

Design and Implementation of GIS Application Aimed on Higher Education Information Dissemination

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Abstract-India has second largest population in the world with count of over 1.25 billion people. Higher education system in India is largest in the world. It is estimated that 34.6 million students have enrolled for higher education in the year 2015-16. There are 799 universities across India. The colleges and Stand-alone institutes in India are 39071 and 11923 respectively. The Government of India carries out survey to gather statistics on a large number of parameters and prepare database on Higher education system. Sharable and non-sensitive data is made available on the Open Government data platform in machine readable format. It facilitates community participation for further development of the product with Visualizations, APIs, Alerts, etc. This project is to design and implement geographic information system by using popular web-technologies and google map services for higher education information dissemination for public consumption.

Keywords-Geographic Information System, Higher Education, Web Technologies, Google Map services, Open Government Data, All India Survey on Higher Education

I. INTRODUCTION

Higher Education system in India is one of the largest education systems in the world. Thousands of students apply for the college/institutes and universities every year. Getting prior firsthand knowledge about the college/institutes and universities one would like to apply is very important. The cost of education in India is very low as compared to other nations. There are some institutes which provide world class education. In Indian education system, there is 10 years of primary education followed by 2 years of higher secondary education. One can opt for higher education only after successful completion of 10 or 10+2 stage. Three years of degree course in case of liberal arts, for most professional degree courses the duration is four years to six years. After degree course one is eligible for master degree course which is usually of two years duration. After successful completion of master degree course one can prefer research degree which is of minimum two years of duration. Apart from degree courses numbers of diploma and certification programs are available in universities. Some of these programs can be undergraduate that is after primary education or higher secondary education while others are postgraduate programs that is after

completion of degree course. These programs can be of duration ranging from one year to three years. For development of higher education a number of professional, regulatory bodies and councils are in place. Cost of lifestyle in India is quite inexpensive. Weather of India can be divided into three seasons. Summer season is from February to May, rainy season is from June to September and winter season from October to January. Hindi is the national language of India. Different languages are spoken in different states of India. The main medium of instruction for most of the courses is English. [1]

Since the introduction of internet for public use, tremendous growth has happened in the field of internet. Many technologies have evolved over the years that made internet a household term. Many website are available for information interchange. This project is about GIS [2] website that gives information about the institutions that is providing higher education in India. The website also performs geotagging of institutes and also provides direction to the user to reach destination institute.

II. LITERATURE REVIEW

If you want to get information about the university and the courses available there you will visit the website of that university. These sites also give the list of college/institutes that are affiliated to it, if applicable. [4-24] For getting detail information about the college/institute you will have to web search for the college/institute name, find it's official website if available, and visit that website. The college/institute website indeed gives most of relevant information about the courses they offer but still some details they don't provide like the number of student studying in their college/institute, exam result, location on the geographic map and list of faculties available. This is the case with most of the college/institute websites. Also if you have to travel to any college/institute you have to make use of the most popular android app Maps from google. [25] In this app you have to give the destination location then it gives the route from your current location to the destination. There is need of one stop destination website which will serve all these purposes. The website that will give data regarding Basic Information, Hostel Information, Departments, Teaching Staff Details,

Teaching Staff Summary, Student Enrollment for Regular Courses, Examination Results, Infrastructure and also give route to reach destination college/institute.

Study Area of project includes all universities, colleges and institutions on mainland of India which extends between $8^{\circ} 4'$ and $37^{\circ} 6'$ North Latitude and $68^{\circ} 7'$ and $97^{\circ} 25'$ East Latitudes.[26]

III. METHODOLOGY

The project is about design and implementation of website. The end product of the project is the software. Therefore a software development life cycle- Big Bang model is followed for managing the implementation work. The resources were limited and the project is small. The requirements were incorporated as they were identified. The main focus was on coding and delivering final product. The software module was tested when they were ready. If a bug is found the module is tested individually. Modules are integrated when they were functionally ready. Detailed planning is not required. The expenses occurred during project development are less. The process was very flexible and adaptive to the changes and ideas. Modules are easily managed as they are operative at individual level independently. Some of the disadvantages of following this module were also identified. During the initial phases of development a module consisting of forms was developed to collect information which was scraped as it was not required later. Had this project been lengthy it would have been difficult to track. [27][28][29][30]

IV. EXPERIMENTAL WORK

There are few terminologies associated with the data used. These are National Data Sharing and Accessibility Policy (NDSAP), four star web data and Open Government Data (OGD). It is important to understand these concepts before moving to data.

