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Analysis of Hospital Resources with Mortality Rate

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Abstract - *In the present days there is an increase in mortality rate (death rate) and it becomes very big problem. As the mortality rate increases there will be a chance of serious issue in health department. So it is very necessary to reduce the mortality rate. This project is beneficial for the hospitals to try and improve their services and also for public service. Using different data mining algorithms the frequent item sets are mined from the input and then the association rules are generated. To upload the data set and to improve the services the website is developed for the hospitals. Using this website public also view the hospitals in their city to get the hospital overview.*

***Key Words*: Hospital Resources, Mortality Rate, Data Mining, Association Rule, Apriori TID algorithm, SFIT algorithm, Eclat algorithm.**

1. INTRODUCTION

One of the most important service in the world is healthcare. One can see a hike in mortality rate by looking at the statistics obtained from various hospitals, government and non-government organizations. The challenging issue for the Ministry of Public Health is to provide medical knowledge and modern technology for reducing the mortality of the population. The reason for this, increasing in mortality rate every year which is revealed from mortality data by Strategy and Planning Division of the Permanent Secretary office of the Ministry of Public Health. Analysis of the relationship between hospital resources and mortality is necessary task for public health's policy deployment in terms of data analysis. The data mining technology is used to analyze and try to predict the dependencies of mortality rate with fields such as the number of duty doctors present, the number of doctors associated with the hospital, the number of wards, the number of empty beds, the modalities within the hospital and the ratios of nurses to hospital.

2. EXISTING SYSTEM

The number of deaths that occur in a hospital in any given year is defined by a hospital's crude mortality rate and then the same is compares against the amount of people admitted for care in that hospital for the same time period. The number of deaths for every 100 patients admitted is set as crude mortality rate. To maintain daily work of hospitals Hospital Management System software is used.

To book online appointments and make payments, Online appointment System and Billing Software are used respectively. The existing systems are tools and maintenance software. Currently there is no tool which analyzes hospital data and discovers the association between hospital resources and mortality rate.

Drawbacks:

- Manual Process.
- Only Maintenance Software is used.
- Time Consuming.
- Efficiency is less.

3. PROPOSED SYSTEM

In terms of data analysis, for the deployment of the public health's policy, analysis the relationship between hospital resources and mortality rate is the necessary task. A good health service is a most important task to reduce the mortality rate. Using the data mining technique the Proposed System discovers the correlations among health services and mortality rate.

Proposed system is very helpful to the medical departments so as to reduce the mortality rate. Proposed system finds the hidden correlations between hospital resources such as doctors, dentists, pharmacy, nurses, technical nurses, scanning departments with mortality rate.

Aim and Advantages:

- The main objective of the Proposed System is to reduce the mortality rates and improve hospital resources pertaining to disease.
- It is a real world application used by health departments.
- To analyze health data, the proposed system uses data mining techniques to discover the association between health resources and affected crowd.
- Using the previous data collected, the proposed system predicts the relationship and suggests improvements that can be made.

4. SYSTEM DESIGN

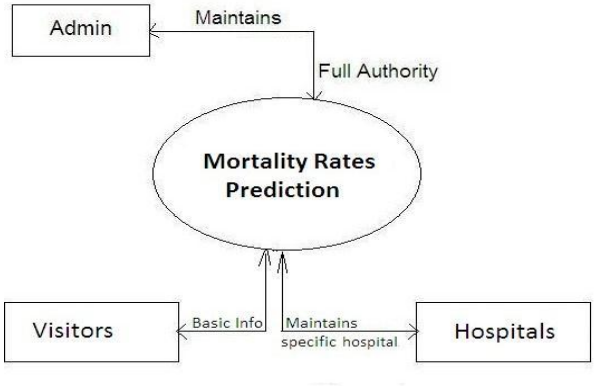


Fig 1: Components of the proposed system

Fig 1 describes the three system components namely, Admin, Hospitals and Visitors. The system is fully controlled by the admin and for visitors and hospitals the admin grants access. The hospital data and the results of the Mortality rates prediction can be access and view by the visitors. The data set can be uploaded by the hospital (the individual hospital using the system) and then the suggestions are given to the hospitals and they can access only their respective data. The admin granted the login credentials to visitors and hospitals.

The data set provided by the hospital is used by prediction algorithm to get the association rules.

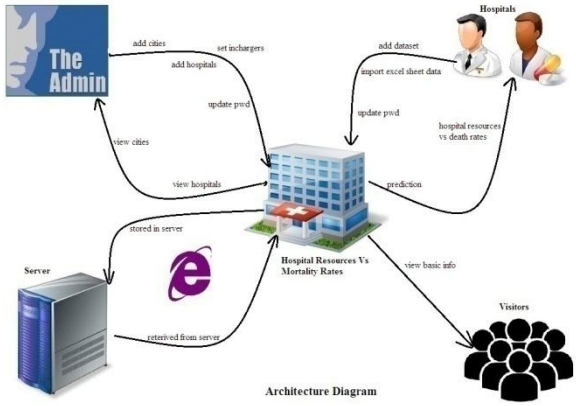


Fig 2: Architecture diagram

Fig 2 represents the architecture diagram which consists of the three system components and the server. The server is used to store the data.

The data in the server is also used for the prediction of the association between the hospital resources and mortality rate.

5. METHODOLOGY

Data Mining

It is a process of analyzing data from different perspectives and extraction of useful information from the processed data. Data mining applied on n number of fields and used to solve real world problems. Data mining supports many techniques. In the Proposed System Association Rule technique is used.

Association Rule technique

Association (or relation) Rule technique is the most familiar data mining technique. Here, we make a correlation between two or more items and finds the rules or patterns.

To find association rule different algorithms are used.

