



School Mapping System Using GIS for Aurangabad City

Sudhir P. Khobragade¹, K. V. Kale²

M. Tech, Dept. of CS & I.T., Dr. BAMU, Aurangabad, Maharashtra, India¹

Professor, Dept. of CS & I.T., Dr. BAMU, Aurangabad, Maharashtra, India²

ABSTRACT: Quality and degradation of education affects more on upcoming youth consequently society as well on nation. Overall these consequences are come in to existing from childhood, thus new generation become inactive and unworthy. All this happen due to education system and inappropriate selection of school for their child. Parents are also not aware about that where and in which school they have to be admitting their child. In India, more than 50% parents admitted their child in nearest school, according to their availability of school. Every year hundreds of people shift their geographical location for their child education and by other service issue too. In India, thousands of parents are worrying about their child education. It is very crucial to have an application to guide and to determine that where to take admission for their child. School mapping may help to such users to determine suitable school and their requirements and priority. Schools in India are located and spread in inappropriate manner by breaking the rules of education board. So, to avoid future conflicts in new establishments of schools and proper management school mapping is an important issue for analysis to Govt. body of education. Mapping of schools according to geographical location GIS plays an important role. This paper gives peoples to an idea to choose best school around the area within the range, which is helpful for society to increase the education standard as well as to make appropriate choices accordingly.

KEYWORDS: School, Mapping, Geographic Information System (GIS), Location Based Services (LBS), Fusion Table

I. INTRODUCTION

Geographical Information System and Geo Imaging technology contributes and helps to planning and decision making process. It is not only visual tool but also a technology which helps to build infrastructure on top of the other information from various perspectives. There are various examples such as multi-criteria analysis for land management. The current trend in modern operation towards flatter structures and the involvement of various stakeholder groups in solving a decision support system [1]. In a developing country with a large and rapidly growing population, faces many challenges and result as slow progress development, socio-economic indicators do not show the positive trends [2].

The contribution of this work is to show a real execution example and thus to share such experience with others. Therefore, discussion and summary of the develop GIS data-model for school mapping planning application in Aurangabad is presented. Most importantly, presentation of the GIS development examples as a major role player in the educational decision support process to facilitate decision-makers in either enlarge current school or suggesting sites for new schools in Aurangabad. This will be used eventually, once all the statistical data are available, for student and resources location/allocation. The outline of the Educational Decision Support System (EDSS) for Ministry of Education, Aurangabad, will combine Geospatial database and other database with modelling techniques to support problem-specific semi-structured decisions while allowing the decision makers to use their practical experience and insight. It is important, to illustrate the importance and usefulness of using Geo-Imagery to help in managing, resolve error-checking and assist in integrating large and small-scale vector data format with the present GIS data model for school mapping planning purposes [1].

The main motivation of this project is to locate all the schools such as English medium schools, CBSE, Urdu medium Schools & Marathi medium schools of Aurangabad City through Fusion Table on Google API. In this paper, the detail information contains vicinity of school i.e. location and website of school if any, contact detail of school, school medium of schools, building of the image, school facilities. Due to that people or parents may get the actual



International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 10, October 2016

information about the schools and choose proper schools for their daughter or son. For making the actual growth of students initially choosing right school is very important.

II. RELATED WORK

School mapping is the science and art of building geospatial databases with relational databases of educational, demographic, economic and social information for educational and schools directorates to support educational planners and decision makers.

In order to do proper planning and to execute, the educational division should not start any project before making available to all involved parties a comprehensive database of all schools, pupils, teachers and resources. Building that part of GIS layers with showing school locations and other notable geographic features such as streets, city-zoning, railroads, school-directorates, sub-districts, districts, governorates & other features would provide an important tool for planners. For example, school mapping can be utilized in Maharashtra to approve proposal for constructing new schools or/and renovating existing schools. Also, it is very important to build the management intake and the staff in general to be capable of utilizing such technology as it is an ongoing process. Furthermore, the data has to be updated regularly.

On the other hand, authorities are of major importance to train and guide, and can be considered as a link between the geospatial database, the stakeholders who are maintaining and/or using the data. Their major role is to ensure an efficient use of available data, models, for developed software and the basic theoretical knowledge. Doing this, will make Education Decision Support Systems available and applicable, and at the same time, will make the Decision makers creative to ensure alternative solutions as they who genially knows the reality & what is considered applicable solution.

