

EDUCATIONAL DECISION SUPPORT SYSTEM

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Abstract

Educational Decision-makers need reliable information on schools, students, and other resources. There is need for to provide a decision support system at district and region level which analyze the spatial implications of Education data and enable planning, decision making and monitoring of performance. The Educational Decision Support System (EDSS) aim is to define best location for schools and to minimize the sum distance between students and the schools; the system helps the decision makers to improve policy, planning and monitoring of the educational system.

Keywords: Decision Support Systems.

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INTRODUCTION

Government puts more attentions on the management of education and hardly ever spent much time on studying how to define the service area for each school. Finding the location to establish a new school and maintain them is one of the major tasks.

Most of the NGOs, UN (United Nations) and Government organizations are working to spread education. These organizations need data regarding population, nearby schools, school condition, number of school going children, building condition and standard of teaching. They collect data through field survey, supervised by survey officers. Now, most of the organization needs to use the GIS data for their decision-making process and most of the countries have their own satellite to provide GIS data.

Academic decision making involves broad analysis of large data volumes originating from multiple systems. Our Educations decision system incorporates the data input from relevant sources into a database, while the front-end confirms suitable output

management to the user so as disclose significant details (Vinnik and Scholl, 2011).

Initially for implementing this project we have selected Baluchistan, Pakistan. Baluchistan the largest province in Pakistan by geographical area composes 48% of the total land area of Pakistan, slightly smaller than Norway. The population density is very low due to the mountainous terrain and scarcity of water. In addition, there are total 28 districts (Wikipedia).

There is need for to provide a decision support system at district and region level which analyze the spatial implications of Education data and enable planning, decision making and monitoring of performance.

The following two constraints should be considered:

- One is how to define best location for school's (primary - high) and to enroll students at district level.

- Moreover, the other is minimizing the sum distance between students and schools.

The objectives of our education support system are:

- To provide decision for determining the need of opening another school.
- To provide decision for determining the need of upgrading school.
- To provide decision for determining the need of upgrading school building, increasing classrooms, and other renovation for increasing the quality of education of those schools.
- To provide decision for determining the need of new teacher.
- To decide how many students that the district can produce by ensuring the attendance of teacher and student.

Data acquisition

The most important part of building decision support system is collection of data. We acquire data related to total number of districts and villages, population data, etc. from different sources e.g. [Wikipedia] and from Baluchistan educational foundation [BEF] Pakistan.

A. Data Requirements:

To define the location for each school properly, there are some aspects which should be considered:

- The suitable location to open the school, there is no school in 2 Km² areas for rural and 1 Km² for urban.
- If the population is too high, is there any need to open another school.
- If the literacy rate is too high for few years, the organization has to upgrade from primary to middle, middle to secondary school and so on.
- There is the need to upgrade the building, increasing the classrooms, and other renovation.
- If the population is less, but the school is situated in the distance more than 1 Km.
- Is there any need of new teacher? Teacher might be transferred to other villages.
- By ensuring the attendance of teacher and student, how many students that the district can produce can be decided.

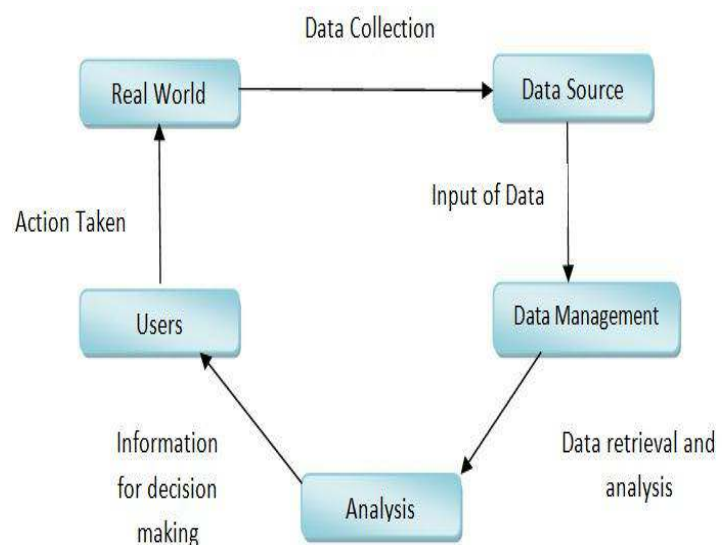
B. Data Source

Definition of school's service area

School's service area definition is very vital. In order to assure that every student will obtain impartial education opportunity and useful study environment. The students will confirm which institute to study.

Optimize and shorten the distance between students and Schools.

The distance between student and school location is one part of the concerned cost to realize the shortest distance. The school should localize proper position of its provision area.



Problem Solution

A four step approach has been followed in order to solve the problem, which has been shown in the Figure 2 given below. First by selecting the target area e.g. the target province/ district where there is a need for school based on the numbers of attributes, which will be discussed later. Similarly, classification of the area is done on the basis of population and furthermore the best possible location is identified. On this basis, the decision for establishing the school has been made finally.