1. **Apriori TID Algorithm**

Apriori TID has the same candidate generation (frequent subsets are extended one item at a time in bottom up approach) function and groups of candidates are tested against the data as Apriori, however, it does not use database for counting support after the first pass. Instead, an encoding of the candidate item sets which was used in the previous pass is used again here. It uses breadth-first search approach. If further successful extensions are not found then the algorithm terminates its process.

Steps:

STEP 1: Scan the data set and determine the support(s) of each item.

STEP 2: Find C1'

STEP 3: Generate L1 (Frequent one item set).

STEP 4: Find C2', C3' .....

STEP 5: Use Lk-1, join Lk-1 to generate the set of candidate k - item set.

STEP 6: Scan the candidate k item set and generate the support of each candidate k – item set by comparing with previous step (but not with the original data-set as we did in apriori algorithm).

STEP 7: Add to frequent item set, until C=Null Set.

STEP 8: For each item in the frequent item set generate all non empty subsets.

STEP 9: For each non empty subset determine the confidence. If confidence which is determined is greater than or equal to the specified confidence then add to Strong Association Rule.

2. SFIT Algorithm

SFIT (Set Operation for Frequent Item Set using Transaction Database) is a combination of Apriori, which is the most popular mining algorithm and set operations. Intersection and union are the principles of set operations used. The principles used are related to frequent Item set tree. In frequent Item set tree, there are nodes holding frequent itemsets and transactions containing related itemsets. Frequent (k-1)-itemsets are used to construct k-itemsets. The union of the itemsets is formed and intersection operation is employed between the Tids of the itemsets to find their support count.

Item set {A} is in transactions with Tid 1,3,4,5 and {B} is in transactions with Tid 1,2,3,4,5,6 i.e., T(A)={1,3,4,5} and T(B)={1,2,3,4,5,6}.

The Item set {A, B} is the union of these two itemsets and to find the tids for {A, B} intersection principles is used as follows:

$T(AB)=T(A)\cap T(B) =\{1,3,4,5\}\cap\{1,2,3,4,5,6\}$

$= \{1, 3, 4, 5\}$

If the result is greater than minimum support, it will be joined to frequent Item Set tree. The result will be pruned off if the result is lower than minimum support.

Steps:

STEP 1: Scan database and find frequent 1 itemsets, at the same time obtain transaction sets, which includes the Item set. (Assume that there is space for generating candidate 2-itemsets from frequent 1-itemset and also the frequent 1-itemsets and transaction sets, require no more memory that available).

STEP 2: Generate candidate 2-itemsets from frequent 1-itemset only.

STEP 3: Prune off the candidate 2-itemsets whose node count is lower than min support using their Tid set. Now frequent Item set tree contains only frequent 2-itemsets at the second level.

STEP 4: Consequently, for each frequent 3, 4… n–Item set, scan the database to approve the consistence of the Item set.

STEP 5: Finally, Item set are used to generate strong rules having minimum confidence in the frequent Item set tree.

3. Eclat Algorithm

It is a depth first search based algorithm. A vertical database layout is used in eclat algorithm i.e., each item is stored together with its cover (also called tid list) instead of explicitly listing all transactions and to compute the support of an item set, the intersection based approach is used. It requires less space and requires less time for frequent pattern generation than other algorithms.

Steps:

STEP 1: Get tid list for each item(DB scan).

STEP 2: Tid list of {a} is exactly the list of transactions containing {a}.

STEP 3: Intersect tid list of {a} with the tid lists of all other items, resulting in tid lists of {a, b}, {a, c}, {a, d}, … = {a}-conditional database(if {a} removed).

STEP 4: Repeat from 1 on {a}- conditional database.

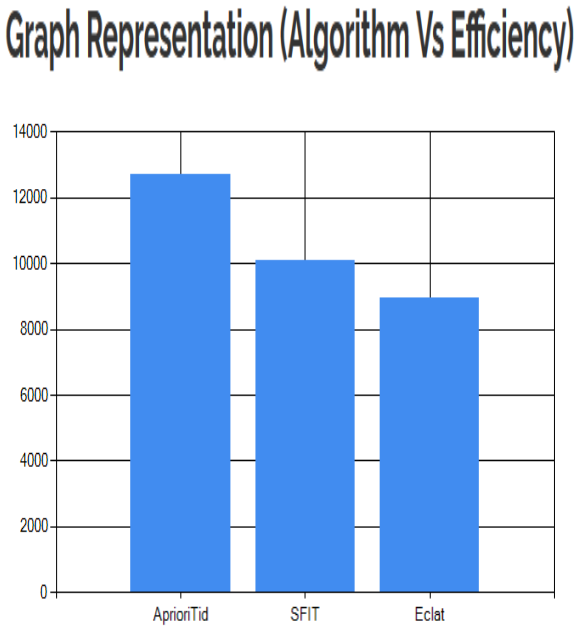
STEP 5: Repeat for all other items.

4. Comparative analysis:

For comparative analysis, efficiency of the algorithms is considered. The constraint used to represent the efficiency is time in milliseconds.

Constraint	Apriori Tid	SFIT	Eclat
Time	12706 milli secs	10076 milli secs	8976 milli secs

Graph representation is shown below.



6. CONCLUSION

Identifying important hospital resources which are depended on deaths is a challenging task in the current medical sector. Every year all over the world mortality rate increases consecutively, so to reduce the mortality rate

health service become as the most important task. To reduce the mortality rate of the population, it is very challenging issue for the Ministry of Public Health to provide medical knowledge and modern technology.

Proposed system finds the hospital resources which are dependent on mortality rate. We use data science algorithm to identify hospital resources and also system identifies most important hospital resource which is related to death rate. System is useful to the medical sector, so that the death rate may decrease.

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