The application of Geographical information system in Education involves combining statistical inferences to geographic information. Information in education might be used with GIS to present a clear picture of educational facilities and movements. Ratio of students to teacher, number of students in a class and student density in school, schools supervision in a district to find lack of schools and in time processing education facilities and so on. GIS might be used for supporting educational decisions by senior supervision and how to use statistic for this system [3][2].

II. METHODOLOGY

In this paper, we have covered maximum schools of Aurangabad city and divided it into four different categories. In Aurangabad city, there are more than 50 schools which may be public or private under some educational welfare societies. Population of Aurangabad city is increasing rapidly, it crossed the figure of 1 379 596 [18] that's why schools have to be increased as per need. Our main purpose of this project is to show the maximum schools with their detail information in terms of Latitude, longitude and vicinity by using Geospatial technologies.

The detail information of single school shows the actual location of school which is identified by longitude and latitude. In this project, there are 18 CBSE, 10 English medium schools, 10 Urdu medium schools and 10 Marathi medium Schools and classified into four categories such as CBSE (Central Board of Secondary Education), English Medium School (State Board of Primary & Secondary Education), Urdu Medium School (State Board of Primary & Secondary Education) and Marathi Medium School (State Board of Primary & Secondary Education). Figure 1 shows the actual working of proposed system of this project. We have to use Fusion Table which is cloud based open access data storage repository from where user accesses the information to any projects and to map it on Google API. Two management systems are applied to implement the actual output in this project. According to these management skill people can take decision in their confirm zone.

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 10, October 2016

Table 1: Different colour code system used for different Category of School

Serial Number	School Category	Colour Marker Used for Identification
1	CBSE (Central Board of Secondary Education)	Blue
2	English Medium School (State Board of Primary & Secondary Education)	Red
3	Urdu Medium School (State Board of Primary & Secondary Education)	Orange
4	Marathi Medium School (State Board of Primary & Secondary Education)	Yellow

The table 1 shows different colour code system used for different category of school for identification purpose and it's Very easy to find the schools.

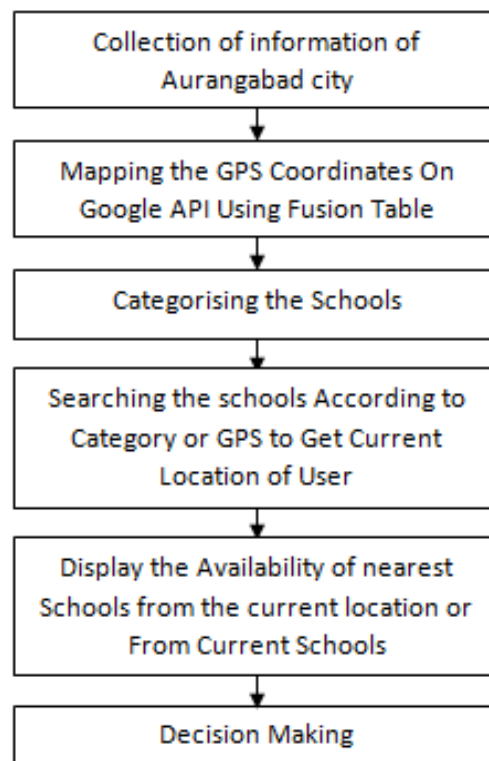


Figure 1: Process Flow Diagram



International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 10, October 2016

III. TECHNOLOGIES USED

In this paper we used following technologies for the development of School mapping application with all the technologies works in their original form. it is important to remember that some technologies are present only in the client (HTML5,Bootstrap,Javascript,JQuery,AJAX), some only in the server (Fusion Table) and some are found on both (JSON).

A. HTML5 AND CSS

HTML5 is used to develop the interface of Google maps with web services and APS from the google.HTML5 is Hypertext Markup Language and 5 is the Version to be used , It supports advanced features and plugins from different updated Browsers like Chrome , firefox etc.

CSS is cascading style sheets used to deal with HTML selectors to make web page interactive [5].

B. JQUERY

JqueryUI is a powerful JS library built on top of JQuery JavaScript library. UI stands for User Interface. It is a set of plug-ins for JQuery that add new Usefulness to the JQuery core library [6].

