

APPLICATION OF GOOGLE API WITH JAVA SCRIPT FOR WEB MAPPING OF SHIVAJI UNIVERSITY CAMPUS (MS)

Dr. Pradip Ashok Saymote¹, Mr. Abhijeet Patil²

¹Assistant Professor, Department of Geography, Shivaji University, Kolhapur, pas_geo@unishivaji.ac.in

²Student, P. G. D. Geoinformatics, Department of Geography, Shivaji University, Kolhapur

Abstract— Application Programming Interfaces (APIs) is used to develop several kinds of applications. By Geoinformatics perspective there are different kinds of well-known APIs in the market i.e. Google Maps, Open Layers. The present study is an attempt to apply the Google API with Java script for web mapping of Shivaji University. The data used in this study is vectorized spatial features of university campus (i.e. department, buildings, roads, water bodies, Hostels, etc.). The essential attribute information of spatial features is attached to shape file. In initial phase the base map of study and spatial features available at university campus are mapped. The code available on Google Map API is taken and using Microsoft visual web developer 2010 express, scripts are generated. The Microsoft visual web is utilized to create the forms and design of actual mapping representation.

Keywords—Google API, Java Script, Web Mapping, Geoinformatics, Shivaji University Campus

I. INTRODUCTION

The development of web applications is often supported by Application Programming Interfaces (APIs) which is having good capability to development several kinds of applications. An API is typically used by programmers, but it can also be used by domain experts who occasionally may play the role of programmers in the development process. While selecting among competing APIs, user is interested for an API that improves the productivity of programmers, through usability. There are three well-known APIs available in market i.e. Google Maps, Open Layers and Arc GIS by Geoinformatics perspective. These APIs are concern with commercial, academic and GIS aspects with map. The present study is an attempt to apply the Google API with Java script for web mapping of Shivaji University, campus.

II. AIM AND OBJECTIVE

The aim of this study is to understand the application of Google API with java script and its utilization for Shivaji University campus. The related objectives are:

- To understand the functions of Google API and Java Script for GIS Web Mapping
- To develop web application for mapping of Shivaji University Campus

III. STUDY AREA

Shivaji University is situated in south eastern edge of Kolhapur city; which is in Karveer tahsil of Kolhapur district. It is one of the rural universities in Maharashtra. It is extended within the 16°41' to 16°39'N latitude to 74°14' to 74° 16 E longitudes. The campus is spread over 345 ha. area. The Shivaji University campus is rich in terms of bio-diversity, infrastructure and other related aspects.

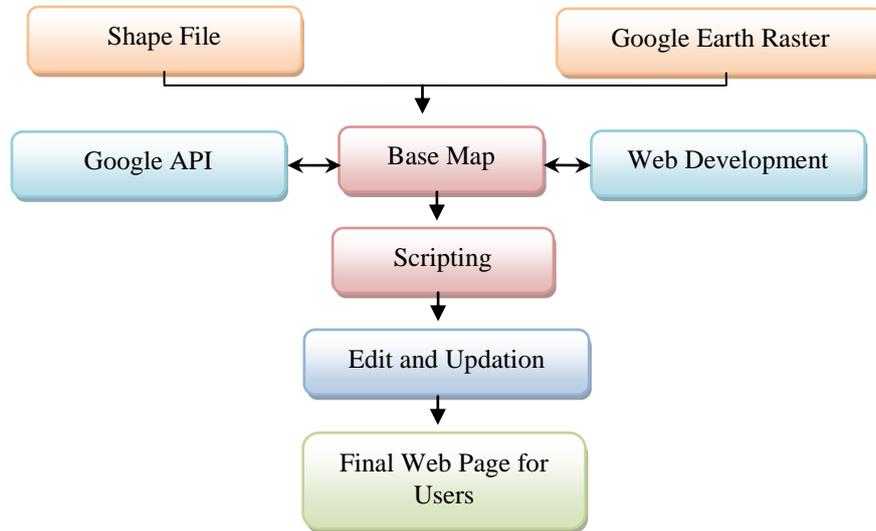
IV. DATA

The data used in this study is very limited i.e. for base mapping. Vectorized spatial features of university campus (i.e. department, buildings, roads, etc.) are also used. The attribute information

of spatial features is collected. The use of available code and script of Google API and Java Script is also made systematically.

