

# Data Mining And Business Intelligence

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## Abstract

Business Intelligence is the ability to transform data into information and information into knowledge. It is the best way to optimize the decision-making process in business. The benefits of Business Intelligence programs include accelerating and improving decision making; Optimizing internal business processes; increasing operational efficiency; driving new revenues; and gaining competitive advantages over business rivals. Data mining tools provide better customers relationship management, too, through mining real habits and diverse patterns. Data mining and Business Intelligence have made possible that various industries, such as sales and marketing, healthcare organization or financial institutions, could have a quick analysis of data and thereby, improving the quality of decision making process in their industries. In addition, data mining technologies have by automated prediction of trends and behaviors in these businesses. So, how data mining is used to generate Business Intelligence is a concept that we will hear a lot during the coming years: it is the future.

**Keywords:** Business Intelligence, Data Mining, Decision Making

## 1. Introduction

Over the years the information analysis is done with the help of statistical techniques, but now, to make the task easier, improved techniques like "Data Mining" is used. Data mining is the process of "knowledge discovery" in database which can be used in decision making. It uses artificial intelligence, machine learning, database systems and statistics to apply the advanced techniques of data analysis, the research states that the process which is designed and used for the purpose of exploring data is called as data mining; this process is like taking out nontrivial nuggets from the huge volumes of available data.

This paper gives a view about how data mining assists business intelligence to find out patterns and gain knowledge from existing data. Because of the intense competition, the companies are compelled to find out innovative ideas in which they can capture and enhance their market shares while reducing their costs too. Implementation of the data analysis techniques can help the companies to find such solutions like finding out some unexpected patterns from the large volumes of the data present in the database or data warehouse. These patterns can provide information which could help in predicting future outcomes,

### 1.1 Why do we need to Manage Data?

- For faster decision making:

Maximum complaints by people are of not having real time information so that they can take decisions. Data needs to be managed and kept in an organized way so that it would be easy and quick to be referred to when taking the decisions.

- Limited insight due to large volumes of information:

The statistics show that almost all of the organizations have more volumes of data than they can handle and use effectively. Since the organizations cannot handle so much of data, their working procedures and insight gets restricted and ultimately they function inefficiently.

- New emerging varieties:

Emails, audio, video, documents, and images are responsible for generating 80% of the new data. Due to this newly generated data there emerges another problem of the storage. Data should be stored in such a way that they can be identified and segregated at any point of time.

## 1.2 Techniques of Data Mining

The data mining techniques which are used for the analyses of data are as follows:

- Regression
- Classification
- Clustering
- Association Rule Discovery (Dependency model)
- Anomaly detection
- Summarization

### 1.2.1 Regression

Regression is a data mining technique used to predict a range of numeric values (also called *continuous values*), given a particular dataset. For example, regression might be used to predict the cost of a product or service, given other variables. Regression is used across multiple industries for business and marketing planning, financial forecasting, environmental modeling and analysis of trends.

### 1.2.2 Association Rule Discovery (Dependency Model)

The descriptive method which is used in data mining is Association rule discovery. In this model significant dependencies between variables are defined.

Association rules are if-then statements that help to show the probability of relationships between data items within large data sets in various types of databases. Association rule mining has a number of applications and is widely used to help discover sales correlations in transactional data or in medical data sets.

### 1.2.3 Classification

Classification is a data mining function that assigns items in a collection to target categories or classes. The goal of classification is to accurately predict the target class for each case in the data. For example, a classification model could be used to identify loan applicants as low, medium, or high credit risks.

### 1.2.4 Clustering

Clustering is the grouping of a particular set of objects based on their characteristics, aggregating them according to their similarities. Regarding data mining, this methodology partitions the data implementing a specific join algorithm, most suitable for the desired information analysis.

This clustering analysis allows an object not to be part of a cluster, or strictly belong to it, calling this type of grouping hard partitioning. On the other hand, soft partitioning states that every object belongs to a cluster in a determined degree. More specific divisions can be possible to create like objects belonging to multiple clusters, to force an object to participate in only one cluster or even construct hierarchical trees on group relationships.

### 1.2.5 Anomaly detection (change and deviation detection)

This technique helps to determine the most significant data change that has taken place in the database. This is calculated and identified on the previously determined data.

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### 1.2.6 Summarization

With the help of this technique, a subset of the data present in the database is evaluated and consequently a compact description is found.

## 1.3 Defining Business Intelligence

Business Intelligence (BI) is a concept of applying a set of technologies to convert data into meaningful information. Basically, the term business intelligence has two different meanings when related to intelligence. The first is the human intelligence or the capacity of a common brain applied to business affairs.

The second is the information which helps raise currency in business. It is the intelligent knowledge gained by experts and efficient technology in managing organizational and individual business.

## 2. Business Intelligence Using Data Mining

Emergence of business intelligence has thrown a light upon the new dimensions of the data collected over a business. Business Intelligence (BI) can only be acquired by using mining of data in different ways. Use of data warehousing and Information Systems (IS) have made it possible for enterprise datasets to grow rapidly. The demand for more sophisticated and intelligent BI solutions is constantly growing due to the fact that storage capacity grows with twice the speed of processor power. This unbalanced growth relationship will over time make data processing tasks more time consuming when using traditional BI solutions.