NDSAP policy is adopted by the government of India to make data owned by government available to public easily. Government through various mechanisms collects lots of data that can be used for social development by data analyst, scientist, researchers and key stakeholders. The policy dictates proactive disclosure of non-sensitive sharable data which can be documents, charts, images, maps, facts, figures, tables etc. available with various departments / organizations of Government of India. The data is available in human and machine readable format. Policy provides access to government owned data. This facilitates the use of public resources for the community benefit. There are multiple

bodies which collect similar data. With a common sharable database and reuse of data collected there is no requirement to collect data separately there by reducing the cost and efforts. Use of common standards for collection and transfer of data will make integration of data simpler and easy. Data and information available help to make good decisions on various aspects of developmental work. [31]

Data used in this project is four star web data. Open data that means it has open licence, it is structured data which can read by machine, it is available in non-proprietary format (e.g. CSV), Data store APIs URL are provided which make data presence in the web, four star web data can be stored locally, transferred to other system, data can be shared with others, can be processed, aggregated, perform calculation and visualise it, can be converted to another format, manipulate it, link the data, reuse parts of data, data can be safely combined with other data. Publication of web data is simple. Others can make use of the data shared. There is discrete control over data optimizing data access. [32]

The data follows the principles proposed by Sunlight Foundation which are completeness, primary source of data, Real-time information updates, easy to access physically and electronically, machine readability, any person can access the data, use of commonly owned standards, open licensing, permanence and zero or less usage costs.[33]

OGD Platform India has been set up at <https://data.gov.in> to provide collated access to Resources (datasets/apps) under Catalogs, published by different government entities in open format. It also provides a search & discovery mechanism for instant access to desired datasets. [34]One such dataset is provided by Ministry of Human Resource and Development (MHRD) [35]. This dataset consist of data collected under All India Survey on Higher Education (AISHE) 2015-2016. AISHE is the annual survey conducted by the MHRD since 2011. The survey covers all the institutions providing higher education in India across all the disciplines. The objective of the survey is to identify institutes giving higher education and collect data from these institutes on educational parameters. This dataset contains the data regarding spatial and attribute data about college/institutions. Spatial data is Geographical Location (latitude and longitude coordinates). Attribute data includes list of parameters under Basic Information, Departments Details, Teaching Staff Details, Student Details , Examination Results and Infrastructure etc. [3]

a) Technologies used in project are

- Operating System - Linux distribution Ubuntu version 16.04 LTS to host webserver and database server

- Web Server - Apache HTTP Server Stable Release Version 2.4.18 to host website
- Database server - MySQL version 5.7.20 to store data
- Server-side Language PHP version: 7.0.22 to communicate with the database server.
- Client-side Language JavaScript, JavaScript library-jQuery version 3.2.1 to display dynamic content on webpage using AJAX and Google Maps JavaScript API [36] to display map.
- Markup Language - HTML along with CSS[37]

b) System Architecture

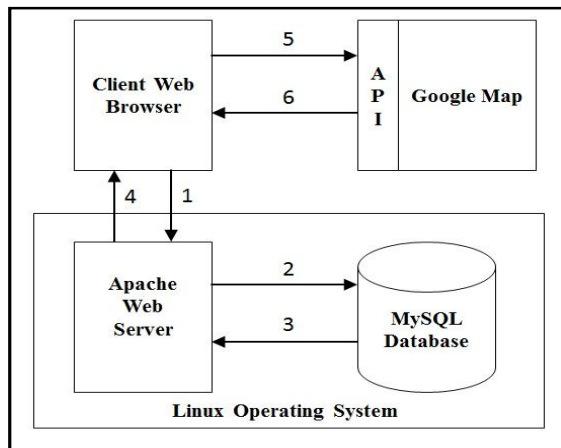


Figure 1 System Architecture

The arrows 1 and 4 are for webservice-browser communication. Arrow 2 and 3 are for fetching data from database. Arrow 5 and 6 are for fetching the map and route details.

c) Database Development

Steps followed for database development are -

1. Data is available in machine readable format (CSV files) obtained from open government data website. [35]
2. Data cleansing is performed on obtained data. [38]
3. Table created in MySQL server respective to CSV file data.
4. The cleaned data is then uploaded to database using the Load Data Infile statement [39]. It is used to upload data from text file into database table in very less time.
- 5.