V. METHODOLOGY

In initial phase the base map of study area is prepared with spatial features (department, buildings, roads, water bodies, etc.). The use of high resolution satellite dataset is used for mapped of features. The essential and specific attribute data is tabulated and attached to spatial features.



The code available on Google Map API is taken and using Microsoft visual web developer 2010 express, scripts are generated. The Microsoft visual web is utilized to create the forms and design of actual mapping representation. Finally, the derived output is made available for its use.

VI. LITERATURE REVIEW

The web-based GIS application can be classified into two categories. The first category is Web-based Public Participatory GIS (PPGIS), which employs a "Bottom-up" approach (Talen 1999). The "Bottom-up" approach enables the users with GIS tools to communicate their perception systematically. It aims to empower the grassroots through providing more accessible public information and opening available channels for response. Public Participation GIS (PPGIS), in some literature, is also referred to as Community GIS, bottom-up GIS with the similar objectives of extending GIS capabilities to benefit much broader social groups (Obermeyer 1998). Another category is Web-based GIS systems designed specifically for government agencies to assist their routine work associated with spatial decision-making. In recent years, this technology has been used in semi-public and private applications also. Nowadays, many researchers are utilizing PPGIS and WebGIS as an effective online tool for several applications with enhanced GIS capabilities.

Barndt (2002) explains that access to comprehensive information is limited for communities; therefore, support in the use of online GIS tools is important. Carver and Evans et al. (2001) discussed many benefits of online participatory systems such as no location restriction for planning meetings, high accessibility of information, and anonymous participation.

Kingston (2000) revealed another advantage of a Web-based system, which is the dynamic update of the database. However, there is often a lack of decision-making tools available in these systems, and there are not many fully implemented examples in the literature. Choi (2005) revealed the benefits of using open source software MapServer in the implementation of a Spatial Decision Support System (SDSS) which can be helpful for watershed management decision-makers.

Lu (2005) explored the potential of implementing a browser independent health emergency Web based GIS system to visualize health surveillance data. Web-based applications like these indicate that more sophisticated functions, if implemented in an effective and efficient way, could largely improve the depth and extent of user participation and therefore benefit online democratic process at large (Wei Chen, 2009).

VII. UNDERSTANDING OF GOOGLE API

7.1. What is API

API is a computer programming system which termed as **application programming interface (API)**. It is used for computer operation, input and outputs as a software component. API is used to see the location of things, to search for the position of an address, to get driving directions, and to do numerous other things. Google API is one of the most popular API on the Internet. Applications and web sites that are combining data or functionality from two or more sources are commonly referred to as *mashups*. The term API can mean many different things. Sometimes it means hardware APIs, or the Java API or various other technical incarnations.

7.2 History of API

Google Maps was introduced in a blog post on Google in February 2005. It revolutionized the way of utilizing maps on web pages. Initially the map solutions were expensive and required special map servers. Google Maps was originally developed by two Danish brothers i.e. Lars and Jens Rasmussen. They cofounded 2 technologies and start a company dedicated to creating mapping solutions. The company was acquired by Google in October 2004, and the two brothers then created Google Maps.

7.3 How does it Work

There is dynamic nature of Google Maps, it is just HTML, CSS, and JavaScript working together. The API is basically consists of JavaScript files that contain classes with several methods and properties that can use to tell the map how to behave and how to use.

