

Esta comunicación trata de conceptos asociados a la teoría de la comunicación y a la inteligencia artificial, detallando situaciones de acuerdo con un término identificado que es de gran amplitud para ser representado, permitiendo su reducción al punto referido en una materia determinada. La subjetividad humana es considerada como un elemento dependiente en un proceso de definición de un área temática, así como en un proceso de especificación e identificación de los límites de las aplicaciones automáticas en general.

Palabras clave: Inteligencia artificial, Sistemas de información, Teoría de la clasificación.

1 Preliminary context

Since early times, survival conditions have been demanding important adaptations to man, many of them provoked by natural phenomena, others, by consequence of his own actions.

The technological advance we are testifying, the disposable resources, hardware and software, multiply the possibilities of using informatics in many areas of human knowledge. According to this, it is normal to see clinical laboratories, hospitals, schools, museums, cooperative firms, taxis, among many others, taking services based on the use of the computer.

Consequently, professionals from different areas make use of these resources, challenging a revision on the production means of products and services, specifically turned to privilege the understanding of pattern functions of the computer, without the requirement of familiarity with countless specific commands of the operational system, for example. In this process, a link was searched between the description of functions and the language known by these professionals. Once leded the issue related to the disposable resource, and the perception of the potentialities of use from the resources in each professional area, we face another problem: where (and how) to get information necessary for the daily tasks, giving strength to the concept of the user. This way, we substituted the devoted telex network for the computer network, where each one could operate individually or share resources, not only of software, but hardware, interacting remotely among various points in a same organization; for example, a head office and its many branches spread all over the country.

This movement gave rise to a lot of doubts, and at the same time motivated the offer of new services and supports to increase the conditions of use of the resources that were disposable. The speed of production of new resources grew dramatically, making the equipments become out of date by the third year of use.

On the other hand, it is natural to many groups of users, with their particularities, producers of services and equipments and specialized professionals in the support to the use of those resources, to face many problems, on understanding them. The information, in a broader sense, became recognized as a differential to guide the organizations to manage these conflicts and preserve the projects of production.

However, it is usual that experts of a commercial area can't manage to use the technical resources disposable in the market, for lack of training or knowledge. From the identification of these needs, studies has been engaged, in a sense of finding a product that absorbs the activation tasks from repetitive processes on computers, keeping the man the work of ordering the tasks and evaluating the situations liable of being supported by the use of the product. A tool considered quite efficient on these process was the sequential warehousing of the realized events till the conclusion of a task, as well as the classification, allowing that the same process being repeated from the identifications of the first instruction known as artificial intelligence (AI).

2 Objectives, methodology and the conceptual approach

This paper is the previous result from the ongoing research process wich associates the concepts of classifications languages and artificial intelligence in order to offer a new scenario to the automated information retrieval process under the believe that it is possible to improve the human interaction resources to approximate it to the regular tasks.

As an explorative research process it demanded literacy search for conceptual works that could offer a background for further studies. A regular literacy was considered as well papers and results showed in seminars and congress that we have found. A list of the main topics identified and the authors defined the "path" and offer a view from the related structures of the concepts that are now being shared.

The relation among concepts of AI and classification is not clear. AI is defined as "the study of making computers do things that, at the moment, people do better" (Rich and Knight,

1993). Classification is a cognitive act that gathers or dissociates “things” for its similarities and differences (Fernández, 1991). What both definitions have in common is the space for subjectivity, for a study depends of the cognitive map from whom undertakes it, such as the identifications and the gathering of “things”.

In the beginning of discussions about AI, the elements of comparison of performance (or capacity) were games and demonstration of theorems. Assuming that being intelligent was solving well those problems, the mark of difference and advance was dealt with the capacity of the computer to explore a great number of solutions in a brief period of time.

As evolutions of levels of interest about the subject, the expert of AI solved daily problems, called reasoning of the common sense. In both situations the understanding about what is knowledge and the form to represent it has limited the levels of complexity of the experiments.

When studying the situations that are not repetitive tasks, the descriptions of the universe of each problem and its interactions with the environment has become a object of interest, as from it, depended the solution of these problems. The representation of knowledge, for AI, becomes to have the same importance in relation with the capacity to use the language for the human species. This association is natural, because the identifications of the environment and the actions of the problem is a task of the human element associated to the process generation of knowledge.

Dealing with the representation of knowledge, it is important to consider the interference of the language that is used. Particularly dealing with the AI interest, it is imperative that we don't promote double understanding of a same expression, because the inductive process for the definition of understanding can be dependent of the description of knowledge that doesn't consider enough variations to identify the desired meaning. About this aspect, Derr (1983) alerts: “the theory that the linguistic meaning is a mental construction of the knower can not explain the facts of ambiguity and synonymy...the meaning is property of the language”.

This way, the precision of understanding of a certain model will be dependent of the specificity of the language used on the representation. The more reduced the number of terms, the bigger is the specificity of language, which limits its application.

