# An Approach to Implement Apriori Algorithm for Transactional Database

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## Abstract

As there are many Data mining algorithms have been proposed in recent years, there lacks a comprehensive study to compare these algorithms.. Apriori algorithm is the first algorithm proposed in this field. With the time a number of changes proposed in Apriori to enhance the performance in term of time and number of database passes. This paper proposes an innovative utility sentient approach for the mining of interesting association patterns from transaction database. The algorithm uses the results of this analysis to define the parameters of the mining model. While you can use different algorithms to perform the same business task, each algorithm produces a different result, and some algorithms can produce more than one type of result.

*Keywords: Association Rules; Apriori algorithms; minimum support; computation power; frequent Items.*

## 1. Introduction

In Data Mining, **Apriori** is a classic algorithm for learning association rules. Apriori is designed to operate on databases containing transactions (for example, collections of items bought by customers, or details of a website frequentation). Other algorithms are designed for finding association rules in data having no transactions, or having no timestamps (DNA sequencing).

As is common in association rule mining, given a set of *itemsets* (for instance, sets of retail transactions, each listing individual items purchased), the algorithm attempts to find subsets which are common to at least a minimum number C of the itemsets. Apriori uses a "bottom up" approach, where frequent subsets are extended one item at a time (a step known as *candidate generation*), and groups of candidates are tested against the data. The algorithm terminates when no further successful extensions are found.

A large supermarket tracks sales data by stock-keeping unit (SKU) for each item, and thus is able to know what items are typically purchased together. Apriori is a moderately efficient way to build a list of frequent purchased item pairs from this data. Let the database of transactions consist of the sets {1,2,3,4}, {1,2}, {2,3,4}, {2,3}, {1,2,4}, {3,4}, and {2,4}. Each number corresponds to a product such as "butter" or "bread". The first step of Apriori is to count up the frequencies, called the supports, of each member item separately.The table 1 explains the working of apriori algorithm.

Table 1: Support-Item

| Item | Support |
|---|---|
| 1 | 3 |
| 2 | 6 |
| 3 | 4 |
| 4 | 5 |

We can define a minimum support level to qualify as "frequent," which depends on the context. For this case, let min support = 3. Therefore, all are frequent. The next step is to generate a list of all 2-pairs of the frequent items. Had any of the above items not been frequent, they wouldn't have been included as a possible member of possible 2-item pairs. In this way, Apriori *prunes* the tree of all possible sets. In next step we again select only these items (now 2-pairs are items) which are frequent:

Table 2: Relations of Support-Item

| Item | Support |
|---|---|
| {1,2} | 3 |
| {2,3} | 3 |
| {2,4} | 4 |
| {3,4} | 3 |

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And generate a list of all 3-triples of the frequent items (by connecting frequent pairs with frequent single items). In the example, there are no frequent 3-triples. Most common 3-triples are {1,2,4} and {2,3,4}, but their support is equal to 2 which is smaller than our min support.

- In data mining, association rules are useful for analyzing and predicting customer behavior. They play an important part in shopping basket data analysis, product clustering, catalog design and store layout.
- Association rules are if/then statements that help uncover relationships between seemingly unrelated data in a relational database or other information repository. An example of an association rule would be "If a customer buys a dozen eggs, he is 80% likely to also purchase milk."
- Association rules are if/then statements that help uncover relationships between seemingly unrelated data in a relational database or other information repository. An example of an association rule would be "If a customer buys a dozen eggs, he is 80% likely to also purchase milk." confidence to identify the most important relationships. Support is an indication of how frequently the items appear in the database. Confidence indicates the number of times the if/then statements have been found to be true.

## 2. Problem Definition

- Repeatedly scanning the transaction database. For each element of each circular candidate set C*, it must be verified whether to join the frequent item set Lk through scanning the database. If there is a large frequent item set contained 10 items, then it is need to scan the transaction database at least 10 times, which will bring a great I/O load.

- Most of the strong rules found can be inferred from domain knowledge and do not lead to new insights. It only tells the presence and absence of an item in transactional Database.
- The strong rules found do not lend themselves to any actions and are hard to interpret. These can be removed by using attributes like weight and quantity, weight attribute will give user an estimate of how much quantity of item has been purchased by the customer, profit attribute will calculate the

profit ratio and tell total amount of profit an item is giving to the customer.
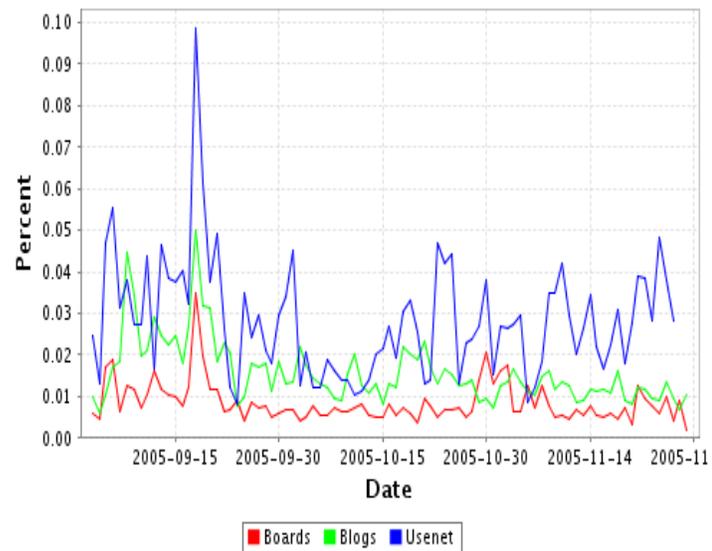


