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An Efficient Approach of Association Rule Mining on Distributed Database Algorithm

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Abstract

Applications requiring huge data processing have two main problems, one a massive storage and its supervision and next processing time, when the quantity of data increases. Distributed databases determine the first trouble to a huge amount but second problem increase. Since, current stage is of networking and communication and community are involved in maintenance huge data on networks, therefore, researchers are propose a range of novel algorithms to raise the throughput of resulted data over distributed databases. Within our research, we are proposing an novel algorithm to process large quantity of data at the a variety of servers and collect the processed data on customer machine as much as necessary.

Keywords: Apriori algorithm, Association rules, parallel and distributed data mining.

1. Introduction

Association rule mining is one of the mainly essential and fine researched methods of data mining. It aims to extort exciting correlations, common patterns, associations or informal structures amongst sets of objects in the transaction databases or additional data repositories. Association rules are broadly used in a range of areas such as telecommunication networks, market and hazard managing, inventory control etc [1]. Different association mining methods and algorithms will be momentarily introduced and compared afterwards. Association rule mining is to locate out association rules that

suit the predefined least amount support and confidence from a database [3]. The trouble is decomposed into two sub problems. One is to discover those item sets whose occurrences go above a predefined threshold in the database; those item sets are known as frequent or large item sets. The second dilemma is to produce association rules from those large item sets with the constraints of negligible confidence [2].

The two most important approach for utilizing multiple Processors that have emerge; distributed memory within the each processor have a private memory; [6]and shared memory within the all processors right to use common memory. Shared memory structural design has many popular property. Each processor has a straight and equal access to all memory in the scheme.[4] In distributed memory structural design each processor has its own local memory that can only be access directly by that processor.

A Parallel purpose could be divided into number of subtasks and executed parallelism on disconnect processors in the system .though the presentation of a parallel application on a distributed system is mostly subject on the allocation of the tasks comprising the application onto the accessible processors in the scheme.[5] Association rule mining model amongst data mining numerous models, including Association rules, clustering and categorization models, is the mostly applied method. The Apriori algorithm is the mainly representative algorithm for association rule mining. It consists of plenty of modified algorithms that focus on civilizing its efficiency and accuracy.

2. Literature Review

Association Rule Learning is a general technique used to discover associations amongst numerous variables. It is often used by grocery stores, retailers, and anyone with a bulky transactional database.[7]Association rules are if/then statements that help out to discover associations between apparently unrelated data in a relational database or other information storehouse. An example of an association rule would be "If a customer buys a dozen breads, he is 80% likely to also purchase butter/jam." Association rules are shaped by analyzing data for frequent if/then patterns and using the criteria support and confidence to identify the most important associations[9]. Support is an indication of how frequently the items emerge in the database.

In data mining, association rules are helpful for analyzing and predicting customer nature[8][9]. They play an significant role in shopping basket data analysis, item clustering, catalog design.

Programmers use association rules to construct programs of machine learning[5]. Machine learning is a sort of artificial intelligence that seeks to assemble programs with the capability to develop into more competent without being explicitly programmed.

Algorithms for mining association rules from relational data have been developed. numerous query languages have been planned, to assist association rule mining such as the issue of mining XML data has acknowledged very little concentration, as the data

mining society has paying attention on the progress of techniques for extracting common arrangement from varied XML data.

The PADMA tool is an article analysis device executing on distributed environment, based on co-operative agent. It works without any relational database underside.

3. Association Rule Mining Algorithms

An association rule implies definite association interaction among a set of objects in a database. An association rule is an expression of the form A,B, where A and B are items[10]. The observant logic of such a rule is that transactions of the database which contain A be inclined to contain B Association rule is one of the data mining technique used to huge data out concealed information starting datasets that can be use by an organization decision maker to get better on the complete earnings.

3.1 Apriori Algorithm

Apriori is an algorithm for frequent item set mining and association rule learning over transactional databases. It proceed by identifying the recurring individual items in the database as well as extending them to bigger item sets as long as those item sets come out adequately often in the database. The frequent item sets examined by Apriori and can be used to create a conclusion association rules which depict interest to general trends in the database. Apriori is designed to work on databases containing transactions (for eg. collections of objects bought by customers,)[11][12]. Other algorithms are planned for ruling association rules in data having no transactions or having no timestamps. Each transaction is seen as a set of items.

