

Decision Support System in Educational and Telecom Sector

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Abstract

Every organization needs a system which can take efficient decisions for the company's growth. Data Mining provides a platform which facilitates efficient decision making on the basis of past data trends and behavior. This paper proposes the benefit of using some techniques of Data Mining in Educational Sector and Telecom Sector. Such techniques can grow Staff performance, students' performance and hence organizational performance.

Keywords: SIM, DSS, Data Mining, OLAP, OLTP, ETL

1. Introduction

Higher educational systems need to take decisions on many core areas like Admissions, Improvement of Weak students and overall growth of the educational unit. As per expanding size of educational sectors the size of the databases is increasing tremendously and therefore a structure/system is required to save and use the data in efficient manner.

Whereas in Telecom sector millions of new users are purchasing new SIM cards and therefore millions of new data records are being added to the telecom provider's database. So, telecom sector also needs a system which facilitates queries and decision making for future projections.

A. Operational and Informational Data

The data which deals in day to day operations is considered as Operational or Transactional data whereas the data which is used for decision making is said to be Informational or Analytical data.

B. Decision Support System (DSS)

Decision support systems are the systems extract the data from transactional databases and use the data in taking major decisions of that organization. Major apparatus and techniques being used for DSS are Data Warehousing, OLAP and Data Mining.

C. Data Warehouse

Data Warehouse is integrated, historical, un-changeable collection of data. According to William H. Inmon, "A data warehouse is subject oriented, integrated, time-variant and nonvolatile collection of data in support of management's decision making process."

Features of data warehouse:

- a. It is always developed around some major concerns of the organizations like students, faculty, customers, sale, admissions etc. instead of applications.
- b. The data in the data warehouse is integrated from different sources. These sources could be internal or external. Further the data could be any of the forms like flat files, Excel Files, MS Access or any other advanced data formats.
- a. Data is uploaded to the data warehouse on fixed time intervals instead of day-to-day (like operational databases). That is why it is also called as Time Variant. It contains all the historical data of the organization till date. Further, concurrency control is also not required here in Data Warehouse as concurrent users are not inserting data to it.
- b. Data warehouse is non-volatile in nature because once the data is uploaded to a warehouse it can never be updated/changed.

D. Architecture of Data Warehouse

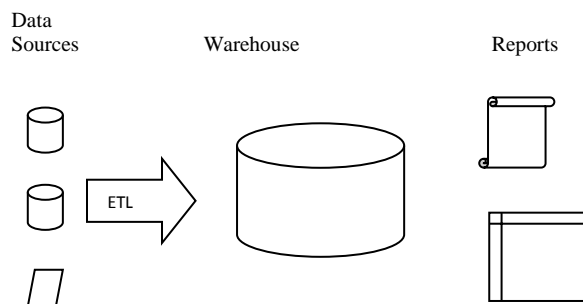


Fig.1 data warehouse architecture

Architecture of data warehouse comprises of three main components.

First is the data sources part which comprises of data coming from different sources (internal or external). Some preprocessing techniques are applied to the data i.e. called as Extraction, Transformation and Loading(ETL).

Secondly, Data warehouse which comprises of Data Storage in servers along with the Meta Data and Data Repository.

Finally, reports are extracted from the data warehouse to decision making.

2. Data Mining Techniques

- a. Classification-Classification is a two way process, divided into two phases. In first phase data is collected as sample and an algorithm is framed with the sample data. This step is called as Learning. In second phase the algorithm which is framed with the help of Sample data is used to classify the rest of the data. This step is called as Classification.

Classification is also called as Supervised Learning as the class labels are available in sample data.

Example: Classification of the customers of different age groups so as to send appropriate packages information to them.

- b. Clustering – It is the process of grouping the available data in various packets so that the data in one packet is similar with one another and dissimilar to the data in another packet.

Clustering is also known as Un-supervised Learning as the class label information is not available.

Example:

A teacher is always interested in knowing which of the students will get distinction and which of the students need extra classes to even clear the exam. So, appropriate clusters are made for such decision making.