7.4 Different Types of API

There are many types of APIs for different operating systems, such as:

- 7.4.1 Most operating environments, such as MS-Windows, provide an API so that programmers can write applications consistent with the operating environment.
- 7.4.2 APIs are also specified by websites. For example, Amazon or eBay APIs allow developers to use the existing retail infrastructure to create specialized web stores.
- 7.4.3 Third-party software developers also use Web APIs to create software solutions for end-users.

7.5 What is Google API

Google APIs is one of the best programming in the world. It is a set of APIs developed by Google which allow communication with Google Services and their integration to other services. It is also used in the form of Search, Gmail, Translate or Google Maps. The APIs provide various functions such as analytics, machine learning as a service. It is also used to access the user data. Another important example is an embedded Google map on a website, which can be achieved using the Static maps.

7.6 Aspects / Functions of Google API

The API programming consist many functions. The overlay operations of objects are bound on the map that has latitude/longitude coordinates.

Google Maps has several types of overlays:

- Marker - Single locations on a map. Markers can also display custom icon images
- Polyline - Series of straight lines on a map
- Polygon - Series of straight lines on a map, and the shape is "closed"
- Circle and Rectangle

- Info Windows - Displays content within a popup balloon on top of a map
- Custom overlays – As per the requirement and specification of applying users

VIII. GOOGLE API AND WEB MAPPING

Web-based GIS applications using API have advantages over PPGIS in ways that

- (1) Consistent support is available from beneficial agencies during the whole life cycle of the system,
- (2) Users of the system are relatively well trained with a better GIS knowledge and
- (3) More sophisticated GIS functionalities can be added to facilitate decision-making process. Many of these applications emerged in recent years when new web technologies are being widely adopted. Hence through this study the application of Google API is examined.

8.1 Scripting of Spatial Features

The Google API application is having various supporting material. The tutorial, manuals are assisting the programmer in proper direction. There are several supporting material on internet which is having instructions, raw scripts as well as video libraries.. New user can download the scripts and with necessary modification it can be used for different projects. Using these scripts the spatial features of Shivaji university campus are customized and web application is developed. The samples of different layers of point, line and polygon are created for web mapping are given below.

