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Business Intelligence using Data Mining in Diverse Areas

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Abstract: This Paper mainly focus on data mining techniques and methods as well as how these techniques are effectively used to generate business intelligence in different fields. Data mining can be classified as a process to extract information or knowledge pattern from massive amount of data using various operational sources such as data warehouse, databases and relational databases etc. The paper emphasizes various features of data mining. It also provides effectiveness of data mining in Business Intelligence (BI).

Keywords: Data Mining, Business Intelligence, Operational Database, Business Analytics

I. INTRODUCTION

Data Mining (DM) is a process of extracting useful information from large sets of databases or data warehouses to help the user in fast decision making. It is generally used by decision support system in the organizations. For extracting the useful data, different patterns are used as a knowledge discovery from databases over any other operational sources. In the industries, large amount of old and current data is stored and saved in data warehouses and this data may be required any time to make a decision, so data mining tools are used for extracting the meaningful data from the sources such as multidimensional databases, relational databases etc. Business Intelligence emphasizes on detail integration of data and organizing that data. Now a days Business Intelligence (BI) is the scorching topic in all industries that how the Data mining techniques are used to get effective results in the growth of business.

Data mining and Business Intelligence works together to process and analyse large amount of data to lighten their work for the users in the organization [3]. Business intelligence system reduces labour costs by generating reports automatically. It makes information actionable as user can get data as per their requirement to get the knowledge. By using BI decision makers can take better decisions, as meticulous and up to date information is provided. Multiple data sources can be combined through business intelligence, so decision can be taken faster and quicker. Business intelligence is a collection of refined tools/techniques that are combined with a great understanding taken from risk analysis, organizational behaviour, and business strategy. BI makes use of information system and transactional databases to offer decision making support and convert data into intelligence [5].

II. DATA MINING

Data Mining (DM) is a combination of databases and business intelligence that are used to provide useful data for both technical and non-technical users. It helps them in better decisions making.

A. *Use of Data Mining*

Large amount of data is not easily analysed and managed by humans and it is also not easy to extract useful information from large datasets or other huge data sources such as data warehouses, databases, multidimensional databases, relational databases etc. To overcome this issue, we can use data mining techniques. Data mining is used in diverse fields to help in extracting meaningful information for better decision making in many organizations. Data mining can be used in promotions and marketing purpose as well. It can help in providing useful information about the products and other necessary data which are used in advertisement for providing incremental growth to the sales of product.

Data mining techniques such as association analysis are used in finding historical data and that data can be used in comparison with current data, so decision makers can take decision which helps growing sales in enterprises. Data mining can also be used in web-based mining, making it convenient to get or extract useful information from internet and web sites.

B. *Data Mining Process*

Data mining process is a little bit complex process as there are various different techniques used. DM is quite a complicated process where iterations of process are done. Below figure shows the steps of data mining process. It also

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shows that some steps may be repeated and some are restarted in the entire process. Data mining process comprises of six steps as follows:

- Problem Definition
- Data Preparation
- Data Exploration
- Modelling
- Evaluation
- Deployment

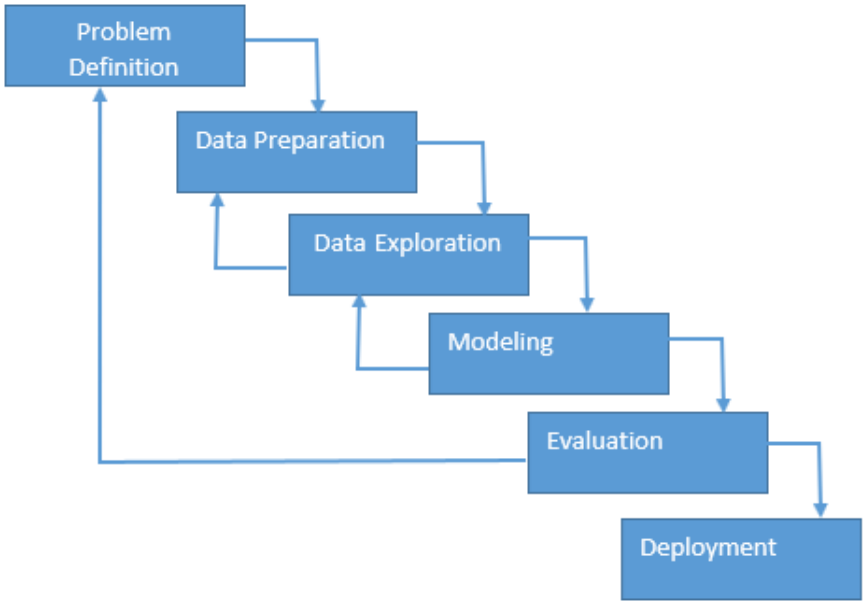

Fig. 1 Data Mining Process

III. DATA MINING APPLICATIONS

Data Mining Technologies are becoming popular and being used in diverse areas, owing to provide rapid data access and useful information from a huge volume of data. The diversity in the applications of Data Mining comprises of areas explained in brief below:

A. *Data Mining in Applications for Market Basket Analysis*

The shopping database is used as the base for such analysis. Discovering the commodities, customers are buying intermittently, is the sole purpose of this Market Basket Analysis. This information can be used by the departmental stores and now they will arrange the products in such a manner that all the popular and/or related products will be in the vicinity of each other. This will highlight these products, for at the time of shopping these products with this new arrangement are more noticeable and quite handy to the customers [12].

B. *Data Mining in Applications for Telecommunication*

Incorporation of Data Mining in the telecommunication sector is fundamentally on account of the fact that this sector deals with enormous volume of data, generated through its humongous customer base, and also due to the extremely cutthroat and expeditiously fluctuating market scenario. The applications of Data Mining practices in the telecommunications sector comprises of swindle recognition, improved administration of telecommunication grids and to facelift their advertising exercises [4].

