Chapter 1
Information and Knowledge:
Concepts and Functions

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ABSTRACT

Defining data, information, knowledge and their relationships is mainly a point of view matter. Indeed, the same entity may be related to any of these concepts depending on the use of it. This is true, at least as long as the entity is communicable through some means (text, voice, gesture, signal, object, or media, for example). By restricting our attention to symbolic entities and to the World Wide Web in particular, we can learn much about these concepts, their interconnections, the functions that apply on them and their values.

INTRODUCTION

Defining data, information, knowledge and their relationships is mainly a point of view matter. Indeed, the same entity may be related to any of these concepts depending on the use of it. This is true, at least as long as the entity is communicable through some means (text, voice, gesture, signal, object, media for example). In the free online encyclopedia Wikipedia, the page about the "Monty Hall problem", a probabilistic puzzle, represents at the same time data, information and knowledge. It is simple data when seen as a file downloaded to be interpreted and displayed in the web browser. The reading of the page reveals information about the problem and the solution. This web page will also be a source of knowledge for the reader who managed understanding the counterintuitive solution. On the other hand, this knowledge may help him for example, as valuable information for some reasoning by analogy, if he is asked to give an answer to the similar "three prisoners' problem". By restricting our attention to symbolic entities and to the World Wide Web in particular, we can learn much about these concepts, their interconnections and their values. It is a fact that symbols are used beyond a self-contained meaning as keywords to annotate other entities of different nature like documents,

images and videos to allow relevant classification and search. By this, textual symbols play an important role in expressing and interpreting various things but also in pointing out information in order to catch attention to the object they are annotating.

By symbolic entities we mean any type of data in the sense of databases (like numeric, text, date, image or logical). In knowledge bases they are called facts or literals when we deal with rule bases, instances when we deal with ontologies and cases when we deal with case based reasoning systems. Composed data like records or sets of literals, instances or cases represent specific information. We think that it will be of great interest to propose a unifying framework for investigating information functions with respect to both the quantity of information and its quality or value. This would be the main contribution of this paper together with a clarification of the concepts of information and knowledge with respect to each other and the functions that operate on them. Many definitions have been proposed for the concept of information and other related concepts such as data, knowledge and sometimes meaning. A comprehensive summary of some of these definitions is given in (Stenmark, 2002). In (Chaim, 2007), the author investigates these concepts on the basis of definitions proposed by a panel composed by information science experts. Five models based on universal or subjective domains were identified for defining the data, information and knowledge concepts. The study is limited to inferential propositional knowledge, the two other kinds of knowledge, practical knowledge and knowledge by acquaintance being considered not relevant within the field of information science. In our opinion, the two latter kinds of knowledge do exist in the electronic documents world on which we shall focus. Indeed some of the practical knowledge can be codified into documentation. Consider for example websites aimed to help repair engines, build origami, learn programming, or teach healthy behavior. Undoubtedly, these websites are means for successfully transferring at various degrees skills and practical knowledge. As to the knowledge by acquaintance, it is also at work since one can feel, as an immediate sensation, that a given website is esthetically well designed or that the content of some document may be highly relevant for him, he might also identify an anonymous forum member as being an acquaintance of his, based on his posts.

We discuss in this chapter issues related to the concept of data, information and knowledge. We shall first see that very often the same functions apply to these concepts and few functions are specific to one or another of these concepts. Secondly we shall discuss the concept of meaning as being a relation between informations. In the two last sections, we restrict our attention to the context of the World Wide Web by considering information flow from web to user and from user to web. The first flow is mainly the outcome of a search process. The second one results from user personal data being collected by first or third parties with or without his knowledge when surfing the web. In these particular contexts, information is not a concept which is restricted to human minds. Indeed, applications like Web Services may act on behalf of the user or third parties to achieve some intelligent research or data processing.

INFORMATION FUNCTIONS

The processing of the information uses **information functions** which come either from human minds or from database management systems, reasoners or inference engines. The application of these functions yields other informations which might be used in their turn as input for the other information functions along the classical information acquisition/processing/feedback scheme. Such functions are used to obtain explicit information from implicit information or discover new information, for example in the case of large databases through data mining.

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