Apriori uses a "bottom up" method, where numerous subsets are extensive one item at an instance and groups of candidates are experienced alongside the data. Pseudocode below demonstrates the process of frequent itemset generation of the Apriori algorithm.

3.2 Distributed/Parallel Algorithms

Databases may accumulate an enormous quantity of data to be mined. Mining association rules into such databases might involve significant processing power [13]. A possible resolution to this problem can be a distributed system. Moreover, lots of databases are distributed in nature which may assemble it more possible to use distributed algorithms. Principal layout of mining association rules is the calculation of the set of big item sets in the database. Distributed computing of large item sets encounters a number of new problems. One may calculate locally large article sets naturally, but a locally large item set may not be internationally large[7]. Since it is very costly to transmit the whole data set to other sites, one alternative is to put on air all the counts of all the item sets. However, a database may take hold of very big combinations of item sets, and it will engage momentary a huge amount of communication.

3.3 Optimized Distributed Association Rule

Association rule mining is an active data mining research area. However, most ARM algorithms provide a centralized atmosphere. In contrast to previous ARM algorithms, optimized distributed association rule is a distributed algorithm for physically distributed data sets that reduces communication overheads[14][5].Current organizations are geologically distributed. Normally, each site locally stores its ever increasing amount of day-to-day data. Using federal data mining to find out useful patterns in such organizations ' data isn't always possible because integration of data sets from different sites into a centralized site incurs huge network communication overheads. Data from these organizations are not simply distributed over various locations but also vertically disjointed, making it difficult if not impossible to unite them in a central position mining algorithm.

To defeat these problems, we don't produce candidate support counts from the raw data set after the first pass. This method reduces the normal transaction length

4. Proposed Algorithm

We will focal point on telling the experiments planned to estimate the performance of the projected Data Structure Mining algorithm. At this time, Association ruling acting an important role. The purchasing of individual product when an additional product is purchased represents an association rule.

The algorithm developed to present the distributed data at a very quick rate to the users engage flow of processing of data the same as follows

- Customer demands the data from the crossing point given. Data demanded is transferred to the proxy server, somewhere it is initially checked in the local database for simplicity of access, if the data is accessible, then provide to the user and occurrence of data is incremented, if not data is transfer to the various Distributed databases using multithreaded atmosphere used for parallel processing.
- The variety of servers throw the number one winding up to the proxy server, where it is combined collectively to find the infrequent item set for the searched charge Item customer / Proxy Server mediator is acceptable to store the outcome close by so that Future search of the same value will not take longer instant.
- Proxy server mediator has been provide with the capability of setting Support threshold percent previous to handing out and also present the facility of searching for more than item at a time and in a quick rate of searching for particular value and more than one value a reduced amount of amount of time is preferred.

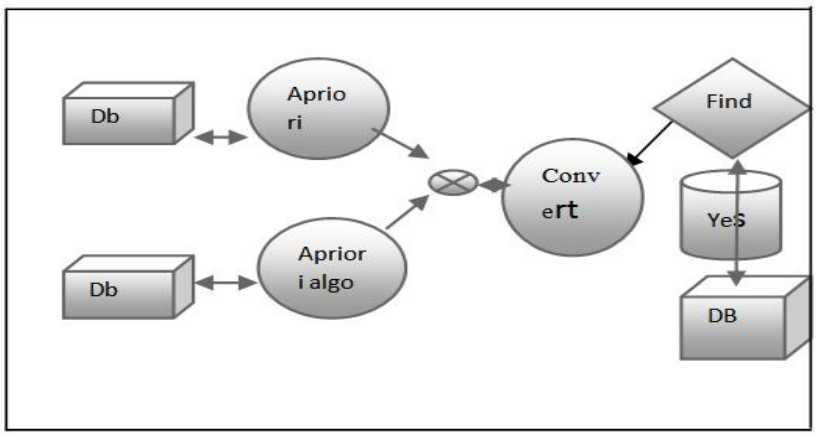


Fig. 1.1: flow chart of DB algorithms.

5. DATA SET: The experimentation is carried out with the help of synthetic datasets that are generated through the use of a dataset generator that is publicly available. A data set is a gathering of data, frequently presented in tabular shape. Each column represents a particular variable. Each row corresponds to a specified associate of the data set in question. It gives values to every variables, such as transaction id and transaction of an object. Each value is known as a element. The data set might consist of data for one or more members, equivalent to the number of rows. . For example, consider a sample database as shown in Table1.1

Table 1.1 table of item number and item sets

Table 1.1: Database Example.

