KATHMANDU UNIVERSITY

SCHOOL OF ENGINEERING

DHULIKHEL, KAVRE

GEOM 405: Web GIS

Final Report on Mini-project

Route Finding Using Web Map

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1. INTRODUCTION

1.1 Background

Nepal has been the sixth largest inbound tourism receiving country of the world (*Development and Importance of Tourism for Nepal*, 2020), the largest outbound tourism source country of Asia, and will become the largest domestic tourism market. Compared to the rapid growth of the tourism market, it becomes more and more urgent to improve the traditional tourism route planning to digitization services. Beyond such background, the service of tourism route planning is developing with the tourism websites as an essential function of those websites. The exploitation and research on the combination of the tourism route planning with intelligent algorithm and GIS/WEBGIS is in progress. The tourism websites are developed fast with the tourist industry digitalization, while the tourism route planning has become an essential service of the websites (Lin et al., 2009).

The routing service can find routes, directions, and perform advanced analyses on street networks (*Find Routes and Directions | ArcGIS*, n.d.). The service can solve network problems such as creating an optimized route to visit many destinations, finding the closest emergency vehicle or facility, identifying a service area around a location, or servicing a set of orders with a fleet of vehicles (Yang et al., 2012). When it comes to the mapping industry, we all know that Google Maps wears the crown, as the ultimate route planner (*Google Maps Multi Route Planner*, n.d.).

Nevertheless, at the end, route planning isn't just about plopping the addresses into Google. A multi-stop trip is of a much hassle and yet figuring out an optimal route plan is vital. This can be done by defining several parameters such as:

- Locations – where, when, how many.
- Major priorities – which locations are needed to reach immediately and which ones can wait

However, even after considering these things, Google has a big problem that seems to be overlooked. When it comes to using Google Maps to find the shortest route with multiple destinations, Maps seems to fail. Google Maps is great if it is with making a small number of stops as one can easily plan the route. However, for a long journey with multiple stops, Google Maps falls short, as it necessitates manually entering each destination one-by-one in the order one would like to visit them. It is a very tedious job. So, to overcome such issues we are creating a route-finding web map on Web GIS. Easy availability of such facilities may indicate prosperity of a

nation. Specifically, this project focuses on the quality of international as well as domestics tourist journey.

1.2 Objectives

The principal objective of this project was to create a creating a route-finding web map on Web GIS. It majorly dealt with identifying and locating the route, maximizing the number of destinations you're able to reach, and present them in interactive web map with additional contact information.

The secondary objectives achieved are:

- Get to know about various web mapping components (HTML, CSS, JavaScript)
- Get familiar with the open-source mapping library (Leaflet)

2. METHODOLOGY

2.1 Study Area

In this particular assignment, although, base layer of large extent could be accessed, detail information of the road service provider for Nepal were mapped.

