

Incorporating the People Perspective into Data Mining

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INTRODUCTION

Today's economy is increasingly based on knowledge and information (Davenport & Grover, 2001). Knowledge is now recognized as the driver of productivity and economic growth, leading to a new focus on the roles of information technology and learning in economic performance. Organizations trying to survive and prosper in such an economy are turning their focus to strategies, processes, tools, and technologies that can facilitate the creation of knowledge. A vital and well-respected technique in knowledge creation is data mining, which enables critical knowledge to be gained from the analysis of large amounts of data and information. Traditional data mining and the KDD process (knowledge discovery in data bases) tends to view the knowledge product as a homogeneous product. Knowledge, however, is a multi-faceted construct, drawing upon various philosophical perspectives including Lockean/Leibnizian and Hegelian/Kantian, exhibiting subjective and objective aspects, as well as having tacit and explicit forms (Nonaka, 1994; Alavi & Leidner, 2001; Schultze & Leidner, 2002; Wickramasinghe et al., 2003). The thesis of this article is that taking a broader perspective of the resultant knowledge product from the KDD process,

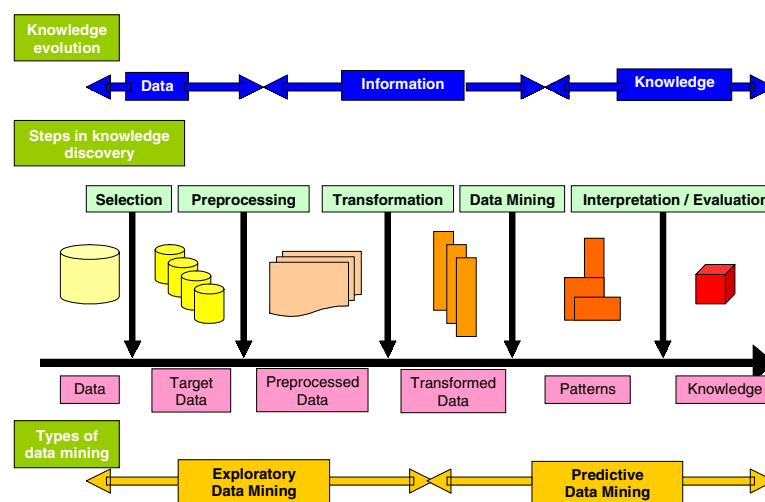
namely by incorporating a people-based perspective into the traditional KDD process, not only provides a more complete and macro perspective on knowledge creation but also a more balanced approach, which in turn serves to enhance the knowledge base of an organization and facilitates the realization of effective knowledge. The implications for data mining are clearly far-reaching and are certain to help organizations more effectively realize the full potential of their knowledge assets, improve the likelihood of using/reusing the created knowledge, and thereby enables them to be well positioned in today's knowledgeable economy.

BACKGROUND

Knowledge Creation through Data Mining and the KDD Process

KDD, and more specifically, data mining, approaches knowledge creation from a primarily technology driven perspective. In particular, the KDD process focuses on how data are transformed into knowledge by identifying valid, novel, potentially useful, and ultimately under-

Figure 1. Integrated view of the knowledge discovery process (Adapted from Wickramasinghe et al., 2003)



standable patterns in data (Spiegler, 2003; Fayyad, Piatetsky-Shapiro, & Smyth, 1996). KDD is primarily used on data sets for creating knowledge through model building or by finding patterns and relationships in data.

From an application perspective, data mining and KDD are often used interchangeably. Figure 1 presents a generic representation of a typical knowledge discovery process. This figure not only depicts each stage within the KDD process but also highlights the evolution of knowledge from data through information in this process as well as the two major types of data mining, namely, exploratory and predictive, whereas the last two steps (i.e., data mining and interpretation/evaluation) in the KDD process are considered predictive data mining. It is important to note in Figure 1 that typically in the KDD process, the knowledge component itself is treated as a homogeneous block. Given the well-established multifaceted nature of the knowledge construct (Boland & Tenkasi, 1995; Malhotra, 2000; Alavi & Leidner, 2001; Schultze & Leidner, 2002; Wickramasinghe et al., 2003), this would appear to be a significant limitation or oversimplification of knowledge creation through data mining as a technique and of the KDD process in general.