S. N	Item Number	Item Set
1	I1	a,b,c,d,e,f
2	I2	d,b,a,e,c,e
3	I3	b,g,i,h,j
4	I4	c,h,a,b,e
5	I5	a,b,c,e,i
6	I6	d,e,i,j,d
7	I7	e,g,h,i ,j
8	I8	a,d,c,j,i,b,e
9	I9	c,a,b,f,g,h
10	I10	a,e,i,f,k,l,b

We have created a database at the run time given below

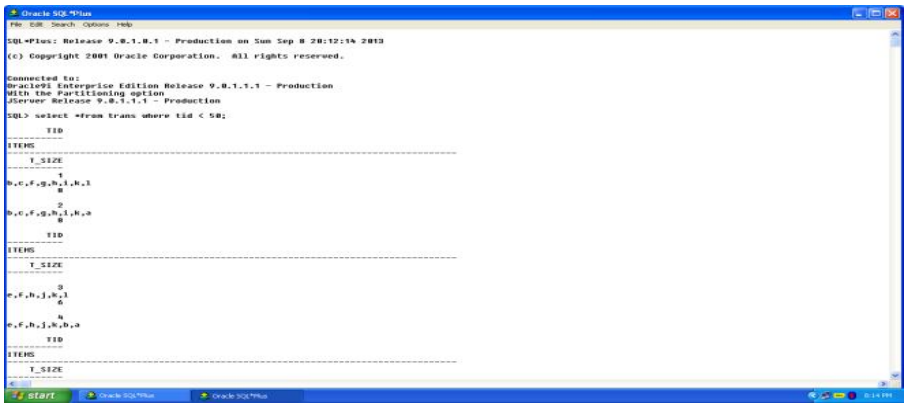


Fig. 1.2 (a): data base screen shot from 1 to 20.

Fig. 1.2(b): data base screen shot from 20 to 50.

5. Results & Implementation

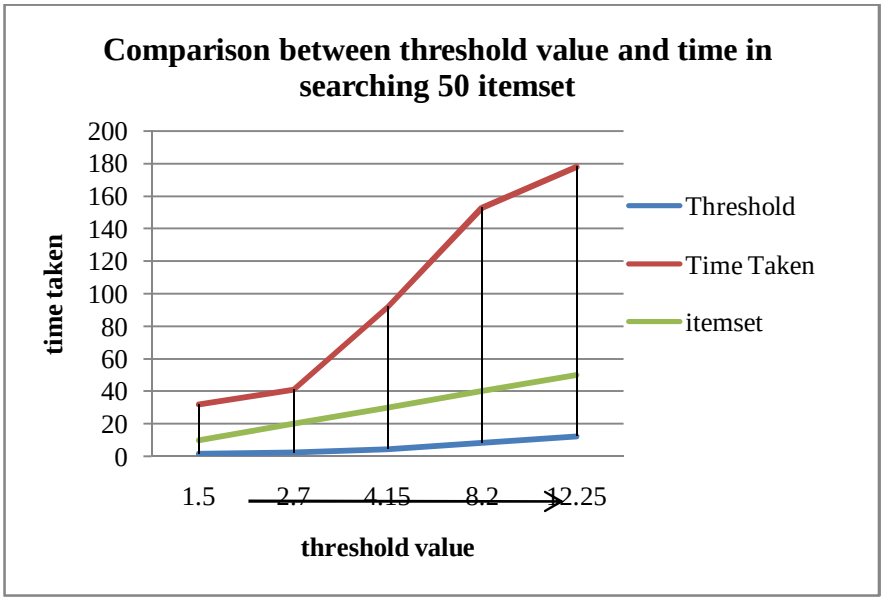
The dilemma of mining association rules is to produce all policy that have support and self-confidence better than or equal to some customer specified lowest support and least confidence threshold correspondingly. We have evaluated the performance of our proposed algorithm (DB algorithm) by comparing its execution time with the threshold value of the existed algorithms.

Because of the huge size of data and quantity of working out involved in data mining, high-performance computing is an indispensable constituent for any successful large-scale data mining applications.