C. BOOTSTRAP

It is a open source and free front end web framework for designing websites and web applications [7] to develop mobile first web sites. This web application capable to view on mobile platform too.

D.GOOGLE MAPS API

The Google Maps Application Programming Interface allow for the insertion of Google Maps onto web pages of outside developers, using a simple JavaScript interface or a Flash interface. It is intend to work on both mobile devices as well as traditional desktop browser applications. The Application Programming Interface includes language localization for over 50 languages, region localization and geo-coding, and has mechanisms for Endeavour developers who want to utilize the Google Maps API within an intranet. The Application programming Interface HTTP services can be accessed over a assured (HTTPS) connection by Google Maps API Premier customers [8].In this paper we uses Google Maps API to display the mapped places according to filters and make a decision accordingly from user points of view.

E.GOOGLE FUSION TABLE

Google Fusion Tables (or Fusion Tables) is a web service provided by Google for data management. Fusion tables can be used for gathering, conceptualize and sharing data tables. Data are stored in multiple tables that Internet users can view and download [9]. We used fusion table as a database where all the information of schools are stored and these information are fetched using the web services.

F.LOCATION BASED SERVICES USING GIS

Location Based Services hold a number of elements including Google maps and Geographic Information System (GIS) information, geo-location collection services, and LBS application-particular subcomponents. Location Based Service (LBS) is a good platform that facilitates information services based on the current or a known geo-location, supported by the electronic map platform or framework. The geo-location information (latitude and longitude coordinates) of Smartphone end user can be acquire through the mobile communication network or the Global Navigation Satellite Systems (GNSS) [10][16]. Location Based Services (LBSs) facilitate customized services to the holding-customers based on their current geo-position using Global Navigation Satellite System (GNSS), Geographical Information System (GIS) [11], Wireless Communication (WC) technology framework.

Location-based service (LBS) offers customers with data customized by the user's current geo-location, such as the neighbourhood restaurants/hotels/hospitals, which are collected from a spatial database stored remotely in the Location Based Services server. Location Based Services not only perform for individual Smartphone end-users, but also act as an key role in public safety, transportation facility, emergency response unit, and disaster management services. With an increasing amount of mobile devices featuring built-in Global Positioning System (GPS) technology, LBS have experienced rapid growth in the past few years onto the Smartphone users [12][14].

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 10, October 2016

G.GOOGLE DISTANCE MATRIX SERVICE

Google's Distance Matrix service computes travel interval and journey duration between multiple origins and destinations using a given mode of travel.

This service does not recur detailed route information. Route information, including poly-lines and text based directions, can be obtained by passing the desired single origin and destination to the Directions_Service [13].

A Google Maps Distance Matrix API requests the following form:

<https://maps.googleapis.com/maps/api/distancematrix/outputFormat?parameters>

Where *outputFormat* may be either of the following points:

- JSON, indicates output in JavaScript Object Notation (JSON); or
- Xml Specify output as XML.

IV.EXPERIMENTAL WORK

A.DATA COLLECTION

The GPS Data (Latitude and Longitude) of schools are collected along with detail information of the categorized schools to develop the database. Database of school information consist of name of school, address, zip, phone, grade, grade boundary, type of school, classification, rating of the school, growth, attainment, culture, medium etc. we collected 45 different school information and mapped them onto Google maps along with required information. Total 29 attribute table we used to deal with schools information and all are in its original form.

