METADATA GENERATION IN HEALTH SERVICE PLANNING

Jaspreet Singh Phul, Dr. Rajan Vohra

Abstract— Each Capital city of India is administered by multiple agencies. Each agency has its own network of health (Nodal Centre) to identify different Nodes in terms of region or distinct so that the facilities within the region which can be achieved by load transfer between centers. At the primary level, the Nodal Centre is the Node which has maximum load. This research paper describes a model Driven Decision Support that Facilitates load balancing and decentralization. This model can be used by primary health care services within a district, based on patient load.

Index Terms— Decision Support System,Decentralization, Health Service,Load balancing,MetaData, Other Nodes, Planning,Service Nodes.

1 INTRODUCTION

In this era of computerization, connectivity through World Wide Web and support of automated software's has completely changed concept of human life. Life sciences are not an exception to it. It has made a remarkable change in the functioning of health service centers. Computerization has in turn improved the way of data processing in medical sector. This research paper intends to provide a survey of current techniques of knowledge discovery in data bases using data mining techniques that are in use today in medical research and public health. We also discuss some critical issues and challenges associated with the application of data mining in the profession of health and medical practice in general. This paper intends to clarify the centralized approach to manage difference medical nodal centers by governing their load and resources.

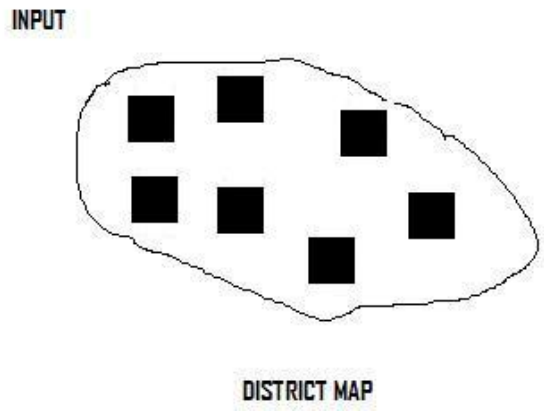

Figure 1.Input to district Map

2. RESEARCH PROBLEM

To identify Nodal Centre, Service Node and Other Nodes in a given district (problem space) so as to facilitate planning of health care services through decentralization, load balancing and telemedicine. In this problem, Data mining techniques and MDDB (multidimensional database) analysis can be used to refine such algorithm.

2.1 OBJECTIVE

To show generation of metadata for planning of health care service of district using a suitable algorithm that facilitates selection of various types of health center for the overall purpose of health care service delivery. We also show the algorithm discuss its implementation, its benefits and applications in various fields.

2.2 SIGNIFICANCE OF RESEARCH PROBLEM

It performs manpower, load balancing in a given problem space having distributed Nodes which are unordered, we design an algorithm that brings order to the given space through selection of nodal center, service nodes and other nodes such that the selection facilitates planning of health care service in the given region.

Nodal Center can be used for delivery telemedicine facilities and the Service Node can be used for delivering service of a particular type. This partitioning can also be used to plan other municipal services in the given region.

The output will be shows as Nodal Center, Service Nodes A, Service Node B and Other Nodes.

3. THE ALGORITHM

a. NODAL CENTRE: Nodal Centre is a node which has maximum load(Patient load)

SERVICE NODE: A Node with maximum load of a particular type.

OTHER NODE: All other nodes in the problem space defined are other nodes.

It is assumed that health canter is primary health center**s.**

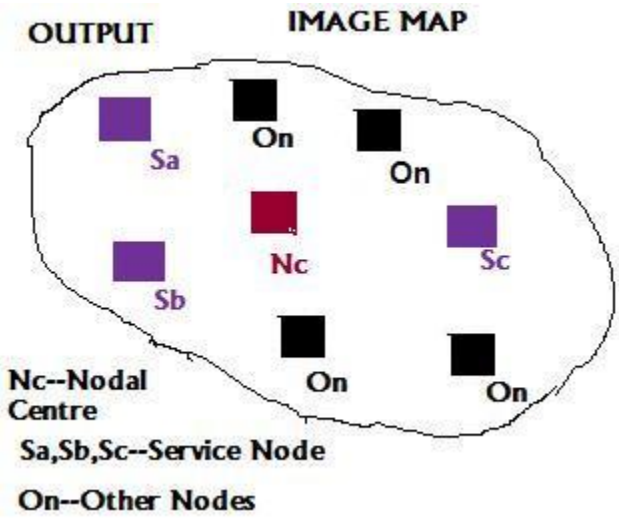

Figure II. Output Algorithm

b. FLOWCHART

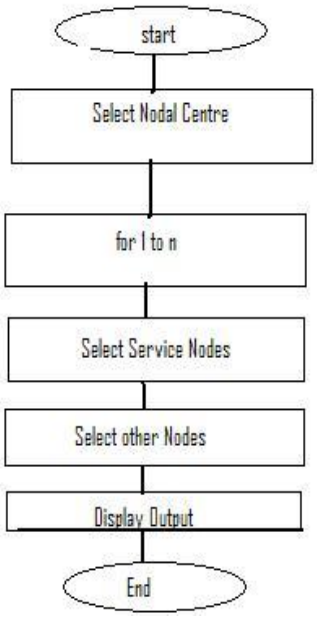

Figure2: Flow Chart shows complete process.

c. MATHEMATICAL MODEL OF THE ALGORITHM

Let N be the number of health centre's in a given region are synomenous with a district which is taken as a single contiguous logical unit for the purpose of implementing this algorithm.

