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Review of Data Mining Applications

Jagmeet kaur[1], Paramjit kaur[2]

[1]Department of Computer Science, Guru Nanak Dev University, Regional Campus Jalandhar, Punjab, India

[2]Department of Computer Science, Guru Nanak Dev University, Regional Campus Jalandhar, Punjab, India

Abstract

This paper focuses on real life applications, where data mining techniques are used. From the last few decades data mining has emerged as a powerful technique to manage data. In every field data is available in huge amount. It is necessary to handle this abundant data so that it can be easily retrieved and the technique used to analyze and manage this data is called as data mining. The purpose of this paper is to survey the applicability of data mining in different fields. The limit of our discussion is to the areas where data mining is used to a high extent. Such areas include education system, agriculture, e-commerce, healthcare, business, and telecommunication.

Keywords: *Spatial mining, K-means, Web mining, Data mining*

1. Introduction

In today's generation, with the growth of various technologies, huge amount of data is used in different fields. The data is in the number of forms, it can be in the form of documents, video or audio. Data in abundance is available and there are number of fields that generate abundant data daily. The various sources of this abundant data are web, stocks, scientific simulation, remote sensing, society etc. Processing of data is slower than its speed at which it is generated, so often it remains concealed. Availability of huge data is useless until it is managed properly. So to handle this large set of data in any form is a difficult task. Hence there is a need of technique that can provide some useful information or knowledge from raw data. In such a competitive world every field needs to be up to date and for that they require a technique which helps them to store their data in such a way, that it can be easily retrieved and updated. Data mining is that technique which helps to retrieve knowledge from such abundant data. It is better known as "Knowledge Discovery in Database (KDD)" [1]. It is a process that helps to discover the useful information from the large databases. Data mining is capable of dealing with the huge amount of data which is located at different sites [9]. Discovering useful knowledge, analyzing the data for valid and interesting patterns and determining relationships between different elements within a database are the main functions of data mining [10].

2. Data Mining Tasks

The process of data mining includes various steps for analyzing data and each step is based on different task. These tasks are mainly classified into two broad categories which are:

2.1 Predictive Mining

In the predictive mining predictions are made on the basis of historical data thus value of one variable can be predicted from other variables. It includes:

Classification: In classification output prediction is based on its input. It is also known as supervised learning because set of possible classes are predefined.

Regression: It is used to determine the relationship between those values which we want to predict and the values on which our prediction is based.

Prediction: In prediction, we predict future state based on the relationship between the values that are already known to us and values that we need to predict.

2.2 Descriptive Mining

It identifies the patterns in the already known properties of the data. It describes the real world events. Descriptive mining is used by customer-driven organizations.

Clustering: In clustering, all the variables are grouped together based on some similarity. The variables in one cluster are similar to another but are different to the variables of other clusters [1].

Link Analysis: It creates links between individual records and find relationships between them that is why it is also referred to as association rule.

3. Applications

With the rapid advancement in every field has made it difficult to handle huge amount of data, for

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which we need data mining. Data mining has its applications in various fields. In this section some of the important applications of data mining have been discussed.

3.1 Education System

At present time, the education system is growing rapidly and it has become a storehouse in itself. Data mining in educational field is basically a technique of extracting meaningful data from this storehouse [1]. We extract data to develop such methods which are helpful to better understand students, improve decision making process, increase the efficiency of educational systems and for better results[1][2]. Data mining can be applied in educational field through various techniques and these include [1][3][4]. Clustering: It means grouping of similar type of data. Students with similar behavior are grouped together for example group of good rankers in a class. Prediction: It is a method of predicting future results from the present values for example predicting student's future grades from their present class performance. Relationship mining: It is discovering of relationships among variables in a data set which produces the result in if-then form. In the education system data mining is applied for finding students mistakes in common while solving the same questions including their problems and behavior [1].

3.2 Agriculture

Agriculture is expanded field with its various resources. Climate, soil, crops, plantation form an important wedge of agriculture. The application of data mining in agricultural field is related to weather conditions and forecasting. For pollution forecasting in atmosphere, replicating daily precipitation and to analyze weather condition data mining techniques are used [8]. The concept of spatial data mining is applied in the field of agriculture with the help of K-means algorithm. In this algorithm, K number of objects is randomly selected and each of which represents a group and all the remaining objects are assigned to the most similar group. A new mean for each group is calculated. In agriculture this concept is applied where temperature and rainfall gives the initial spatial data and by analyzing the agricultural climate, crop yields can be enhanced and crop loss can be reduced.

