

Chapter 3.16

Discovering Implicit Knowledge from Data Warehouses

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INTRODUCTION

Today, every corporation faces the problem of how to acquire, store, and share information. Knowledge management (KM) has been introduced to accomplish these tasks (Adams, 2004; Barquin, 2000; Frappaolo & Wilson, 2004). Fundamental to KM is the realization that knowledge exists in two basic forms: explicit and tacit (Adams, 2004; Barquin, 2000; Frappaolo & Wilson, 2004; Orr, 2004). Organizations have data, in the form of operational databases and/or data warehouses, which contain implicit knowledge. Some knowledge believed to be tacit (experiential and intuitive) can be transformed into explicit knowledge. Getting to implicit knowledge requires taking a look at tacit knowledge resources (i.e., domain experts or data warehouses) to determine whether that knowledge could be codified if it were subjected to some type of mining and translation process. Then, it requires implementing that mining/translation process. The majority of an organization's knowledge is presumed to be tacit.

Yet, the majority of the KM applications seem to focus on the explicit knowledge base: working on existing corporate knowledge or making individuals more effective at sharing explicit knowledge (Frappaolo & Wilson, 2004). Efforts have been put in creating an organized explicit knowledge repository, called data warehousing (Bischoff & Alexander, 1997) that is continuously fed and leveraged. Knowledge management is not truly possible without data warehousing (Barquin, 2000). It is the real-time access to an enterprise's integrated data stores through data warehousing that complements an individual's tacit knowledge of how something is done.

Knowledge discovery is defined as the non-trivial extraction of implicit, previously unknown, and potentially useful information from data (Adriaans & Zantinge, 1996; Agrawal, Imielinski & Swami, 1993; Brachman et al., 1996; Fayyad, 1996; Inmon, 1996). The automatic knowledge acquisition in a nondata warehouse environment has been on the operational databases which contain the most recent data about the organizations.

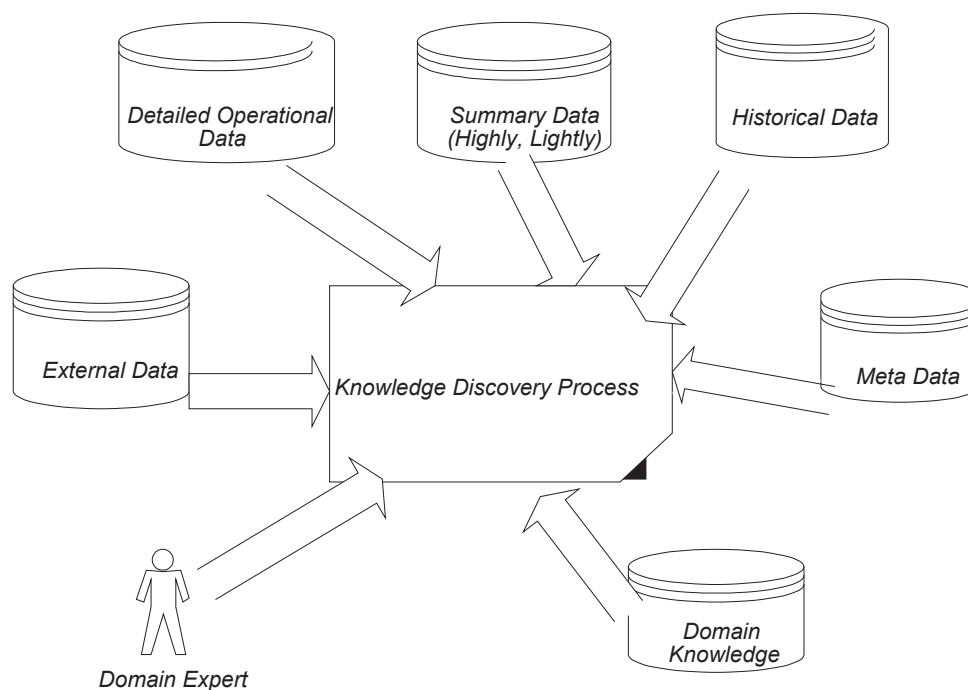
Summary and historical data, which are essential for accurate and complete knowledge discovery, are generally absent in the operational databases. A data warehouse is an ideal environment for rule discovery since it contains the cleaned, integrated, detailed, summarized, historical, and metadata (Bischoff & Alexander, 1997; Inmon, 1996; Meredith & Khader, 1996; Parsaye, 1996).

In this article, we are looking at the discovery of implicit knowledge from the data warehouses. Most of the success of knowledge discovery resides in the ability of the system to elicit the right level of detail as well as accuracy from the data warehouse which has the implicit data. We look at the knowledge discovery process on detailed, summary, and historical data. Also, we show how the discovered knowledge from these data sources can complement and validate each other.

KNOWLEDGE DISCOVERY IN DATA WAREHOUSES

Knowledge discovery on operational relational databases could lead to inaccurate and incomplete discovered knowledge. Without first warehousing its data, an organization has lots of information that is not integrated and has little summary or history information. The effectiveness of knowledge discovery on such data is limited. A data warehouse environment integrates data from a variety of source databases into a target database that is optimally designed for decision support. A data warehouse includes integrated data, detailed and summary data, historical data, and metadata. Each of these elements enhances the knowledge discovery process (Adriaans & Zantinge, 1996; Barquin & Edelstein, 1997; Bischoff & Alexander, 1997; Meredith & Khader, 1996).

Figure 1. A framework for knowledge discovery in a data warehouse environment



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