Laboratory 2 MAPS HANDLING with OPENSTREETMAPS (January 2020)

Josué Guerrero Salas

***Abstract*—This document provides a summary of a map handling with OpenStreetMap using Leaflet JavaScript Library. This work uses as example a bike circuit previously done by the author, in order to prove how the library makes usage of the information to draw markers and lines through the streets on the provided maps. For map drawing it´s been used Routing-machine package from Leaflet.**

I. Introduction

THIS document explains how Leaflet library handles maps for route drawing. Along the topics that could have been chosen for this project, the best option was to pick a bike route, not only because it was the best-known circuit for the author, but for its long distance crossing different districts in Cartago province. The main purpose of this project is to explain how a route is created on a map. It will be shown how the markers are added, how can they be modified and how the route is drawn. It´s been always suggested to have separated files for all three portions of a web page project, this section supposes this well practice.

II. Map addition to a project

First, the *HTML* head sections must have reference to the OpenStreetMap Leaflet and Routing Machine libraries, so the entire added files will have access to its features. This pieces of code can be found in https://leafletjs.com/examples/quick-start/ and https://www.liedman.net/leaflet-routing-machine/ home pages.

Once the project has all necessary tools, the map can be set in a HTML section, in this project is called *mymap.*

```
var mymap = L.map('mapid').setView([9.90631, -83.971767], 13);
L.tileLayer('https://api.mapbox.com/'+
    'styles/v1/{id}/tiles/{z}/{x}/{y}?access_token='+
    'pk.eyJ1IjoibWFwYm94IiwiYSI6ImNpejV4NXVycTA2emYy'+
    'cXBndHRqcmZ3N3gifQ.rJcFIG214AriISLbB6B5aw', {
    maxZoom: 18,
    attribution: 'Map data &copy; <a href="https://'+
        'www.openstreetmap.org/">OpenStreetMap</a> '+
        'contributors, ' +'<a href="https://creative'+
        'commons.org/licenses/by-sa/2.0/">CC-BY-SA</a>, ' +
        'Imagery © <a href="https://www.mapbox.com/">Mapbox</a>',
    id: 'mapbox/streets-v11'
}).addTo(mymap);
```

Figure 1: Map addition

In order to add a map from Leaflet library, it must be specified as shown above. A variable holds the map, a pair of coordinates are supplied to set initial view and more default URLs are provided. After above declaration a basic map is displayed.

Figure 2: Basic Map View

III. Map configuration and data

When map is ready on web page a series of items can be added like lines, shapes, markers, popups, etc. For this project we care about popup markers to stablish interest points on a bike route, these points are going to mark the route with its turns

This paragraph of the first footnote will contain the date on which you submitted your paper for review. It will also contain support information, including sponsor and financial support acknowledgment. For example, “This work was supported in part by the U.S. Department of Commerce under Grant BS123456.”

The next few paragraphs should contain the authors’ current affiliations, including current address and e-mail. For example, F. A. Author is with the National Institute of Standards and Technology, Boulder, CO 80305 USA (e-mail: author@ boulder.nist.gov).

S. B. Author, Jr., was with Rice University, Houston, TX 77005 USA. He is now with the Department of Physics, Colorado State University, Fort Collins, CO 80523 USA (e-mail: author@lamar.colostate.edu).

T. C. Author is with the Electrical Engineering Department, University of Colorado, Boulder, CO 80309 USA, on leave from the National Research Institute for Metals, Tsukuba, Japan (e-mail: author@nrim.go.jp).

and intersections. Also, some extra points have been added like lookouts for picture taking and nature items.

A structure in json format was used to retrieve information at the time to draw into the map, includes name, latitude, longitude.

Example of data retrieved

Name	Latitude	Longitude
Punto de salida	9.9063268	-83,9717935
Punto de recarga bomba total	9.9090916	-83,9899325
Entrada Florencio del castillo	9.9068828	-83.9734423

IV. MAP DRAWING

The drawing method using Routing-machine follow 2 simple steps shown below.

```
var mydata = JSON.parse(data);
var waypoints = [];
for(i = 0; i < mydata.length; i++) {
    console.log(mydata[i].name);
    waypoints.push(L.latLng(mydata[i].lat,mydata[i].lon));
}
L.Routing.control({waypoints}).addTo(mymap);
  for(i = 0; i < mydata.length; i++) {
    L.marker([mydata[i].lat, mydata[i].lon]).addTo(mymap)
    .bindPopup("<b>"+mydata[i].name+"</b>").openPopup();
  }
}
```

Figure 3: Drawing code.

First step is to gather points information from Json file, this action will result in a json array called **mydata.** This data is used to create a list of points ready to be represented on a map, after this process, all points are sent to a Routing-machine routine in a array called **waypoints**, which automatically draws the entire circuit. A second loop is used to add the name of every point already added. This cannot be stablished in the same loop due to the process creates a new marker when draws the route.

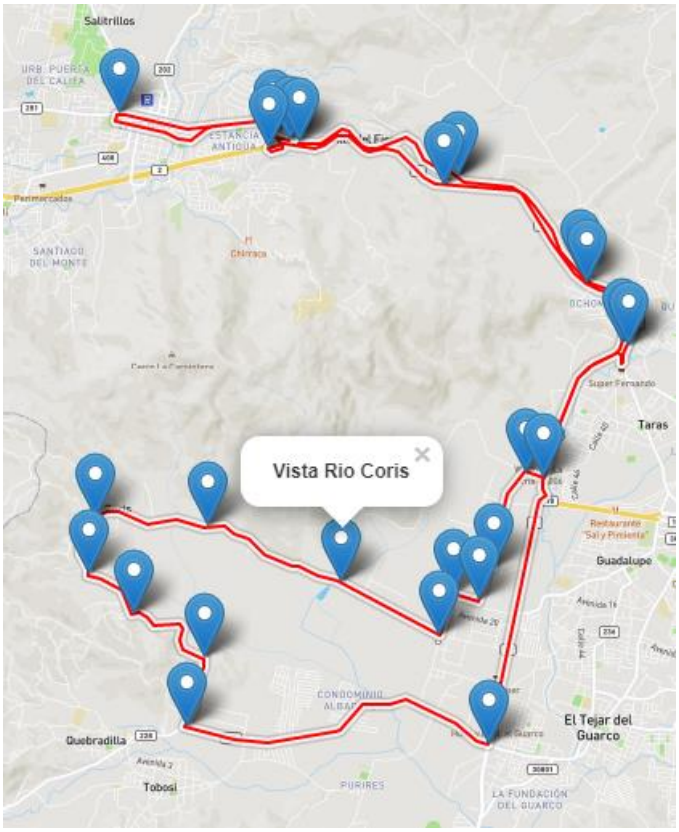

Figure 4: Finished route.

V. CONCLUSION

Routing-machine is a excellent easy way to draw maps, it also has the option to edit points for public data sharing. Besides Google Maps which offers the best option, it has the inconvenient of payment need for all its features. As part of the experience using OpenStreetMap API its performance is acceptable. Not all its features were tested during this project, but it will be used it future releases