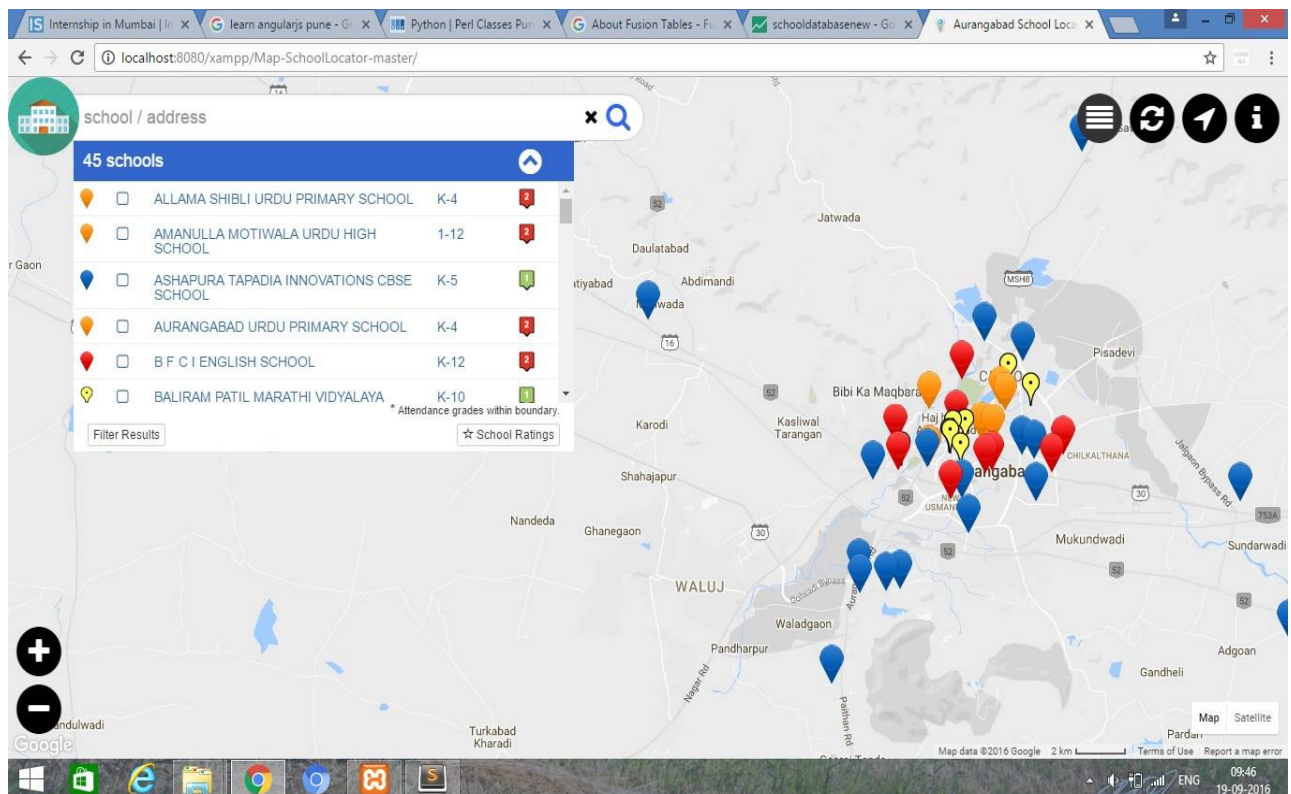


Figure 2. Aurangabad City School Mapping System

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 10, October 2016

B. WORKING FLOW OF GUI

We designed a GUI for school mapping system for someone who wants to get information about nearest school from the location of his location or from selected areas by mapping the major category of the schools around the selected areas using GIS Location based services and Fusion table web services. We don't imported Google maps into our system, we registered with key and uses the services and custom the maps, add few labels onto web system so that it is user friendly for the peoples to handle.

- Display Schools: once clicked on the magnet it displays all the mapped schools in the Aurangabad city. No filters where applied.
- School Category: filters are applied here to display category of schools like CBSE, English, Urdu, and Marathi Schools in Aurangabad city. This Category is for Parents who want to know the information of school to take the admission within area.
- Performance Rating: All schools are mapped with ratings i.e. for what kind of school is , so that it's good for parents to make a decision for taking the admission in school according to ratings and response for the school from students and feedback from students or parents.
- School Classification: This category is used to check whether schools is of type Character (Local Type), Citywide (Have Branches in different cities) and Worldwide (Have branches worldwide). This category also helpful to make decisions to increase the quality of education in society.
- Neighbourhood Schools: This category gets the nearest schools from the current location of the user. This feature helpful to get for the parents to decide best schools around the distance. In Current system it locates all the mapped schools as it selects 10 miles of distance as neighbourhoods search. User point with marker on current location he can visually find and get the current location or have some filtering to get the exact match that he wants to admit his kid to the school.
- Compare Schools: This feature is very useful to compare the information of schools according to the perfect needs like the attributes number of students, the rating of the school, number of teachers, type of the school whether it is citywide, character, worldwide ,category of the school, contact number etc. As we see in daily life when you are buying any product we compare it with the others, so considering these aspects it is also useful to select the appropriate school for their child.