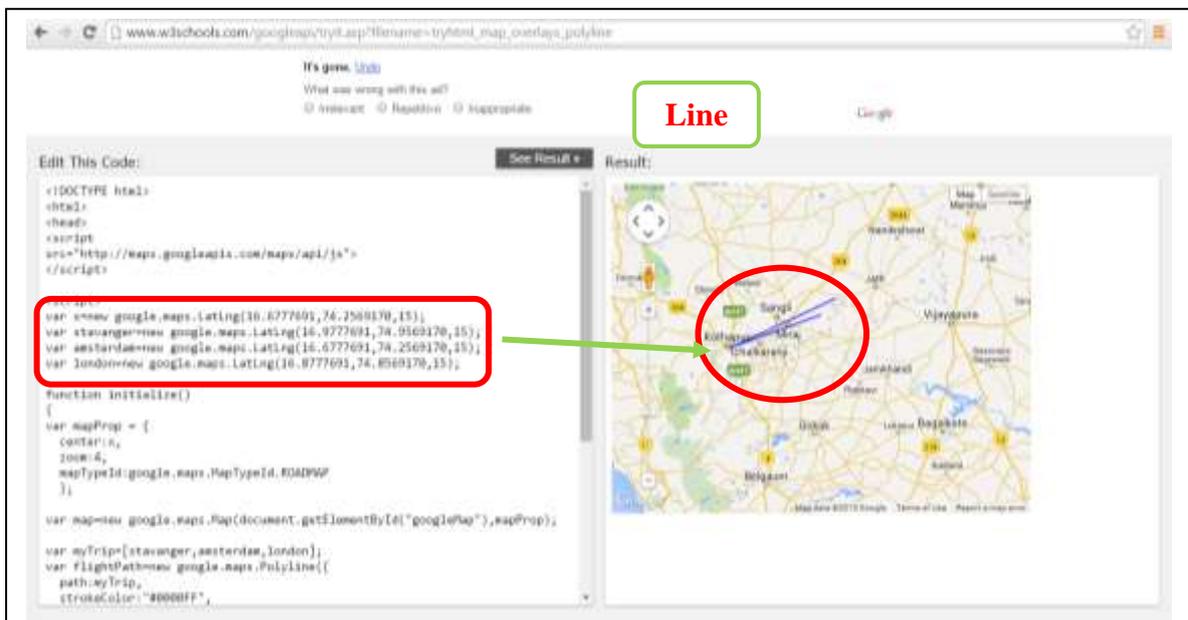


Fig.1 Scripting of Line Feature

8.2 Base Map for Application

The base map is very essential to represent the base information of respective locality. To develop the applications Google is providing base maps and the users are utilizing it by different ways. These base maps can be plane raster satellite image or hybrid of raster with its attribute. Fig.5 represents the base map view (satellite image) of main administrative building at the university campus.



Fig.2 Base map with Satellite Image View

8.3 Tools and Methods for Application Development

There are several development supporting tools available on internet with which the scripting can be made systematic with less efforts. These are also useful for the understanding of scripting. In this study the use of w3schools forum is made systematically for all possible aspects.

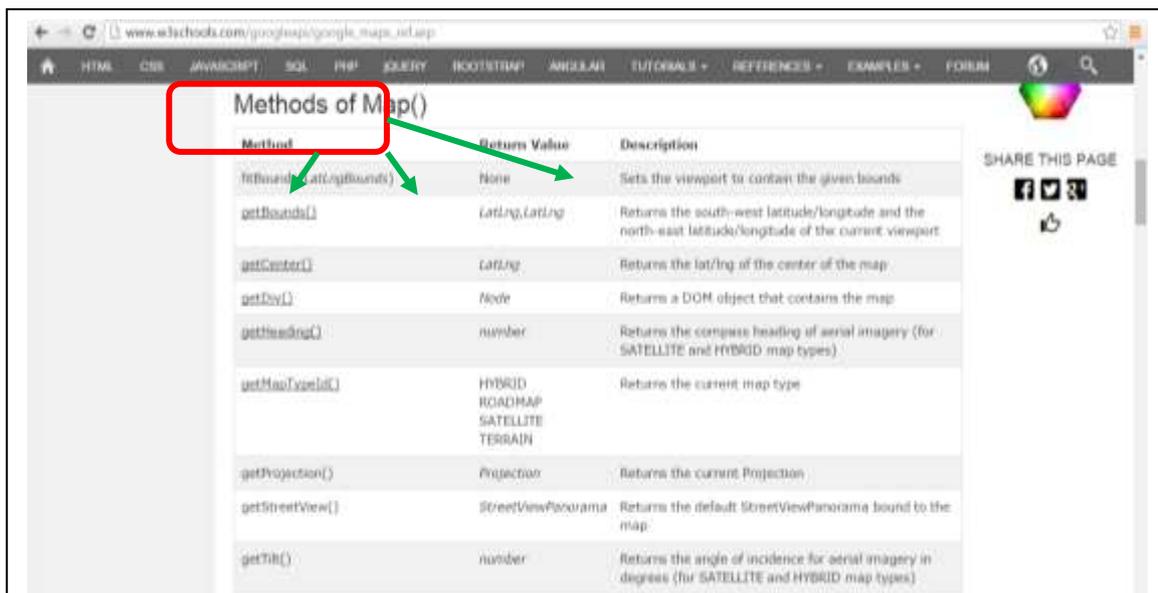


Fig.3 Methods for Scripting

IX. MAPPING OF UNIVERSITY CAMPUS

The web mapping applications are customized to display the tagged information. This customized application of Shivaji University will be useful at various levels. Particularly it will be supporting to students and visitors associated with this campus. It representation the spatial features in campus with the virtual representation effect. With this application basic essential analysis can be performed. The mapping of spatial features and displays its attribute data is a simple function. If user click on building then popup window will appear with attached information. To get the clear idea about surrounding base map of Google satellite image is utilized. The departments, hostels, canteens and other buildings in university campus are well connected with roads. These roads are further

utilized for navigation purpose. The navigation is routing between two points as per the source and destination given by user. The shortest path analysis is carried out which helps the user to reach particular destination through optimum route in minimum time. To demonstrate the functionality of developed application few snaps are taken and illustrate in below section.

