Chapter 18

Enhancing Service Quality in Hospitals:
Mining Multiple Data Sources

Anirban Chakraborty
Lal Bahadur Shastri Institute of Management, India

Sonal G Rawat
Lal Bahadur Shastri Institute of Management, India

Susheel Chhabra
Lal Bahadur Shastri Institute of Management, India

ABSTRACT

Large organizations use multiple data sources, centralize processing in these organizations require analysis of huge database originating from various locations. Data mining association rules help perform exploration and analysis of large amounts of data to discover meaningful patterns which can facilitate effective decision-making. The objective of this article is to enhance service quality in a hospital using data mining. The improvement in service quality will help to create hygienic environment and enhance technical competence among staff members which will generate value to patients. A weighting model is proposed to identify valid rules among large number of forwarded rules from various data sources. This model is applied to rank the rules based on patient perceived service parameters in a hospital. Results show that this weighting model is efficient. The proposed model can be used effectively for determining the patient's perspective on hospital services like technical competence, reliability and hygiene conditions under a distributed environment.

INTRODUCTION

Big organizations such as hospitals with multiple branches deploy multiple data sources, putting all data together from different sources create a com-plex environment for processing huge databases for centralized processing. Data mining involves the exploration and analysis of large amounts of data in order to discover meaningful patterns. The association's rules help to process multiple data sources and also facilitate forwarding these

rules to the centralized company databases. This provides a feasible way to deal with multiple data source problems. However, these forwarding rules may be too many for the centralized processing environment. Therefore, there is a need to discover high frequency rules that can play a major role in decision-making processes to improve the service quality in hospitals.

The objective of this article is to design a model that can be used to enhance customer perceptions on the service quality in a hospital under a distributed database environment. The centralized department needs to gather information (rules) from its various branches. But the massive number of forwarded rules is difficult to analyze. Hence, there is a need to find high frequency rules to facilitate analysis of large quantity of database. The article has shown mining multiple data sources (branches of hospital) in terms of patient's viewpoint on the service conditions and how these can be applied on optimized Xindong Synthesizing Model (Wu & Zhang, 2003). The performance comparison of this model along with our proposed model has also been depicted.

REVIEW OF LITERATURE

Data mining helps analysis of information (rules) that can mine useful patterns from large databases for decision makers. The discovered knowledge can be referred to as rules describing properties of the data, frequently occurring patterns, clustering of objects in the database which can be used to support various intelligent activities such as decision making, planning and problem solving (Jiawei, Kamber, & Kaufmann, 2007).

Let $I = \{ i_1, i_2, i_3, \ldots, i_n \}$ be a set of N distinct literals called items, and D be a set of transactions over I. Each transaction contains a set of items i1, i2, i3,….ik $\in$ I. A transaction has an associated unique identifier called TID (Transaction Identification Number). An association rule is an implication of the form A→B, where A, B $\subset$ I,

and A∩B = null set. A is called the antecedent of the rule, and B is called the consequent. A set of items (such as the antecedent or the consequent of a rule) is called an item set. Each item set has an associated statistical measure called support, denoted as supp. For an item set A$\subset$ I, supp(A) = s, if the fraction of transactions in D containing A equals to s. A rule A→B has a measure of strength called confidence (denoted as Conf) which is defined as the ratio supp(A∪B) / supp(A).

The problem of mining association rules is to generate all rules A→B that have both support and confidence greater than or equal to some user specified threshold, called minimum support (minsupp) and minimum confidence (minconf), respectively (Hand & Mannila, 2004). For regular associations, supp(AuB) $\geq$ minsupp, conf(A→B) = supp(A∪B) / supp(A) $\geq$ minconf.

Synthesizing rules is the process of putting all rules together and to produce valid rules from that. To mine transaction databases for large organizations that have multiple data sources, there are two possible ways.

i.   Putting all data together from different sources to amass a centralized database for centralized processing, possibly using parallel and distributed mining techniques.
ii. Reusing all promising rules discovered from different data sources to form a large set of rules and then searching for valid rules that are useful at the organization level.

There are many methods and algorithms suggested for this second task. Apriori algorithm (Agrawal & Srikant, 2001) uses a two step technique to identify association rules, and a search space in Apriori consists of all items and possible itemsets. Apriori algorithm is an influential algorithm for mining frequent itemsets for Boolean association rules. The algorithm uses a Level-wise search, where k-itemsets (An itemset that contains k items is a k-itemset) are used to explore (k+1)-itemsets, to mine frequent

Related Content

The Progress of the Internet

Grant Blank (2000). *Social Dimensions of Information Technology: Issues for the New Millennium (pp. 37-45).*

www.irma-international.org/chapter/progress-internet/29109

Trust in the Digital Era

Joe Nandhakumar, Niki Panteli, Philip Powelland Richard Vidgen (2004). *Social and Economic Transformation in the Digital Era (pp. 77-94).*

www.irma-international.org/chapter/trust-digital-era/29029

The Role of Outside Affordances in Developing Expertise in Online Collaborative Learning

Craig Deedand Anthony Edwards (2013). *Governance, Communication, and Innovation in a Knowledge Intensive Society (pp. 191-202).*

www.irma-international.org/chapter/role-outside-affordances-developing-expertise/76605

HR Transformation Through Artificial Intelligence: An Insight Through Literature Survey

Ritu Gandhi Aroraand Neha Kumari Siradhana (2022). *International Journal of Information Systems and Social Change (pp. 1-16).*

www.irma-international.org/article/hr-transformation-through-artificial-intelligence/309736

Artificial Neural Network What-If Theory

Paolo Massimo Buscemaand William J. Tastle (2015). *International Journal of Information Systems and Social Change (pp. 52-81).*

www.irma-international.org/article/artificial-neural-network-what-if-theory/133163