V.RESULT ANALYSIS

As our motivation is to develop the education system, so that we develop the system which filters the schools according to the user need. In analysis we concentrate on three parts, first is we discuss the nearest schools within the miles from the location as well as from the current location as shown in figure 3. Second we will discuss distance from the school to the location of the user, with the help of Google maps we get the distance of schools from the current location. Google uses distance matrix to calculate the distance in KM and third case we discuss how compare schools strategy will help to choose the appropriate school to get the admission.

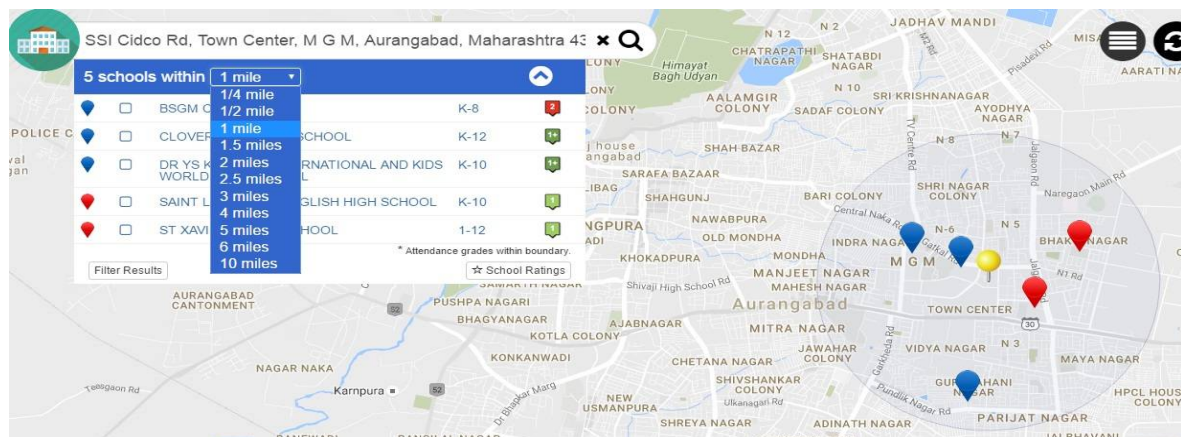


Figure3. Schools within the 1 mile from the location (Current location)

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 10, October 2016

We consider the first case where we get the schools from the location whether it is current location of the user or from the mapped schools. Here we consider the strategy of MRSAC master plan to provide education to each school going child based criteria- (a) Primary education facility in 1 km vicinity. (b) Upper primary education facility in 3km vicinity. (c) Secondary Education facility in 5km vicinity [17].

We consider the same strategy for the Aurangabad city, for that we choose 3 road address from where we display the number of schools present.

Table2. Schools from Cidco area

Address	School Type		
	Primary (under 1 mile=1.6km)	Upper Primary (under 2 mile=3.2k m)	Secondary Schools (under 3 mile=4.8km)
Cidco,Aurangabd,Maharashtra,India	2	6	11

In Aurangabad city some schools are from K-10,So we categorize it into Upper primary schools rather than add both onto primary and upper primary similar with some schools are from K-12 we categorize it into Secondary schools rather than add separate into primary ,upper primary and secondary. If no primary schools are in 1 mile range and we got the results of primary, upper primary and secondary schools which included for primary education we put that result into the results.

Table3. Schools from chawani area

Address	School Type		
	Primary (under 1 mile=1.6km)	Upper Primary (under 2 mile=3.2k m)	Secondary Schools (under 3 mile=4.8km)
Chawani, Shantipura, Padegaon, Aurangabad, Maharashtra 431002, India	4	15	11

These are the number of schools within the vicinity; we can filter the results from the school type to CBSE, English, Marathi, Urdu category.