9.1 Departments

There are several post graduate department located at university campus. These all are located at different part of the campus. Figure 7 represents the view of these departments. Most of the departments are located around central administrative building.



Fig.7 Department Location Base Map

9.2 Raster Base Map

The base map of Satellite Image is important to understand the real scenario of that department. Figure 8 is the pictorial representation of university campus.



Fig.8 Base Map of Satellite Image (Real View)

9.3 Roads and Other Features

The roads are main infrastructural connecting departments, buildings each other. Fig.9 represents the road network available at Shivaji University campus.



Fig.9 Base Map View of Other Features

X. NAVIGATION AND ANALYSIS

In this section the click base information system, network analysis and navigation / routing analysis is carried out. The essential information pertaining to respective building is attached; if user clicks it then respective attribute information will be displayed on screen. The scripts are written to get the direction for a user from one place to another. This tool is useful for the visitors coming to university campus. Using internet one can access the detail information and routing in the campus.

10.1 Click Base Information System

The university is having quite big campus. It is functioning as head office for all graduate and post graduate colleges. Each year several students and staff are visiting this campus for numerous reasons. The person who is visiting first time to this campus may confuse about the location of particular departments and offices. This application will be supporting many users though internet. This study is an attempt to implement the Google API and Java Script for web mapping. Hence still there are some lacunas and limitation which will be improved in coming days and this task will be enhanced with greater capabilities.

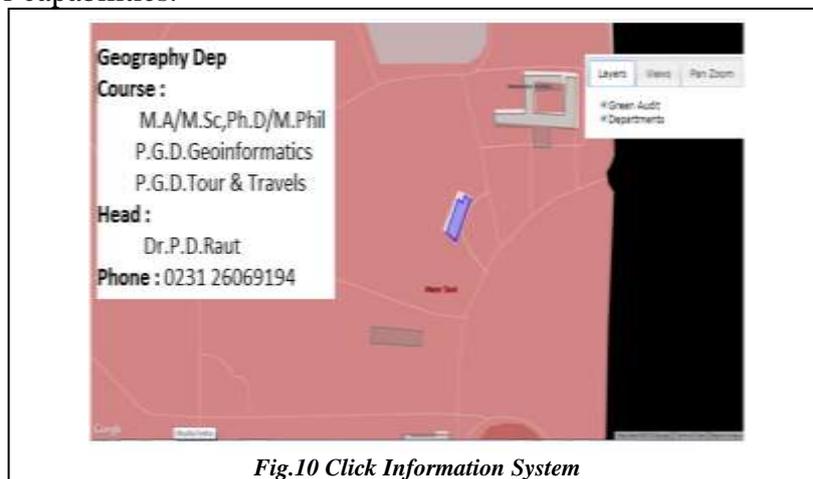


Fig.10 Click Information System

10.2 NAVIGATION / PATH ROUTING

The navigation or path routing is guiding a path to user from one destination to another. By using this tool one can find the desired location through optimum navigation route. This will lead to fulfill the respective task without wasting time. In this phase this work is restricted with university campus, but in coming days it will be generated for entire jurisdiction of Shivaji University i.e. Kolhpuar, Sangli and Satara district.