We have applied our proposed algorithm on this database, following results have been come out then the result shown in fig the result between the threshold values and time taken in searching the 50 item set and show the compute value to table 1.1.Show the comparisons graph1.1 .or transaction record & time set in shown in table1.2 fig or total compression result in as shown in graph 1.2.

Table 1 2: Data collected Threshold Vs Time.

S. N	Threshold	Time Taken	Item set
1	1.5	32	10
2	2.178	41	20
3	4.15	92	30
4	8.2	153	40
5	12.25	178	50



Graph 1.1: Comparison between threshold value and time in searching 50 item set.

Table 1.3: Data collected no of Records processed.

S. N	Number of records	Time taken
1	25	158
2	30	297
3	35	412
4	40	703
5	45	978

Comparison chart no. of records vs. time taken (table 1.3)

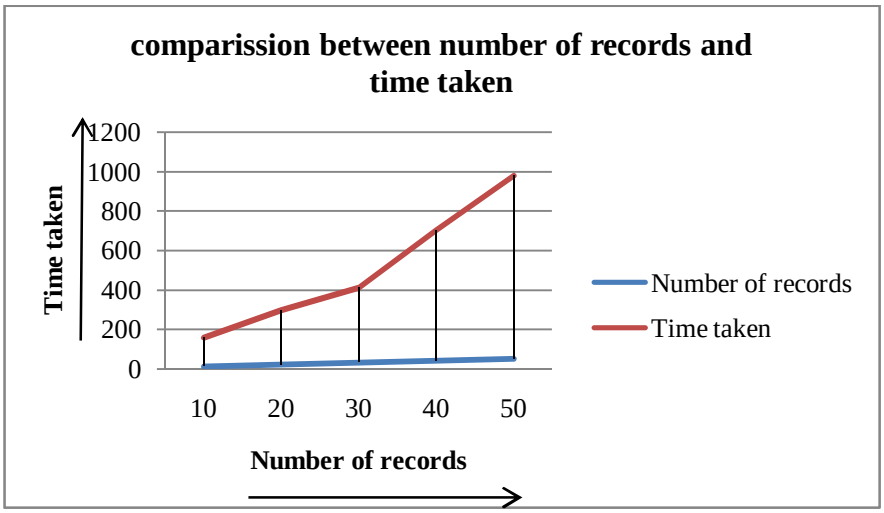


Fig.1.3: Comparison between number of records and time taken.

6. Comparision

Comparison between Apriori Algorithm and new proposed algorithm(DB algorithm) For the item sets given above,we have compared both the algorithm i.e apriori as well as new proposed algorithm DB algorithm on same item sets,and following result have come out. This is an example based on the following transactions in the database. First we are applying the apriori concept then distributed database algorithm(DB) to find searching item set . based data base architecture to find the frequent item sets. This proposed work highlights the important aspects of system implementation, including the technology choice, algorithm implementation and other interesting implementation solutions. The main objective of this stage is to transform the design solutions into working model. The comparison is shown in table 1.3 apriori and data base algorithms. And the comparison result shows that our purposed algorithm is better then apriori algorithms.

Table 1.4: Comparisons between apriori and db algorithms.

S. N	Threshold	Time Taken		No. of Records	Time Taken	
		APRIORI	DB		APRIORI	DB
1	1.5	41	32	25	167	158
2	2.178	53	41	30	302	297
3	4.15	107	92	35	423	412
4	8.2	164	153	40	721	703
5	12.25	189	178	45	981	978

We have applied our proposed algorithm on 50 item sets and the time taken by DB algorithm is much less than apriori algorithm.

7. Conclusion & Future Enhancements

Association rule mining is a significant presentation. The Optimized Distributed Association Mining Algorithm is used for the mining process distributed background. The response time through the communication and calculation factors are considered to attain the superior arrival time, lot of processors in a single environment. As the mining process is done in parallel an best possible solution is obtained. The various graphs show the processing time as estimated and generate the results as per the requirements of the users. Fast response time as shown in the graphs shows that the proposed algorithm generates the results as necessary. The upcoming improvement of this is to work about on proxy server to permit users to access new data searched even when the data is found in the neighborhood.

The exploitation of conventional approach will be hard to collect the latest demand for data mining, so the new data mining algorithm proposed in this paper is meaningful. This paper increases data mining helpfulness significantly. This DB method can solve the algorithm space problem in our environment.

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