d) Web Portal Walkthrough

1. The home page is college/University/Stand-alone Institutions Search page.

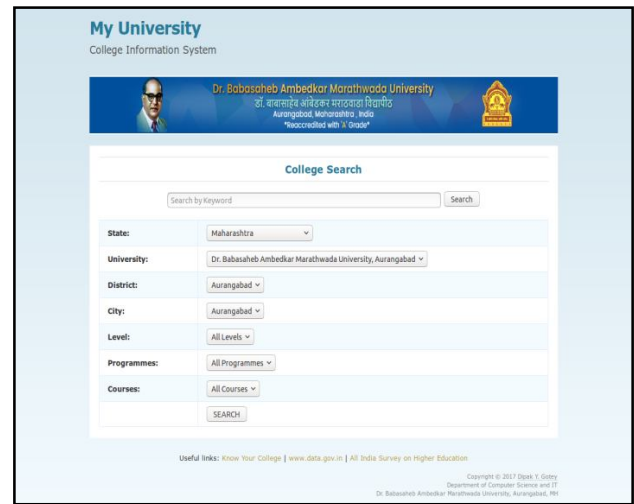


Figure 2 Search Page

2. The college/institute can be searched by entering keywords.
- college/University/Stand-alone Institutions is searched by selecting filtering parameters
3. Search result will be shown on the map with marker and List of college/University/Stand-alone Institutions matching given filter option.

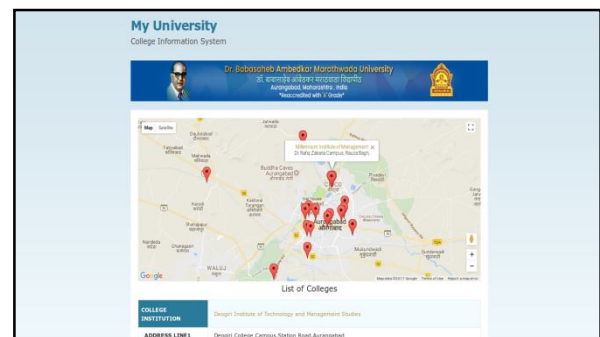


Figure 3 Search Result Page

4. The link on the college/University/Stand-alone Institution name will redirect to college/ University/Stand-alone Institution details respectively.
5. Courses webpage shows the courses available at the college/University/Stand-alone Institution.
6. Faculty webpage gives details of the teaching faculty in the college/University/Stand-alone Institution.
7. Student Count Webpage gives the student count of various courses at different level in different years.
8. Exam Result webpage gives the count of student who passed after successful completion of course.
9. Infrastructure webpage gives details of infrastructure available in the college/University/Stand-alone Institution and its premises.
10. Direction webpage gives the routes on the google map to reach college/University/Stand-alone Institution from user location.

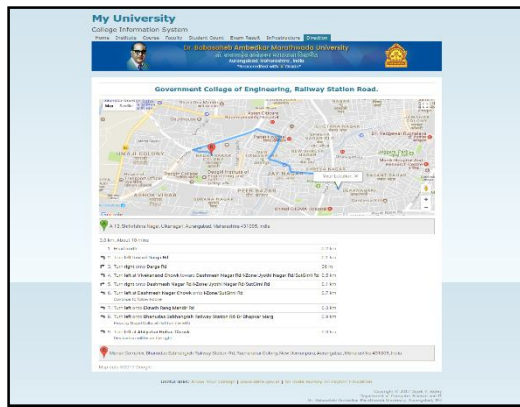


Figure 4 Direction Page

V. RESULT, CONCLUSION AND FUTURE SCOPE

Result

The website is one stop destination to get all the relevant information about any institute in India imparting higher education. The website also serves the purpose of providing route to reach destination institute through google map service. By sharing information the requirement for separate bodies to gather similar information is going to be avoided leading to important price savings in information assortment. The information helps to facilitate decision making such as selecting a program, course and institute. Website will help student to identify college/institutes in the city, district or state. The higher education aspirant can make good decision about selecting best college that is providing the program of his interest based on the criteria like facilities, results etc. The android devices can be used to access the website.

VI. CONCLUSION

This project uses the web technologies that are most popular and widely used for website development. With these technologies and using Open Government Data a GIS web portal is developed that gives the information about the college/institutes on many parameters. The information provided in website will be useful for the teachers, students, researchers, administrators and stakeholders in higher education.

FUTURE SCOPE

The Website uses mainly three of the functionalities provided by the Google Map JavaScript API those are geolocation, info windows and directions service. Other functions such as localizing the map, using kml layer to show university administration boundaries, traffic layer to show

current traffic, reverse geocoding, adding travel modes in directions, draggable direction, place searches and place autocomplete can be added to the map services.

The project uses the csv file data format from OGD platform and builds its separate database in MySQL. The other option available is to make use of Datastore API URL. This will make use of data available in web, thereby reducing the efforts of creating separate database.

Incorporate Infographics in website. Infographics is representation of information in graphical format (e.g. chart). This will make information consumption easier.

Many cosmetic features can be added to website to improve its look and appearance.

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