Table4. Schools from New Usmanpura Area

Address	School Type		
	Primary (under 1 mile=1.6km)	Upper Primary (under 2 mile=3.2km)	Secondary Schools (under 3 mile=4.8km)
New Usmanpura, Aurangabad, Maharashtra, India	9	18	14

Now we consider the second case here we calculate the distance from the current location/required location to the school which we selected to calculate the distance, here we have included the directions button on list of school information display page, once user clicked he get the distance from school to the required place with the help of Google maps, from figure 4, user get the location form search location to required school.

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 10, October 2016

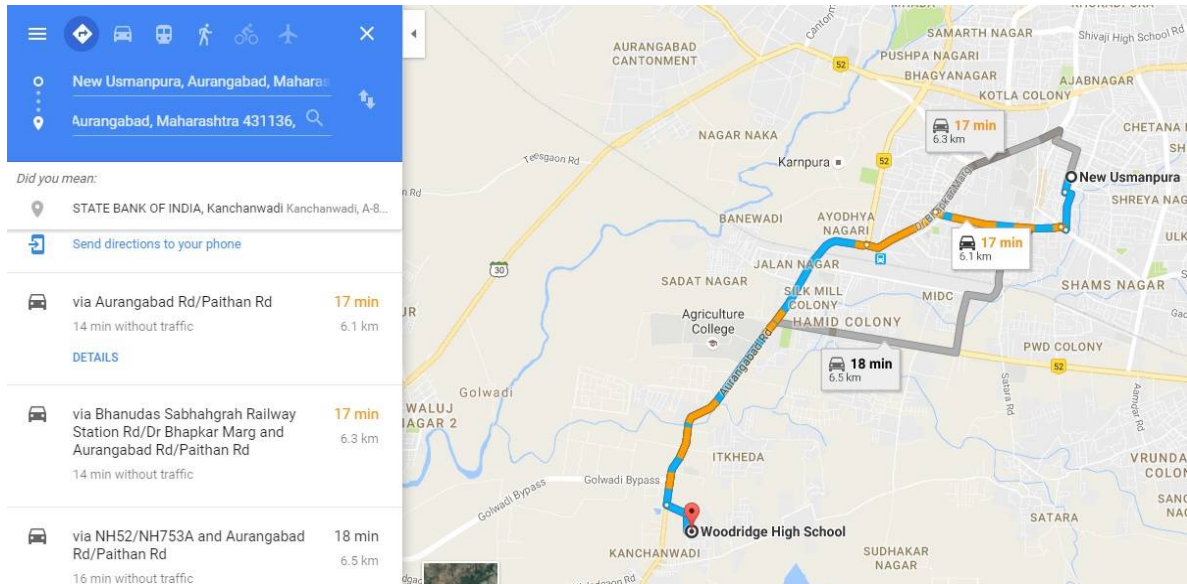


Figure4. Distance from new Usmanpura(Search location) to selected school

Last we compare the schools from the location, which is really helpful for the parents to choose the best school for his child. For comparison we filter and display some important attributes which are display on table 5.

Table5. Comparisons of attributes to decide best school for children

Attribute	Description
Name	Name of the school
# of students	Number of students in schools, which includes the entire category.
Rating(Grade)	Current rating from the feedback of students, standard and the facilities provided to improve the education future. We declare grades as (level 2, level 1 and level 1+ etc).
Reading	Have library in schools or not.
Growth	Depends upon the admissions
Dress code	Have dress for the schools or not.
Mobility	Mobile phone allowed or not.
Classification	Whether school is local, citywide or worldwide.
Programs	Program activity for students.
# Of Teachers	This attribute helpful to decide the number of student: teacher ratio for the area.
Reputation of School	This field display reputation of school by considering past 3 years performance. We declared this field in terms of i.e. Excellent, Good, Average, Poor etc.



International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 10, October 2016

VI. CONCLUSIONS

This paper gives an idea about mapping of different categories of schools, so that which is helpful for user/parents to choose the right school for his children providing different filters which is new idea for the smart city development.

It has the ability of mapping on the desktop through graphical display and manipulates the data. GIS applications have a particular relevance since they show firstly, that the technology has direct application in education planning, and also that the results of the spatial and attribute data analysis is having a direct bearing on the kinds of decisions being made.

GIS Location based services provide information to mapped onto the maps with the help of fusion table API and Google maps API, which is a new technology to fuse the table with information, using this we can update the information in future in case we want to add some schools dynamically, so system will gives more information for the users to choose the good schools and compare the results.