C. *Data Mining in Applications for Education*

Having Education Sector applied Data Mining, for its applications, has given birth to a new thriving zone knows as Education Data Mining. Not only it is quite a fresh research area having Data Mining being incorporated in higher education field, but owing to, it has huge benefits to offer to educational institutes, this research area is getting a decent admiration as well. Data Mining being used in the field of education is quite conducive to assess the performance of current students, their behaviour statistics, help needed for subject selection and statistics for drop-out student etc. [10]. Apart from this, this data will also be going to be used to evaluate the learning practices of the students, which will help to predict the results.

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D. *Data Mining in Applications for Earthquake Prediction*

Data received from the satellite maps is used to assess the possibilities of occurring of the earthquake at certain places. Data Mining techniques are serving this purpose. The precipitous discharge of stress amassed sideways to a geologic defect in the interior leads to a rapid displacement of the Earth's crust and this is what known as an earthquake. The prognosis of earthquake can be broadly categorized in two categories [13] as follows:

a. short-term prognosis – hours or days beforehand

b. forecasts – months to years beforehand.

E. *Data Mining in Applications for Cloud Computing*

Cloud Computing is also considered as one of the protuberant areas where Data Mining is used extensively. When cloud computing is employed to enforce the Data Mining techniques, the users become admissible for the receiving of substantial information from a data warehouse that is virtually unified plummeting the outlays of repository and infrastructure [15].

F. *Data Mining in Applications for Banking and Finance*

The banking and finance sectors are considered among the most prominent users of Data Mining because of its voluminous usage in these sectors [11]. The applications of Data Mining, in the banking sector, are comprised of scrutinizing the trend and profitability, envisaging any credit card related scam and assessing the associated risks. Whereas, neural networks, one of the protuberant Data Mining technique, is being used in the financial market for price forecast and stock envisaging etc.

G. *Data Mining in Applications for Agriculture*

Agriculture sector is one of the most potentially growing sectors for Data Mining, as it provides the crop yield breakdown in accordance to the four crucial parameters well known as production area of sowing, year and rainfall. Yield prognosis is considered to be a crucial issue whose solution is completely rely upon the data accessible. Through the commissioning of some well-known Data Mining practices, i.e. K Means, SVM (Support Vector Machine), ANN (Artificial Neural Network) and KNN (K Nearest Neighbor) [14], this Yield prognosis issue can be very well cracked to a solution.

H. *Data Mining in Applications for Bioinformatics*

An enormous volume of biological data is engendered through Bioinformatics. Unremitting propagation and assimilation of extensive abundance of biological data of various types i.e. proteomic, genomic, will provide an incremental growth to the application of Data Mining in the field of Bioinformatics [4].

IV. DATA MINING TOOLS

There are so many tools available in the market for the incorporation of Data Mining into your field of choice. Still some of the very well known and quite effective Data Mining tools [10], with their availability, are listed as under:

- Orange (Open Source)
- KNIME (Open Source)
- DataMelt (Open Source)
- Weka (Free Software)
- SSDT (SQL Server Data Tools) (Licensed)
- Rapid Miner (Open Source)
- Sisense (Licensed)
- Oracle Data Mining (Proprietary License)

V. BUSINESS INTELLIGENCE

Business Intelligence is considered to be a perception wherein data is converted into substantial information by engaging an array of technologies [7]. Significantly, the jargon business intelligence gives two diversified connotations for the term intelligence. The first being application of a human intellect incorporated with AI (Artificial Intelligence) to be applied in different business-related problems for management and decision making. Whereas the second connotation deals with the ideology of reinforcing money in business.

A. *Business Intelligence and Data Mining*

Business Intelligence advent has given a newfangled direction to the usability of the data possessed off a business [8]. It is quite impossible not to keep Data Mining Tools associated with the organization's management level exercises including decision making and risk governance activities. There are different possible mining techniques to be applied

over data, ultimately facilitating into the procurement of Business Intelligence. The organizational datasets are having a considerable incremental growth in an expeditious manner as a result of the utilization of information systems and data warehousing.

B. *Business Analytics*

Being one of the most noteworthy element of business intelligence, business analytics is precisely alleviated by Business Intelligence and Data Mining. Business analytics can be as the terminology under practice in context with the comprehensive procedure comprises of utilization of technology, expertise with distinctive data mining algorithms. By fabricating invaluable information, business analytics is considerably advantageous for managers, as it is not only empowering them enough to acquire appropriate governance over their business manoeuvres, but also enabling them to establish amended verdicts concerning their business [12]. Business analytics is fundamentally comprising of two phases well known as front-end and back-end. Whereas the front-end is considered to be an ordering of assorted information with managerial reporting metrics, the back-end actually hosts all the data mining operations. Accomplishing efficiently, the business analytics will become the essential competence for an organization comprising of invaluable business intelligence, which in turn can provide assistance in captivating resourceful and premeditated proceedings in the business.

VI. CONCLUSION

In this research paper the authors are primarily discussing upon the overall concept of Data Mining in diverse sectors. Exploring the information from the live data is the foremost purpose of Data Mining practices. This paper also focuses upon as in how Business Intelligence with the support of Data Mining becomes instrumental in establishing the development in the field of business. In this scenario, Data Mining, being the primary aspect, works upon the humongous volume of data to discover invaluable findings. On the other hand, business intelligence, being the secondary aspect, contributing vigorously towards making verdicts associated to business. This makes Data Mining is considered to be the most significant when it comes to deal with information systems and huge data repositories, while the business intelligence being considered as a prominent enterprising association.

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