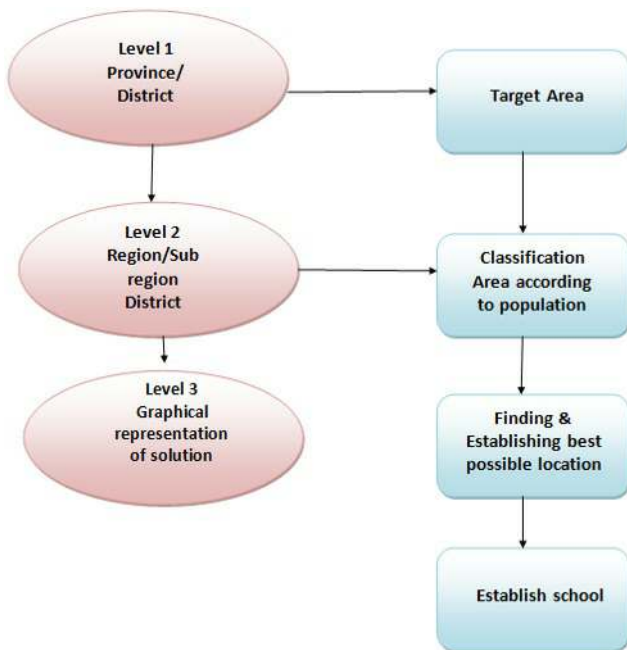


Figure 2 : Solution of Problem

A- Decision support model

A rule-based decision support system (DSS) has been developed according to the requirements of decision support system, where Education support system permits the user to obtain data from the data warehouse and mine it to actionable information. We generated a rule based reports e.g. for schools and for teachers upon input of desired criteria. Development of education support system is followed the architecture shown in Figure 3.

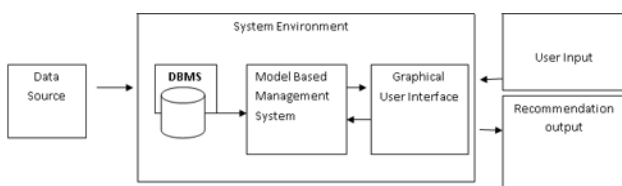


Figure 3: System architecture

A- Rule Based Model

Rule-based models are based on a set of "if – then" statements that embody expert knowledge about education support system. These models are essentially computer codes that represent a hierarchically related rule network defining education support system function. These rule networks form the basic framework for decision-making within the system. To create a rule-based model, expert knowledge about the system is encoded into the software program as a set of rules (if-then statements) on how to

interpret data describing a system. When the model is exposed to new data about the system, it will respond in a similar manner as the expert. This process of encoding expert knowledge is the first step in clarifying understanding of the system. The major advantage of the rule-based modeling approach in this education support system is that it forces the decision-making process to become more transparent, quantifiable, and easily repeatable.

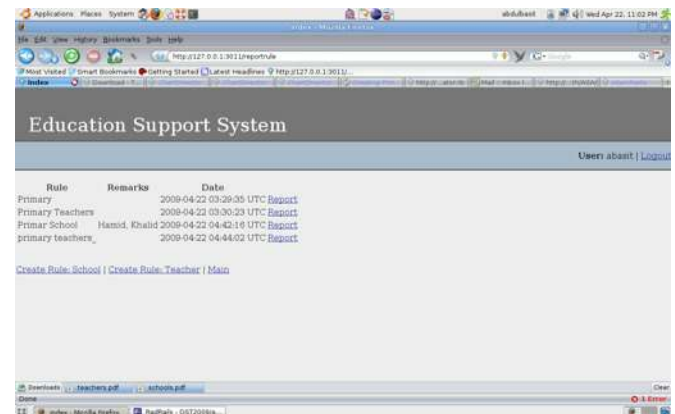


Figure 4: Creating Rule for Schools and Teachers using Rule based system.

Implementation

Data were acquired through various data acquisition techniques, including interviews, questionnaires, site visits, and compilation of location data from published or computer-based sources. The information acquired was then analyzed (Jungthirapanich and Pratheepthaweephon, 1998).

The software modules for realizing the web based education support system were developed using the Ruby on Rails as a front end and Postgre SQL as a database management system. The main page contains the links for input, showing different reports the rule based system and interactive charts for better visualization.

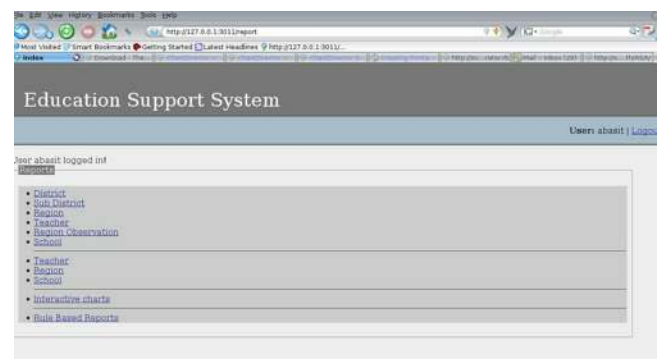
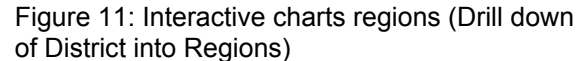
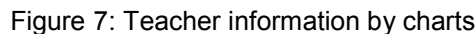
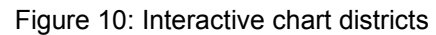
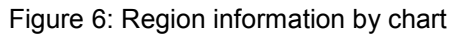


Figure 5: Main page

Figure 9: Rule based school report

An Education Support System makes use of rule-based model and acts as an important tool for decision makers to make decisions like the selection of school location, transfer of the teachers from one region to another. To implement these jobs, our decision support system examines data and identifies the best location through reports and graphical data represented in the form of bar chart, pie charts, etc. Moreover, it also provides data drill down functionality of getting the depth information of each district like viewing the population of each regions under that particular district. In Conclusion the goal is to develop a consistent, actual, and effective system that can be used to support most suitable decision regarding schools and teachers.

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