The Psychosocial-Driven Perspective to Knowledge Creation

Knowledge can exist in essentially two forms: explicit, or factual, knowledge and tacit, or experiential (i.e., “know how”) (Polyani, 1958, 1966). Of equal significance is the fact that organizational knowledge is not static; rather, it changes and evolves during the lifetime of an organization (Becerra-Fernandez & Sabherwal, 2001; Bendoly, 2003; Choi & Lee, 2003). Furthermore, it is possible to change the form of knowledge, that is, transform existing tacit knowledge into new explicit knowledge, and existing explicit knowledge into new tacit knowledge, or to transform the subjective form of knowledge into the objective form of knowledge (Nonaka & Nishiguchi, 2001; Nonaka, 1994). This process of transforming the form of knowledge and thus increasing the extant knowledge base as well as the amount and utilization of the knowledge within the organization is known as the *knowledge spiral* (Nonaka & Nishiguchi, 2001). In each of these instances, the overall extant knowledge base of the organization grows to a new superior knowledge base.

According to Nonaka and Nishiguchi (2001), four things are true: a) Tacit-to-tacit knowledge transformation usually occurs through apprenticeship-type relations, where the teacher or master passes on the skill to the apprentice, b) Explicit-to-explicit knowledge transformation usually occurs via formal learning of facts, c) Tacit-to-explicit knowledge transformation usually occurs when

there is an articulation of nuances; for example, as in health care, if a renowned surgeon is questioned as to why he does a particular procedure in a certain manner, by his articulation of the steps, the tacit knowledge becomes explicit, and d) Explicit-to-tacit knowledge transformation usually occurs as new explicit knowledge is internalized; it can then be used to broaden, reframe, and extend one’s tacit knowledge. These transformations are often referred to as the modes of socialization, combination, externalization, and internalization, respectively (Nonaka, 1994). Integral to this changing of knowledge through the knowledge spiral is that new knowledge is created (Nonaka & Nishiguchi, 2001), which can bring many benefits to organizations. Specifically, in today’s knowledge-centric economy, processes that effect a positive change to the existing knowledge base of the organization and facilitate better use of the organization’s intellectual capital, as the knowledge spiral does, are of paramount importance.

Two other primarily people-driven frameworks that focus on knowledge creation as a central theme are Spender’s and Blackler’s respective frameworks (Newell, Robertson, Scarbrough, & Swan, 2002; Swan, Scarbrough, & Preston, 1999). Spender draws a distinction between individual knowledge and social knowledge, each of which he claims can be implicit or explicit (Newell et al.). From this framework, you can see that Spender’s definition of implicit knowledge corresponds to Nonaka’s tacit knowledge. However, unlike Spender, Nonaka doesn’t differentiate between individual and social dimensions of knowledge; rather, he focuses on the nature and types of the knowledge itself. In contrast, Blackler (Newell et al.) views knowledge creation from an organizational perspective, noting that knowledge can exist as encoded, embedded, embodied, encultured, and/or embrained. In addition, Blackler emphasized that for different organizational types, different types of knowledge predominate, and he highlighted the connection between knowledge and organizational processes (Newell et al.).

Blackler’s types of knowledge can be thought of in terms of spanning a continuum of tacit (implicit) through to explicit with embrained being predominantly tacit (implicit) and encoded being predominantly explicit while embedded, embodied, and encultured types of knowledge exhibit varying degrees of a tacit (implicit)/explicit combination. An integrated view of all three frameworks is presented in Figure 2. Specifically, from Figure 2, Spender’s and Blackler’s perspectives complement Nonaka’s conceptualization of knowledge creation and, more importantly, do not contradict his thesis of the knowledge spiral, wherein the extant knowledge base is continually being expanded to a new knowledge base, be it tacit/explicit (in Nonaka’s terminology), implicit/explicit (in Spender’s terminology), or

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