From the paper we conclude some of the things that schools are not properly mapped in the cities according to the MRSAC smart city strategy, so that in future development we can consider these aspects and develop the schools accordingly.

In future as mentioned in paper we make this system to record the admissions for the peoples around the areas for their children's. It is good for them to get admissions in neighbourhood areas, I this way a complete smart city School mapping system will we can develop.

ACKNOWLEDGMENT

The authors would like to acknowledge and thanks to University Grants Commission (UGC), India for granting UGC SAP (II) DRS Phase-I & Phase-II F. No. 3-42/2009 & 4-15/2015/DRS-II for Laboratory facility to Department of Computer Science and Information Technology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra, India and financial assistance under UGC -BSR Fellowship for this work.

REFERENCES

- [1] Thomas Blaschke, Geoffrey J. Hay, Qihao Weng and Bernd Resch, "Collective Sensing: Integrating Geospatial Technologies to Understand Urban Systems" 3(8), 1743-1776, 2011.
- [2] Population, Growth, trends, projections, challenges: planningcommission.nic.in/reports/wrkpapers/wp_hwpaper.pdf" [Accessed : 16 August 2016].
- [3] Okan Eray "Application of Geographic information System in Education." Journal of Technical Science and Technologies (JTST), 1(2): 53-58, 2012
- [4] JQuery Mobile "https://jquerymobile.com/" [Accessed: August 16, 2016]
- [5] <http://www.tutorialspoint.com/html5/> [Accessed: August 16, 2016]
- [6] <http://www.tutorialspoint.com/jqueryui/> [Accessed: August 16, 2016].
- [7] <http://www.w3schools.com/bootstrap/> [Accessed: August 16, 2016]
- [8] <http://www.programmableweb.com/api/google-maps> [Accessed: August 27, 2016]
- [9] https://en.wikipedia.org/wiki/Google_Fusion_Tables [Accessed: August 27, 2016]
- [10] Q Ren, M. H. Dunham, Using Semantic Caching to – Manage Location Dependent Data in Mobile Computing, In the 6th Annual International Conference on Mobile Computing and Networking, Boston: ACM Press, 2000, pp.210-222.
- [11] Li Zhigang; Liangtian; Yang Wunian, "Research of GIS-based urban disaster emergency management information system," Computer and Communication Technologies in Agriculture Engineering (CCTAE), 2010 International Conference On , vol.2, no., pp.484- 487, 12-13 June 2010.
- [12] Kumar, S.; Qadeer, M.A.; Gupta, A., "Location based services using android (LBSOID)," in *Internet Multimedia Services Architecture and Applications (IMSAA), 2009 IEEE International Conference on* , vol., no., pp.1-5, 9-11 Dec. 2009.
- [13] <https://developers.google.com/maps/documentation/javascript/distancematrix> [Accessed: August 27, 2016]
- [14] Swapnil R Rajput, Mohd Sohel Deshmukh and Karbhari V Kale. Article: Cross-platform Smartphone Emergency Reporting Application in Urban Areas using GIS Location based and Google Web Services. *International Journal of Computer Applications* 130 (12):27-33, November 2015. Published by Foundation of Computer Science (FCS), NY, USA.
- [15] Ioannis A. Pissourios "Developing new educational facilities in cities or large municipalities using GIS: a case study in Thessaloniki, Greece" *International Journal of Arts & Sciences (IJAS)*, 4(16): 65–73 (2011).Greece" *International Journal of Arts & Sciences (IJAS)*, 4(16): 65–73 (2011).



ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 10, October 2016

- [16] Nedal Al-Hanbali , Reem Al-Kharouf , Mohd Bilal Alzoubi, "INTEGRATION OF GEO IMAGERY AND VECTOR DATA INTO SCHOOL MAPPING GIS DATA-MODEL FOR EDUCATIONAL DECISION SUPPORT SYSTEM IN JORDAN", Commission II, WG II/5 – Design and Operation of Spatial Decision Support Systems.
- [17] MRSAC School Mapping Infrastructure Mapping: <http://www.mrsac.gov.in/en/projects/infrastructure-mapping/school-mapping> [Accessed: August 16, 2016].
- [18] <http://population.city/india/aurangabad/> [Accessed: August 16, 2016].