Decision Making for Public Healthcare System using Data Mining Techniques

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Abstract: The issues on public health care and how to make right decisions on public health care. This helps in effective use of data and how to utilize the data in a proper way including improvements. The purpose of this study is to examine the use of data usage considering issues related to that. The study is analysed to over-come with the issues at public health care system by using certain methodology. The major prospect of this methodology is to make out the organizations between usage of data and data mining to help with decision making at various levels of public health care in India. The designed model also shows the improvements on decision making using analytical skills. Despite skills are not only required or not only sufficient in public health. Thus by combining the decision making with models would generate strong platform for data mining. To apply the constructed models are possibly the high effective involvement that enriches usability of data. In order to support the analysing of data and non-stop assessment of models on approved set of indicators of success on which their presentation are assessed of India.

Keywords: Public Healthcare; DSS; Data Mining; CRISP-DM; Decision Making.

I. INTRODUCTION

Public health-care commonly refers to government funded health-care services offered to everyone of the population. This service is a cost effective health-care system which provides the basic health-care needs for every community of the population and financially aided by the government. The government of India controls the healthcare aids fund which is comprised by public healthcare sector. The state government controls rest except the forbidden by the central government. The union department of health and family welfare aids community health-care system overall working by supporting the state and local levels which are more directly involved in healthcare services activities. The main aim of ministry of health and family welfare at the national level is to make possible effective and efficient management by the states and the local health.

India's public health-care system follows centralized planning and policy making including de-centralized implementation. At the national level the government persuades the states to work towards specific health objective and priorities and it also provides the required practical approach to sustain. These health care sectors are operated at levels mainly nationwide level, state-wide level and district wise level. At the national level the main duty is to coordinate, supervise and initiate including the main goal for public national health policy. Several agencies are involved in operating department of health and family welfare. Health-care system as well as policy incidental is monitored by state government. Additionally it also reviews different national level health programs completion such as NRHM. The policy formulation or decision making is carried by central government and converts these policies into operation at district or state levels.

A. Decision Making

Decision making refers to the identification and selecting among alternatives on the basis of priorities of the pronouncement maker. Decision making process cut downs the uncertainty level to some extent regarding available alternatives and aids in making a right decision in alternatives. Decision making are subjected at three main levels operational, strategic and tactical. Operational decision relates to day to day operation of the organization. Long term decision is made using strategic based on organization mission and vision. Tactical decision deals with the implementation and also involved in performance management to accomplish the strategy. Operational decisions are made at lower levels of organization. There are many different techniques and tools which can be used in building decisions. In order to make smart decisions regarding medical examination, surgical treatment, reducing costs and so on health decision tools are used. Likewise, Decision support system helps in building decisions. DSS is computer based system that helps the decision makers in utilization of data and identifying models as well as problem solving so as to build decisions efficiently. The decision makers make use of decision support system in decision making process. The effectiveness of decision is enhanced by decision support system and it is one of the major aims. The decision support system has been integrated with analytical tools like Data mining, OLAP and data warehouse.

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B. Data Mining

In order to discover the previous unknown hidden patterns we can analyse the data through data mining process. This can be used to improve decision making process through support system. Thus by integrating the decision making process along with data mining technique large amount of data can be used to build models and improve the decision support system. This technique has been widely used and researched in various fields. In order to improve the functioning and performance of e-commerce, search engines personalized environment this technique can be put into application says Chen. Similarly the other two researchers Lavrac[10] and Bohanee observed that the combination of data mining with the decision support improved the performance of DSSs also helps in tackling and rising problems. They also advanced the explanation on improving the existing approaches including the new building approaches which lead to problem solving and combination of knowledge obtained from data and expert's knowledge.

C. Existing System

Over the years there has been no proper method to stimulate the process of decision making in public health system. This problem resulted in identification of diseases in hospitals and public health sector. This made difficult to plot the graphs according to states and cities. According to the survey made the issues in health sector in INDIA is conceptual in nature and attempt to identify this no data mining technique is being used at different levels which goes not give spotlights to improve the public health issues.

II. LITERATURE SURVEY

There is not much information on public health care activities prior to colonial period. One of the major sources of health care was Ayurveda which was home and natural based and turned out to be very effective quality. There were not many organization involved with respect to health care neither to prevent the diseases nor deaths. This development of public health care was brought in colonial period and thus the same followed by Britain. The efforts of public health care were highly focused on preventing nation's civilians, army cantonments giving sanitation as the top priority. The early detection was focused on managing the infectious disease such as cholera and plague.