3.3 Telecommunication

With the emergence of data mining telecom industry becomes one of the first industries to adopt it. Various companies of telecommunication industry are widely adopting data mining. They use data mining to improve their techniques of marketing and thus develop a better management. Telecom companies prepare a call detail record (CDR) which contains the information of every phone call. According to a report, in 2001 three hundred million call details were recorded per day by AT&T [11]. The data of call details helps in fraud detection and can be used for marketing purposes. Fraudulence is a very serious problem that can happen in the telecom industry. Data mining techniques like Deviation detection and Anomaly detection helps in sorting these problems. In telecom industry network management is also very necessary; there is a need of proper network efficiency. Many times network fault arises due to complex configuration and resource conflicts. To cope up with these problems data mining tool TASA (The Telecommunication Alarm Sequence Analysis) is used which helps in fault detection and thus faults can be identified in real time [12].

3.4 E-Commerce

As with the passage of time, e-commerce industry is growing rapidly and thus generating huge amount of data. E-commerce uses an internet platform where the information regarding business relationships and transactions is shared. Online business can help in saving time and space. Data mining techniques are becoming more popular to manage the data. Clustering is becoming more useful to group together the customers that have same browsing conduct [14]. It will help to understand customers more accurately so that proper services can be provided. Customers contribute in the revenues of any organization. With the help of new and existing customers, their buyer behavior, their demands and what they want from the site, improvements in the services and products can be done to attain the profits. Data mining techniques help in this process, with the help of these techniques customer's profile and their interaction with the company can be managed [7]. In e-commerce we use web data mining techniques. Web mining helps in extracting useful information from web data. It is the best way of doing business. Most of the companies improve their business through this strategy [13].

3.5 Healthcare System

Data mining is a popular technique used in healthcare system to gain knowledge about the previous data from the storehouse and thus using this information for predictive models. It is beneficial to both healthcare organization and patients [6]. It helps to take better decision and provide a good care to their patients. Cure providers can resolve the health issues of their patients easily by going through their previous

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reports stored in storehouse. As the healthcare organizations have abundant data including their financial details, thus it helps them to maintain costs and revenues. Patients will receive good care and better services, if the healthcare organizations use the applications of data mining to find out the various chronic diseases and design some suitable preventions, thus reducing the number of patients suffering from a disease, for example according to a report data mining is very helpful in case of diabetes this is because as there is a database of historical information and new technology about treatment, that helps to easily diagnose the new patients of diabetes [5]. Applications of data mining in healthcare are also helpful in detecting fraud and misuse by highlighting improper prescriptions and fake insurance and medical claims.

3.6 Business Intelligence

Data mining in business works by analyzing various business activities that are stored in large databases to find out hidden information and knowledge. In business, mining is used for finding marketing performance, reason of manufacturing problems, customer debilitation and for acquiring new customers. To deal with business trends various mining techniques like clustering, regression and classification are used. Most of the business mining applications are based on prediction and classification techniques for creating strong business intelligence system [1]. With the help of prediction modeling, possible future behaviours of customers can be predicted by using current and previous information [7]. A business organization can have its workplaces in different cities. It is necessary for a organization that all its workplaces from different cities can retrieve and access data for better performance. Here data mining plays a crucial role. As it make easy to retrieve data and other relevant information of an organization by its workplace in different cities.

4. Conclusions

There exist many real life applications of data mining. Data mining has its applications in wide areas, where huge amount of data is generated. Data mining helps in extracting the hidden and useful information from the database. In this paper we briefly surveyed the various applications of data mining. In the introduction section we discussed about data mining. In the next section applications of data mining are discussed.

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Jagmeet kaur is pursuing M.Tech in computer science and engineering from Guru Nanak Dev University, Regional Campus, Jalandhar. Her main interests are in the field of data warehousing, data mining and network security.

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Paramjit Kaur is pursuing M.Tech in computer science and engineering from Guru Nanak Dev University, Regional Campus, Jalandhar. Her main interests are in the field of data mining, cryptography and big data.