Rich and Knight (1993) emphasizes the capacity of perception as “crucial for our survival”, and state that “the capacity to use a language to communicate a wide variety of ideas is maybe the most important aspect that separate humans to the other animals”. In other words, the understanding of a determined group of signs, the capacity to associate them with a certain situation, interprets and transmits new understanding about the theme, is particular of the human species.

The classification theory indicates that as we get worried with the representation of a concept or fact, we are driven to two aspects: the cognition and the recuperation. The cognition is associated to the understanding, to the perception of something and our capacity to describe it. The recuperation suggests that the representation offered is understood and capable of being accessed in a further moment.

3 Conclusions

The combination of these elements leads us to an association with the concept of information system, where the application issue is considered. The motivation for a proposition of a system is associated, necessarily, to a situation where the environment is known and capable of description. The conditions of subjectivity are emphasized, naturally, as among the agents that define the environment will be the human agent and his capacity of understanding and description, such for the effects of definitions of the system itself as the conditions of use that are favourable. About the relation of dependency it is important to emphasize what Saracevic (1988) wrote: “the key to the future of information systems and searching processes (and, for extension, of science of information and artificial intelligence, from where the systems and processes are emerging) doesn’t stand on the sophistication of technology, but on the advance on the understanding of the human envelopment with information”.

Assuming that every system is associated to a retrieval process, it is natural that the questions associated to the understanding of the described problem are ordered in a way to satisfy the restrictions necessary to the solution: doing this, we are promoting a mechanism of classification. The essential is that this mechanism must be suitable to the requirements of use.

The problem, then, is to know (or define) a language that is sufficient to describe the problem, without omission, and at the same time that helps a process of solution that doesn’t get to repetition of stages for the double understanding favoured by a word on this language. According to Derr (1983) “the meaning of a word governs its use to regard specific objects in the world, whose essential properties constitute a criterion to determine if the world applies it to a specific subject”. To reinforce his point of view, he quotes COPI to state that “to understand a term means to know how to apply it correctly”. However, it is convenient not to dedicate too much effort on the terms, because they themselves don’t represent the universe of study; what really make the difference is the relation of identity among which the terms represent and which we want to represent; this way we will find Dimmet, quoted by Viana (1954): “the attention to the words don’t produce the thought...: one exaggerated effort can, many times, destroy itself, for being too much meticulous and less intelligent”.

For the exposed, there is an important approximation between the theory of classification and the action of definition and representation of a certain universe in a process of solution of a problem using any techniques of AI, because the combination of restrictions and declarations define each one of the states of a problem, just as its bonding as Landridge (1977) states: “if the process of recuperation always consists in searching an specific answer to a specific question, there are no doubts that the machine can solve it”.

For that, the representation of the knowledge disposable about the problem must consider sufficient details to foresee the possible unfolding issues dealt to a determined action; according to Rich and Knight (1993), “the representation systems of knowledge can carry out the role of a supporting system that guide the solution programs of specific problems”.

Another important issue that is associated is the synonymy and the ambiguity. As the understanding derives from a interpretation of the relation between object and the used term for its representation, it is important that the disposable statements behold all the variations

around the object, without losing its characteristics. The human model of reference makes it, using situation of applications and known definitions, to choose for a representation that considers the environment conditions of observation. Moreira (1980) deals with this issue, associating it to the concept of conceptual maps, stating the storage of information in the human brain like being highly organized, making a conceptual hierarchy in which more specific elements of knowledge are bounded to more general and including concepts.

This approach can be the reason of the importance of declaration/representation of knowledge in problems of Artificial Intelligence and can be used to approximate the principles of the techniques described by Rich and Knight (1993). The challenge is to set up forms of representation that makes easy the incorporation of non repetitive tasks to the group of problems capable of resolution by the computer.

References

- DERR, R. L. Linguistic meaning and language comprehension. *Information Processing & Management*, 1983, vol. 19, n. 6, p. 369-380.
- FERNANDEZ, R. P. *Conferência proferida na disciplina Teoria e Sistemas de Classificação no IBICT/DEP*. Rio de Janeiro, 1991.
- LANGRIDGE, D. *Classificação: abordagem para estudantes de biblioteconomia*. Rio de Janeiro: Interciência, 1977.
- MOREIRA, M. A. . Mapas conceituais como instrumentos para promover a diferenciação conceitual progressiva e a reconciliação integrativa. *Ciência e Cultura*, 1980, vol. 32, n. 4.
- RICH, E.; KNIGHT, K. *Inteligência artificial*. 2 ed. São Paulo : Makron Books, 1993.
- SARACEVIC, T. [et al.]. A study of information seeking and retrieving. I: Background and methodology. *Journal of the American Society for Information Science*, 1988, vol. 39, n. 3, p. 161-176.
- VIANA, M. G. *A arte de pensar*. 2 ed. Porto: Educação Nacional, 1954.