There are a variety of advanced data processing techniques that can help BI processes to run efficiently which are offered by DM. The comprehensive process of applying BI for a business problem is referred to as the Knowledge Discovery in Databases (KDD) process and is necessary for successful DM implementations with BI in mind.

### 2.1 Defining Business Analytics

Business analytics is a major part of business intelligence. Business analytics is directly aided by data mining and business intelligence. Business intelligence is mainly analyzing data and collection of knowledge and applying them to various different methods and Business analytics is a term used in context with the entire process which involves application of skills, technology and different algorithms of data mining. Business analysis produce valuable information to help managers make better decisions regarding their business and have proper control on their business operations.

There are two main faces of business analytics function, the back-end where the main application of data mining takes place and the front-end is a collation of diverse information and executive reporting metrics. If we can effectively execute the business analytics function, it may result in

becoming the core competence for an organization containing valuable business intelligence which can support an organization in taking strategic and efficient actions in business.

## 2.2 Use of Data Mining in Business Analytics

The main force driving the application of business analytics in businesses is data mining or knowledge discovery in databases. Data mining gives a view of the past and present situations and a understanding of the possible future outcomes which can give effective results, hence, we can say that DM act as a detective. Clusters are made by examining the past and the current customers' behavior like transaction, sales selections and servicing choices. Simple extrapolation is used to describe the working of DM. Queries related to data on various data software help us extract useful information. Data mining in Organization is mainly used for the growth of business through discovery of useful patterns. In simple words, queries help us retrieve information of which we already have pre-knowledge whereas mining of data help us discover unknown facts that are there in the database. Business Intelligence using Data Mining Techniques and Business Analytics latter is termed as knowledge discovery. it is a process through which huge databases can be identified of various novel, valid and recognizable patterns which are hidden. The terms knowledge discovery and data mining are sometimes used interchangeably.

## 3. Applications of Data Mining In Business

Data mining is a business process used to study huge volumes of data and derive some useful patterns of information from them. Many companies have improved in their business by using data mining. Those companies which have a strong focus on consumers in fields like Communication, Financial, Marketing Organization, Retail use Data mining to go deep into or "drill down" into their transactional data. This will help them in determining the customer preferences, the pricing and the positioning of the product, the satisfaction of the customers along with the corporate profits. Data mining has been successfully applied in the following areas.

### A. Marketing or Retail

In the marketing field, the applications of data mining includes market based analysis, product performance analysis, market segmentation analysis and retail sales analysis. The buying behavior, the support patterns and trends that can be identified using data mining and hence better customer satisfaction and retention could be achieved and goods consumption ratio can be enhanced thereby reducing the cost of business.

### B. Biomedical and DNA Data Analysis

Nowadays data mining is being widely used in as related to Medical science such as Genetics, DNA, Medicine, Biomedical etc. it is being used in the field of Genetics to learn about the mapping relationships which are related to the DNA sequences of humans and the susceptibility of certain diseases. Data mining serves as an aid in treatment as well as the prevention of diseases and providing proper diagnosis.

### C. Banking or Finance

How can we use it? Data mining is used in financial sectors such as credit analysis, marketing, predicting payment default, ranking investments, cash managements and forecasting operations and many more.

#### D. Insurance

Data Mining is used in many of the business practices such as performing complex classifications and correlations, gathering new customers while relating the existing ones, designing and selection of policies. The data mining techniques will have following applications:

- **Fraud detection:** The factors which show a high probability of a claim or a fraud taking place and its different patterns can be analyzed.
- **Risk factor identification:** Factors like behavior pattern or customer claims history may have an influence over the insured level of risk.
- **Customer segmentation and retention:** Identify such packages and discounts which could increase the loyalty of the customers and include each new customer to appropriate groups.

#### E. Telecommunication Industry

Telecommunication Industry and technology both grow at the same pace. The services of Telecommunication have also grown from the local as well as the long distance voice communication to the advanced methods of pager, fax, e-mails and cellular phones. Now they are integrated with various communication technologies like internet, network and computer. The data mining techniques will have following applications:

- **Cluster analysis:** Fraudulent activities pose a major threat to the telecommunication industry. The performance of the network is affected by these activities. Clustering can help in detecting these fraudulent patterns and increasing the efficiency of the various communication services.

#### F. CRM

The process of acquiring and relating the customers, increasing their loyalty level and executing the strategies focused on the customers all are included under the Customer Relationship Management. In order to maintain a proper relationship with the customer it is necessary to collect and analyze information.

#### Conclusion

This paper discusses the till date effect of data mining technique in business intelligence. Two powerful tools determine the growth in business sector. The primary is data mining which is used to deal with large amount of data to find useful result, whereas the secondary is business intelligence which helps in making business related decisions. The paper shows business analytics with a wide application domain almost in every industry where the data is generated that's why data mining is considered one of the most important outwork in databases and information systems and business intelligence as an interface of the organization

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