- c. Decision Tree: A decision tree is like a tree in which root node and every other node talks about a test on the data, each branch represent the result of the test and each leaf node results in the class label.

Example:

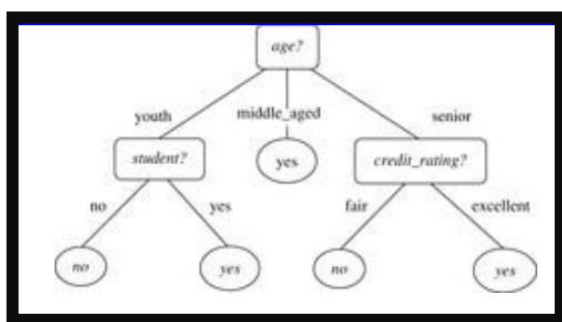


Fig. 2 example of decision tree

- d. Outlier Detection: It is a technique which finds the set of data which behaves different as compared with rest set of data. This is also called as Anomaly

Detection and the objects/data which is found with different behavior are called Outliers or Anomalies.

Example:

A student who is getting 80% and above from four subsequent semesters, if he gets failed in fifth semester; his record of result is said to be anomaly as it did not behave the way it is expected. Therefore he needs consideration.

3. Application of DSS and Data Mining in Educational Sector

Just like any other sector Education sector also requires a system for efficient decision making to encourage better study environment and more satisfied staff, students and their parents.

The art of using the basics of Data Mining in Educational Sector is also called as EDM. Following are some areas where EDM helps:

- a. Admission System: By analyzing the past data and making use of pattern analysis, college can predict that from which area of the city/country/world more students are expected to come and therefore accordingly some promotion campaigns could be defined for particular group of people. It will increase the input (admission) of desired students.
- b. Faculty Recruitment/Management: By making use of Students feedback data, college authorities/management can decide that which of the teachers are liked most. Student's performance reports/data may help in excising which faculty member is serving better result and therefore according to the same, college management can decide over the movement of staff to another course, subject or department.
- c. Students Performance: undefined value/variable of students is estimated which helps in describing the student. In case of education system, student's performance, knowledge and marks are predicted. The value can be defined in two different ways namely numerical (50, 78 etc.) or Categorical (0-10, 10-20 etc) Prediction of a student's performance is the most popular applications of DM in education sector. Different techniques can be applied like Bayesian networks, neural networks, regression, and correlation analysis .This analysis helps to predict about student's success in the course he/she is applying.

- d. Planning for extra classes: Clustering could be used to set the outlying students who need extra lectures. This could be done with the help of students previous records of results in various examinations.
- e. Future Prediction: On the basis of past data trends future behavior of students and staff can be predicted which can further help in making suitable arrangements.

with different facilities. One can choose according to the need and availability of resources (as different costs are involved in different options).

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4. Application of DSS and Data Mining in Telecom Sector

- a. Address Verification/ Overcome Obsolete Data: In the presence of structured DSS and complete database of customers a telecom company can anytime cross check the current addresses, location and other details with helps in providing better services to the clients.
- b. Defining New plans/services: On the basis of the data of recharges/bills a telecom company makes an analysis so as to predict that which types of recharges/services are often taken by a customer and therefor the company can offer suitable plans with rebates to the specified customer.
- c. Building up relations with customers: When a telecom company makes use of customers database to send wishes/offers/facilities to specified customers, healthy relations are formulated within the client and company which helps in maintaining customer relations.
- d. Police Verification Fraudulence Detection: There are many situations when during criminal cases crime squads/drug squads require information and details about the contact information of the person against which the SIM card was issued. This helps to a great extent in many cases. All this could be provided only when the telecom company has the DSS in place.

5. Conclusion and Future Scope

In this paper some important aspects are reviewed to reflect the need of DSS and Data Mining in Education and Telecom sector. Setting up such a system requires some initial and ongoing costs which include Hardware, Software, Human Resource and Maintenance cost. But, once the setup is done it helps the organization to take many decisions for future growth and achieve many targets.

There are many tools and services are available in the market