Two major factors were attributed for the development of public health care system and give a definite shape for the nation. Bhore committee initially formed a report on public health care which involved with survey and development at the colonial period. To prevent and control the emergency diseases there was a development of modern and medical technology importantly focusing on diseases which are communicable. The committee of Bhore appointed a comprehensive remodelling of health services in 1943. At different level there was an integration of preventive and curative health services. Development of hospitals for health care services including primary in two different stage. Training was also provided in medical and health department. These changes gave massive results on health care services resulting in hospital based services. The older service which was created during colonial period were replaced by hospitals and health centres. There was a consolidating of various services into one centre. In 1987 the act was derived based on the model of public service which was basically drafted in the year 1950. But this act is yet to be personalized by constituents of state and country. The medicalisation of the system was set up by the hospitals. There has been negligence on medical health service without any concern. High cost towards poor health and service departments resulted in deaths, illness and debility. Poor and deprived are mainly dealing with suffer. Due to less concern on epidemiological, the statistical data base impacted on poor planning due to less information available and resulted normative planning virtually redundant. Thus due to lack of information and poor result of epidemiological decentralization of health system couldn't service.

According to the author Janos Fulop and Baker (2001) decision making is nothing but study of identifying as well as selecting the alternatives depending on the values along with preferences of the judgment maker. This helps in selecting and considering the different choices in decision making which gives us an extra option to select as per our goals assigned, objectives, desires, values etc says (Harris 1980). This should chiefly commence by identification of stake-holders as well as judgment making dropping variance about problem description, necessities, target along with criterion, thus judgment making method be capable of further separating into subsequent procedure namely, problem definition, identifying the requirements, set up goals and identify alternatives further followed by defining criteria along with selection judgment making device to estimate different against criterion followed by certify solution in opposition to problem definition.

According to S.Pavithra and Dr.S.Ravi, (Volume 8 2017) data mining plays a very important and vital role in public health care sectors. It is not only used to assist the public health but also private concern of health care sector. Large amount of data can be recorded and stored as per the treatments received. Even though there is a difficulty sometimes to discover data by human hence it can be moved to data mining to recover the lost data easily and faster. It is facts based medicine through electronic record, the medicine or treatment can be provided to the patient hence the hospital errors can be provided towards the patient.

III.SYSTEM DESIGN

It defines the outline of the model, shows the interaction between the end users and the system and defines the working of the overall system.
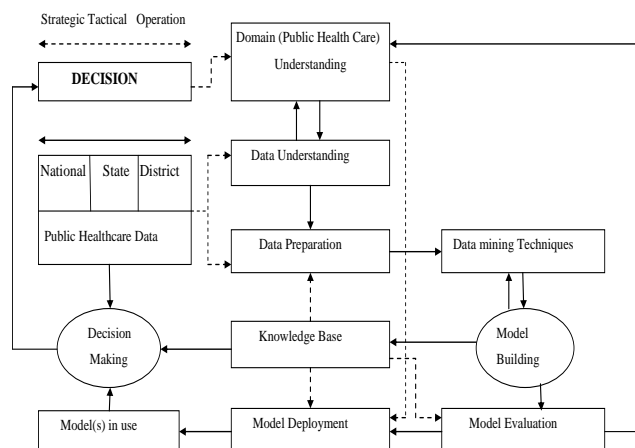

Fig 1 System Architecture: DM-PHCS

The above diagram represents the model of proposed conceptual along with six phases at each different levels. This model mainly aims with the process of decision making and managing the public health care system. Each phases as its own function and helps in decision making. This model is built with data mining software developers and users.

IV. IMPLEMENTATION

Linear Regression
Simple linear regression is defined as when we have a solo(single) input attribute (x) and we want to make use of linear regression. Multiple input attributes (e.g. x1, x2, x3, etc.) defines multiple linear regression. The method for linear regression is unlike as well as simpler than that for several linear regressions.

Algorithm Explanation
Last year, five randomly selected data of the patients, Health care, disease & their statistics is taken. For a given above statistics nearly 600 data has been taken from the datasets.
The regression equation is of the form:
count = count (Σ_0: count(Σ_1)).
Where Σ_0 = disease and Σ_1= states.
To perform a regression analysis, b_0 and b_1 must be solved. Calculations are as follows.