Let $L_1,L_2,L_3 \ldots L_n$ be the individual load on the given health Centre's $C_1,C_2,C_3 \ldots C_n$ in the region R.

Now,

N_c= C with maximum patient load in R.

N_c =C with max($L_1,L_2,L_3 \ldots L_n$)

N_c =Nodal Centre generated for R.

Now, each L is further node up of load types as follows:-

L= (t_1, t_2,$t_3 \ldots t_m$) where $t_1+t_2+t_{3+} \ldots t_{m=}$ L

For 1 to n,

Here

t_i represents the Load type of L_i.

d. GENERATION OF SERVICE NODES:

Name of centre	Patient Load	t_1	t_2	t_3	…	t_n
C_1	L_1	L_{i11}	L_{i12}	L_{i13}	…	L_{i1n}
C_2	L_2	L_{i21}	L_{i22}	L_{i23}	…	L_{i2n}
C_3	L_3	L_{i31}	L_{i32}	L_{i33}	…	L_{i3n}
C_4	L_4	L_{i41}	L_{i42}	L_{i43}	…	L_{i4n}
C_5	L_5	L_{i51}	L_{i52}	L_{i53}	…	L_{i5n}

TABLE 1. Load of different centres.

If there are m service nodes, then

$S_{t1},S_{t2} \ldots S_{tm}$ is defined as

$S_{t1} \rightarrow t_1$: Service Node=max (L_{i11}, L_{i21}, L_{i31}, L_{i41}, L_{i51})

$S_{t2} \rightarrow t_2$: Service Node=max (L_{i12}, L_{i22}, L_{i32}, L_{i42}, L_{i52})

$S_{t3} \rightarrow t_3$: Service Node=max (L_{i13}, L_{i23}, L_{i33}, L_{i43}, L_{i53})

… …. … …. …. …. … … …

$S_{tm} \rightarrow t_n$: Service Node=max (L_{i1n}, L_{i2n}, L_{i3n}, L_{i4n},…L_{mn})

Now,

We have selected one Nodal centre and M Service Nodes:

No. of Other Node=N-(M+1)

4. BENEFITS & APPLICATIONS

This Decision Support Algorithm has wide applications in various sectors like Health Care Services, Banking, Traffic Management and various other commercial and scientific applications. It can be used for specific applications like Load Balancing, Service Distribution and planning , man power planning, demographic analysis and Telemedicine consultation. In brief various applications in diverse sectors are now described below.

3.(a) Health Care Services: As can be seen from this paper, this model can be used for service planning in a region, identification of various demographic and health indicators, usage patterns of Outpatient Services, type information for a region which indicates the current disease profile of the area. The Nodal Center can be selected for providing Telemedicine consultation facilities in the area. This is especially useful for remote & rural areas, that lack the services of specialist Doctors and Consultants. The task of budgeting and financial management of allocated funds can also be delegated to the Nodal Center. In future extensions to this model, the pool of Other Nodes serve as a Reserve pool of Service Nodes and a node in this pool can be converted to a Service Node of a particular type, if the existing patient load on an existing service node exceeds a specified threshold level. Also if the types have to be increased in view of the emergence of new type information, this conversion can be implemented. An outlier analysis can also be done to identify outlier nodes.

3.(b)Banking Sector: The Banking Sector can use this model to plan distribution of services in its network of branches. It can also identify priority branches in terms of revenue generation, demographic social indicators and can also identify critical nodes based on analysis of transaction data.

3.(c)Traffic Management: This Decision Support model can also help in managing road traffic in an area. Thus, based on traffic load, it can identify traffic bottlenecks, pointing to the need for decongestion and road diversions. While a Nodal center can monitor volume and shape of traffic, the service nodes can be used to indicate congestion and also plan new routes.

3.(d)Sales & Distribution: A company can plan its sales and distribution network in an area using this model. The service nodes can be used to estimate demand for specific goods and services. The Nodal center can be used for logistics like storage hubs.

3(e) Delivery of Municipal services: The model can be used to plan the integration of various municipal services in an area. By using the given model, distribution of other services like food distribution centers can be planned. The model can be modified to estimate deficient services and also the quality of services provided. A comprehensive demographic analysis tool can be developed to describe the profile of the given region. Therefore delivery of various other municipal services can be planned for the given region.

5. CONCLUSION AND FUTURE WORK:

In this paper, an algorithm was designed to partition a given region (district) into Nodal Centre, Service Node an Other Nodes. This partition facilitated implementation of decentralized planning which can be used in future to plan the delivery of other municipal services in the region.

Futher, planning of priority services in the region can be done by identifying priority nodes which will be used to deliver priority services in the region.

Further usages pattern of services can be analyzed to verify whether choice of Nodal Centre and other nodes along with service nodes is justified, with respect to service delivery in the region. Data Mining techniques and usage pattern can be accordingly implemented.

Similarly, identification of Service Nodes can be done by Multidimensional data analysis or by grouping load types accordingly. The load types are extensible and generic by definition.

Finally, the scalability of the system can be increased by considering more district /regions, states and maintaining the list of segregated Nodes as meta information for the entire region.

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