Fig 1: Annual Analysis

## 3. Methodology

Ck: candidate item set of size k, Lk: frequent item set of size k
L1 = {frequent items};
For (k=1; Lk != null; k++) do begin
Ck+1 = candidates generated from Lk;
For each transaction t in database do
Increment the count of all candidates in
Ck+1 that are contained in t

- SUPPORT MIN states the minimum support of the mined rules;
- CONFIDENCE MIN states the minimum confidence;
- MAX RULE LENGTH states the maximum number of items (attribute = value) of rules ;
- LIFT FILTERING states the minimum of LIFT.
- LEARNING SET RATIO states the proportion of the dataset used for the learning phase.

- **Pseudo-code for Apriori:**
  • Lk: Set of frequent itemsets of size k (with min support)
  • Ck: Set of candidate itemset of size k (potentially frequent
  itemsets)

L1 = {frequent items};
for (k = 1; Lk !=∅ ; k++) do
Ck+1 = candidates generated from Lk;
for each transaction t in database do
increment the count of all candidates in Ck+1 that are contained
in t
Lk+1 = candidates in Ck+1 with min_support
return ∪k Lk;

- 15 attribute/subset evaluators + 10 search algorithms for feature selection
- 3 algorithms for finding association rules
- More algorithms being added
- Options to customize using the Java source code is made available



Fig 2: Methods to define mining

## 4. Tool of Data Collection & Analysis:

- Tanagra: A collection of open source ML algorithms
  - o pre-processing
  - o classifiers
  - o clustering
  - o association rule

- Software Platform: Java based
- 49 data preprocessing tools
- 76 classification/regression algorithms.
- Custom extensions and plug ins can be developed
- Excellent mailing and discussion lists available.

Tanagra The main purpose of Tanagra Tool is to give researchers and students an easy-to-use data mining software, conforming to the present norms of the software development in this domain (especially in the design of its GUI and the way to use it), and allowing to analyses either real or synthetic data.
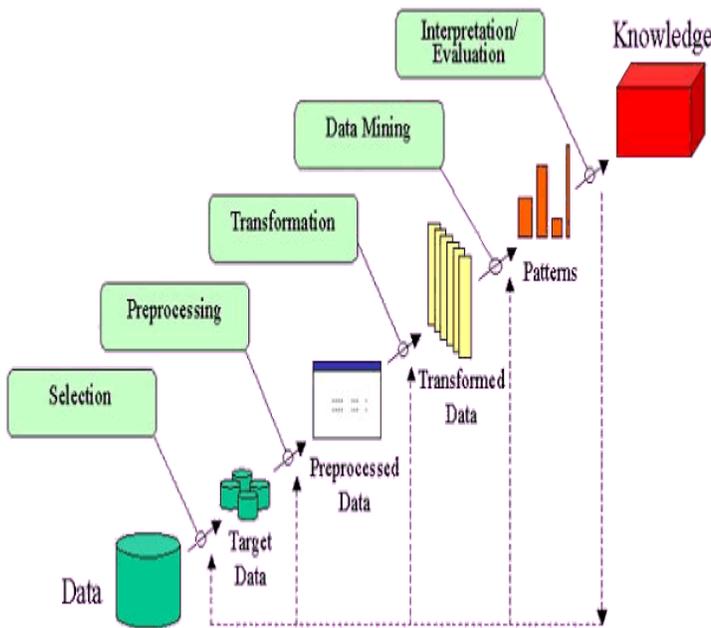


Fig 3: Working of Tanagra tool

- The second purpose of TANAGRA is to propose to researchers an architecture allowing them to easily add their own data mining methods, to compare their performances. TANAGRA acts more as an experimental platform in order to let them go to the essential of their work, dispensing them to deal with the unpleasant part in the program of this kind of tools: the data management.

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Fig 4: Data Management

The third and last purpose, in direction of novice developers, consists in diffusing a possible methodology for building this kind of software. They should take advantage of free access to source code, to look how this sort of software is built, the problems to avoid, the main steps of the project, and which tools and code libraries to use for. In this way, Tanagra can be considered as a pedagogical tool for learning programming techniques.

## 5. Conclusion

The conclusion to this work is that Apriori algorithm is applied on the transactional database. By using measures of apriori algorithm, frequent itemsets can be generated from the database. Apriori algorithm is associated with certain limitations of large database scans. This algorithm reduces the number of scans in the database and improves efficiency and computing time by taking the advantage of Advance Mining Techniques. By experiment results, it can obtain higher efficiency.

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