Σ_1 = count(states) Σ_1 = 5	Σ_0 = count(disease) Σ_0 = 50

Therefore, the regression equation is: $\hat{y}$ = 50:5.

Method to employ Regression Equation
When you include the regression equation, value on behalf of the independent variable (x) is selected, with calculation of (y) is performed, an estimated value (z) is obtained for the dependent variable.
For example, if a 600 patients are suffering from different disease from different states then:
Σ_0= count (x1+x2+x3…..+n)
Σ_0 is the disease
Σ_1= count (z1+z2+z3…. +n)
Σ_1 is the states
Σ_{01}= Σ_0/ Σ_1

Making Analysis /Decision
We now have the coefficients for our simple linear regression equation where we are considering Measles as disease with Karnataka as state.

$\Sigma z_{1=}$ max count (Σ_0)
$\Sigma_{z2} =$ distinct count (Σ_1)
Thus by solving $\Sigma z_1, \Sigma z_2$ we obtain, $\Sigma z_{1=} 29 \; \Sigma z_{2=}$ Karnataka
Where 29 is the entire count of patients, Karnataka is the state.
By which we conclude 29 patients are being affected in Karnataka by Measles disease.

V. RESULT AND ANALYSIS

The hospitals will be registered for different district and cities, once when the hospitals are registered admin administrator of that hospital enters the patient details and the disease suffered by the patient, which will be sent to the "Public Health Care Sector" in CSV format. The data sent by the hospitals is gathered and processed that is large number of patient data are collected using data mining technique. By applying KDD process analysis is done such that, which state has been affected more with the certain disease and the representation is shown using graph. The measure to be taken is sent to the government. Every state has different governments. Here after the analysis is done by the Public Health Care Sector the measures to be taken for the state is received in the form of document, where the government needs to take the further action.
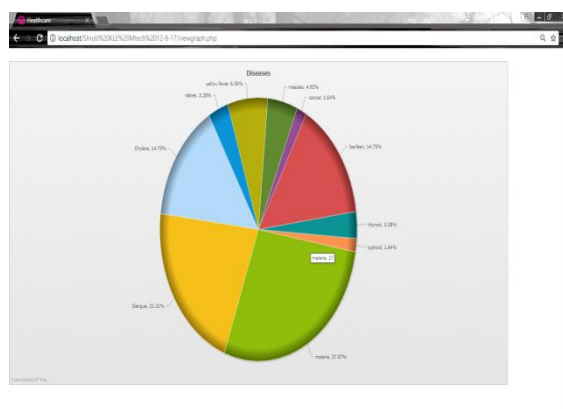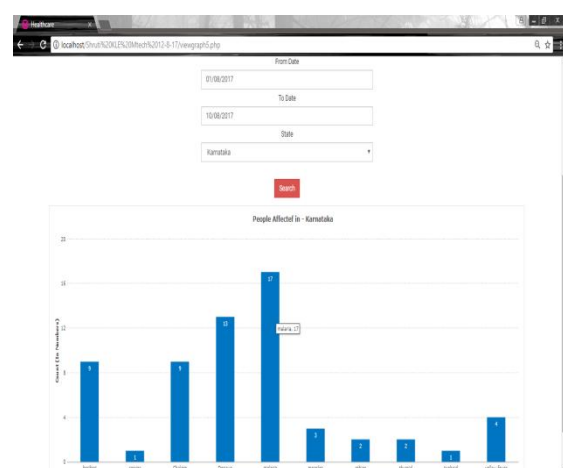

Fig 2 Overall representation of disease

Fig 3 Yearly representation of disease

VI. CONCLUSION

Data mining based model for managing public health care system is based on the decision making model which aids decision making process depending on the information needed from data mining patterns, models, relationships and rules. It helps the processing of decision making through new knowledge acquired. This model aims to provide and simple technique to use which allows healthcare administrations to utilize data mining models with only a ground level of accepting of the data mining method which allows them to construe the models properly. The developed model also describes the task of health care administration and data mining professionals. The stage which demands depth of knowledge in India, and data mining are executed by data mining experts and are unknown from health care

administration. The data created by experts which exploit only data mining models. The constructed model resembles higher combination of decision into data mining. Additionally it offers ground to implement the data mining specifics at various organization levels in public health care system. In order to improve the decision making of data mining system at various levels the availability of data plays a major role in building models. Thus the proposed DM-PHCS for public health care system enables to apply in any service sectors.

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BIOGRPHY

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