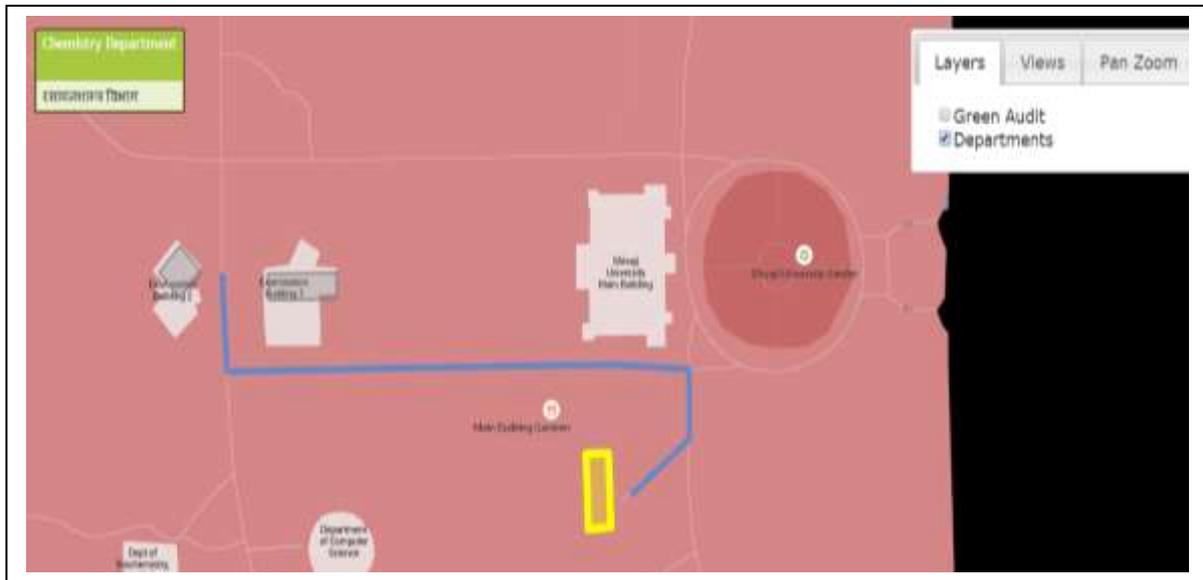


Fig.11 Navigation and Routing on Theme



Fig.12 Navigation and Routing on Satellite Image

XI. CONCLUSION

In this study the Google API is used to web mapping of Shivaji University, Campus. The Google API is not having enhanced layer management but it support very good to geo-coding. In fact it is the best source for the beginners and providing good platform for customization. The present study is outcome of initial attempt of customization and development. In coming days this

task will be enhanced further and conduct a study to evaluate the usability of Maps APIs with mobile devices.

The present study is technical and its results are objective in nature. But overall study reveals that the map identifier is useful tool to display the basic information about the spatial feature. The basic information such as name of building, provided main courses, contact information, etc. is display. This is very much useful to new user.

The shortest path analysis is useful tool is given here to get the shortest route in two buildings in the university campus. By using this tool one can get the short path to achieve the desired destination. In short the Google API with Java Script is very much competent for web mapping.

REFERENCES

- [1] S. M. Metev and V. P. Veiko, Laser Assisted Microtechnology, 2nd ed., R. M. Osgood, Jr., Ed. Berlin, Germany: Springer-Verlag, 1998.
- [2] J. Breckling, Ed., The Analysis of Directional Time Series: Applications to Wind Speed and Direction, ser. Lecture Notes in Statistics. Berlin, Germany: Springer, 1989, vol. 61.
- [3] S. Zhang, C. Zhu, J. K. O. Sin, and P. K. T. Mok, "A novel ultrathin elevated channel low-temperature poly-Si TFT," *IEEE Electron Device Lett.*, vol. 20, pp. 569–571, Nov. 1999.
- [4] M. Wegmuller, J. P. von der Weid, P. Oberson, and N. Gisin, "High resolution fiber distributed measurements with coherent OFDR," in *Proc. ECOC'00*, 2000, paper 11.3.4, p. 109.