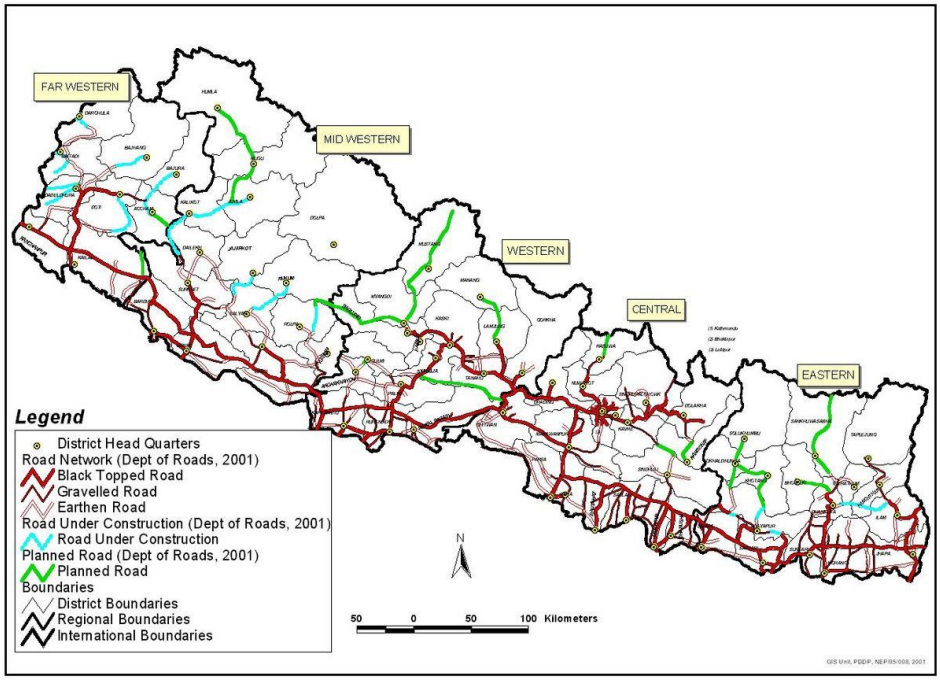


Figure 1. Project Area: Map of Nepal - Displaying Road Networks

Accessed from (Government of Nepal, n.d.)

2.2 Data Layers Used

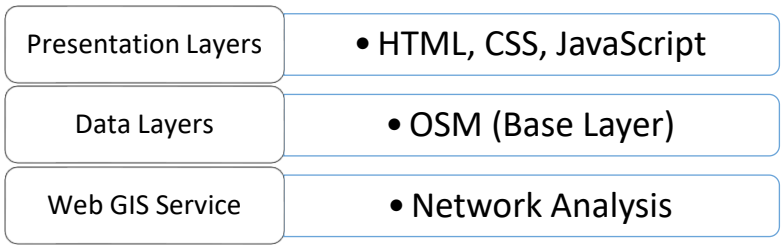
In this web application, the data layers were extracted from the open source platform: Open Street Map (*OpenStreetMap*, n.d.) as Base map.

2.3 Software Used

Visual Studio Code: For Scripting HTML, CSS and JavaScript for web application development.

2.4 Workflow

Overall procedure of the project is as shown in the below figure:



A. **<u>Presentation Layers</u>**: These data layers and WebGIS functionality were scripted together using the JavaScript, HTML and CSS to develop the web platform which can be interactively accessed via web browsers.
B. **<u>WebGIS Service:</u>** Geolocation of sta rting and ending point is derived based upon the markers located (dragged) by the user in their desired starting and location destination.
C. **<u>Outputs:</u>** The output of the project is in the form of the interactive web map of following characteristics:

a. Title: Route Finding Map
b. Scale: Dynamic
c. Map Extend: Nepal
d. Map Format: Interactive Web Map
e. Map Function: Network Analysis
f. Map Layout:

3. RESULT

The final result of this project is the interactive web map capable to detect the user's location and locate maximizing the number of destinations as user required. The final product of the project can be accessed as follows:

Project Source Code: https://github.com/Nims58/Route_Finding_WebGIS.git

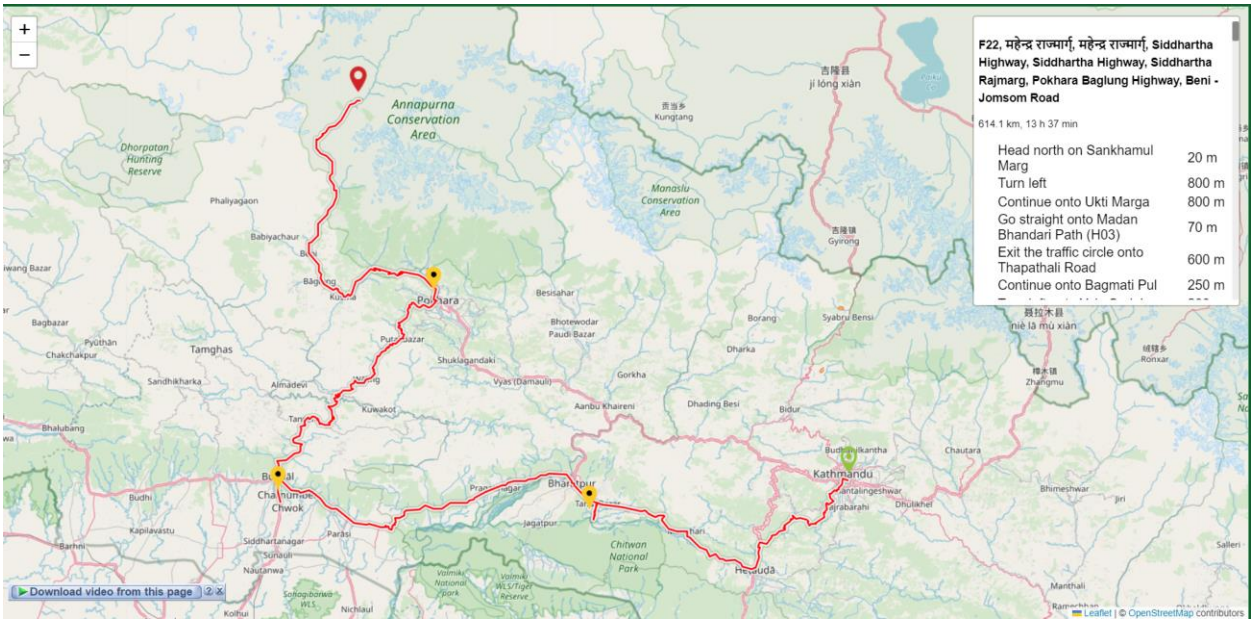


Figure 2. Snapshot of Output Route Finding Map

As illustrated in the output map, for instance, we plan to kick off our journey from Kathamandu (depicted by Green Marker) with our final destination to Jomsom.(depicted by Red Marker). However, on our way, we wish to visit Sauraha to pay a visit to Chitwan National Park and next stop to Tilattoma to visit birthplace of Gautam Buddha – Limbini. As shown in the above snapshot, these mid-stops are depicted by Yellow Markers. As a routing web map, this service provides with the navigation describing all the way from initial point to final destination through the way of mid-stops.

4. DISCUSSION

Open source data can be used to develop the simple yet very useful tools to mitigate the daily life problems of the citizens as well as tourism sector. Due to lots of constraints, there are some limitations in our project.

Limitations:

- Limited Interactivity
- Proximity Analysis
- Only works with the road embedded in the OSM base map
- No manual starting and destination search button

However, with the abundant time and resources, limitations of this project can be minimized and develop to its full capabilities.

Further Development Prospects:

- Complex geospatial analysis for best and suitable routing with better interactivity
- Application of database management system
- Mobile application and dashboards
- Separate interface and capabilities as per the hierarchy of users and service providers
- Multiple layers

5. LOGICAL FRAMEWORK ANALYSIS

S.N.	Objectives	How	Who	When	Risks	Solution
1.	Develop a web map for route finding.	Using Web GIS technology like CSS, HTML, leaflet and best use of available cartographic product in digital technology.	Purna, Nimesh, Susan Sarjun	Nov 25 – Nov 29	Difficult to load base map and. Difficult to add routing functionalities Chances of showing wrong direction after implementation	Consulting with supervisor

2.	To know and be familiar with web mapping componenta and leaflet.	There are two types of web maps static and dynamic our project is little bit dynamic with limited user interactive functionalities.	Purna, Nimesh, Susan Sarjun	Nov 25 – Nov 29	As a beginner it was difficult to get familiar with this technology	Online exploration, consultation with friends and seniors.
3.	Report Writing	Literature Review Documenting report	Purna Sarjun, Nimesh, Susan	Nov 25 – Dec 1		

5. CONCLUSION

Interactive web platform can be developed using the open source software and data which could allow the users to find the suitable routing service providers in the user's vicinity.

5. REFRENCES

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