Data Mining: New Arsenal For Strategic Decision-making

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During the early years of database management the contemporary wisdom was to store only "useful data." In large part, this philosophy was encouraged because of the then-limited storage capacity offered by the prevailing technology. Then along came the microprocessor revolution, enormously expanding the scope of data storage. Subsequent advancement in information technology and recognition of potential business opportunities thereof, resulted in enormous expansion of data storage. Although the future is unknown and unpredictable, it often provides new business opportunities. Thus, new management strategies emerged which encouraged the massive accumulation of data and thus the advent of data warehousing. These massive data repositories are now providing both challenges and opportunities for strategic decision-making concerned with improving existing businesses and exploring new business opportunities. Data mining is an essential part of the process involved in locating relevant information from data warehouses for use in making such strategic decisions. Naturally, business leaders everywhere are willing to make investments in corporate data warehouses to enhance their access to information. The return on such investment is by no means guaranteed but all business activities include a certain amount of risk.

The value of information is created through mining of database in two different ways. First, this is achieved through careful exploitation of the intrinsic value of information. In such a situation, the information itself becomes the source of income through a process of conversion to a valuable commodity, leading to new businesses. Secondly, information often becomes an effective instigator for improved organizational performance. In this case, information acts as a vehicle for effective organizational reengineering that achieves better customer service, permits more flexible business approaches, integrates value chains, speeds up decision processes and expedites responses to customer needs. In the business environment where “time” is becoming a key success factor, maintenance of efficient systems for information processing and organizational learning is critical. As the volume of database itself grows at an exponential pace, technological innovation is becoming especially instrumental in offering a golden opportunity for organizations to arm themselves with more business intelligence and knowledge-making capabilities.

In this paper we intend to provide an overview of this emerging technology and related trends in the application of data mining. Given the confidential and highly proprietary nature of data mining activities critical organizational issues have rarely enjoyed an open discussion. The paper addresses issues of data mining from the organizational strategy perspective.

Overview of Data Mining

Data mining requires the understanding of types of knowledge and search algorithms used to explore them, each of these has two aspects been expanded in this section.

Type of Knowledge

Data-mining makes possible the intelligent discovery and application of various types of knowledge from large-scale databases. Such advanced knowledge is difficult to recover from conventional query processing or on-line analytical processing (OLAP). It is also different from traditional forms of data analysis in that the process itself is dealing with a massive amount of data and more innovative intelligence is incorporated in the knowledge discovery process. Data-mining enables the discovery of various types of knowledge, including, but not limited to:

• Dependency and association relationships among attributes
• Deviation (or anomaly) detection
• Sequential and temporal patterns among inter-transactions.
• Classification of knowledge
• Clustering of records that have similar characteristics
• Summarization of data.

The discovery can be initiated by end-users or by the data-mining system. With the user initiative, knowledge seekers have to develop data-mining questions, then the data-mining system searches for relevant knowledge based on the search directions. The shortcoming of this user initiative approach is that it takes a verification or confirmative modeling approach for the understanding of relationships among variables. The effectiveness of this approach might be limited depending on the level of training and knowledge end-users have on the task domain. It is almost certain that knowledge-miners will never be able to devise all relevant questions and much of the hidden information will go unnoticed.

On the other hand, when a data-mining system has an initiative for a knowledge search, it looks for interesting and significant patterns with no hypotheses posed by the user (exploratory model). In fact, if data-mining is the “discovery of information without a previously formulated hypothesis,”