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Chapter IX

Data Mining and Business Intelligence: Tools, Technologies, and Applications

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ABSTRACT

Most businesses generate, are surrounded by, and are even overwhelmed by data — much of it never used to its full potential for gaining insights into one's own business, customers, competition, and overall business environment. By using a technique known as data mining, it is possible to extract critical and useful patterns, associations, relationships, and, ultimately, useful knowledge from the raw data available to businesses. This chapter explores data mining and its benefits and capabilities as a key tool for obtaining vital business intelligence information. The chapter includes an overview of data mining, followed by its evolution, methods, technologies, applications, and future.

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INTRODUCTION

One aspect of our technological society is clear — there is a large amount of data but a shortage of information. Every day, enormous amounts of information are generated from all sectors — business, education, the scientific community, the World Wide Web, or one of many off-line and online data sources readily available. From all of this, which represents a sizable repository of human data and information, it is necessary and desirable to generate worthwhile and usable knowledge. As a result, the field of data mining and knowledge discovery in databases (KDD) has grown in leaps and bounds, and has shown great potential for the future (Han & Kamber, 2001).

Data mining is not a single technique or technology but, rather, a group of related methods and methodologies that are directed towards the finding and automatic extraction of patterns, associations, changes, anomalies, and significant structures from data (Grossman, 1998). Data mining is emerging as a key technology that enables businesses to select, filter, screen, and correlate data automatically. Data mining evokes the image of patterns and meaning in data, hence the term that suggests the mining of “nuggets” of knowledge and insight from a group of data. The findings from these can then be applied to a variety of applications and purposes, including those in marketing, risk analysis and management, fraud detection and management, and customer relationship management (CRM). With the considerable amount of information that is being generated and made available, the effective use of data-mining methods and techniques can help to uncover various trends, patterns, inferences, and other relations from the data, which can then be analyzed and further refined. These can then be studied to bring out meaningful information that can be used to come to important conclusions, improve marketing and CRM efforts, and predict future behavior and trends (Han & Kamber, 2001).

DATA MINING PROCESS

The goal of data mining is to obtain useful knowledge from an analysis of collections of data. Such a task is inherently interactive and iterative. As a result, a typical data-mining system will go through several phases. The phases depicted below start with the raw data and finish with the resulting extracted knowledge that was produced as a result of the following stages:

- *Selection* — Selecting or segmenting the data according to some criteria.
- *Preprocessing* — The data cleansing stage where certain information is removed that is deemed unnecessary and may slow down queries.

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