UNIVERSITAS
GADJAH MADA

May 17, 2024

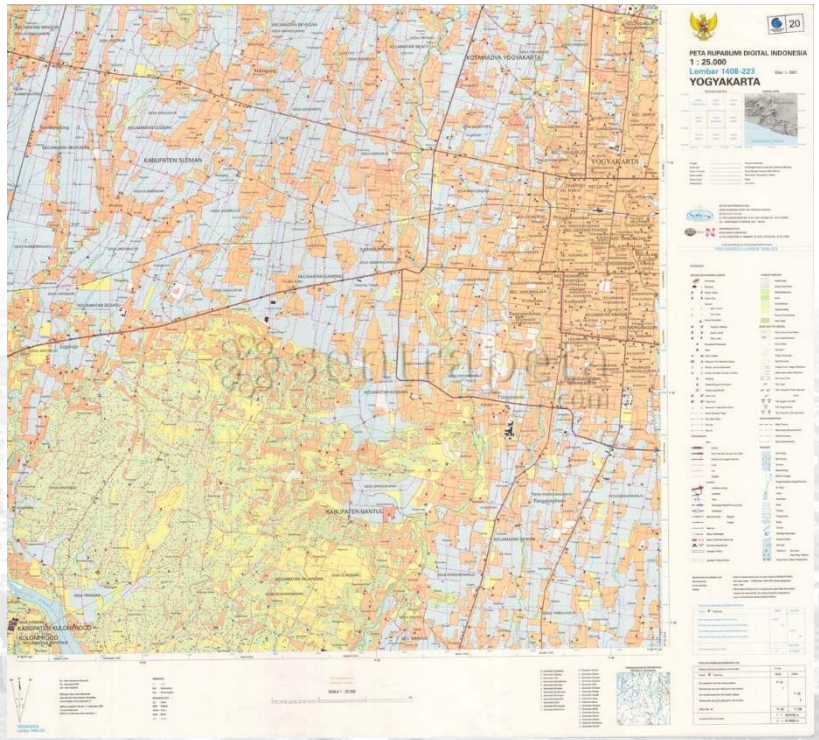
Course: **Web-based GIS**
(TKD1206)

LeafletJS dan GeoJSON

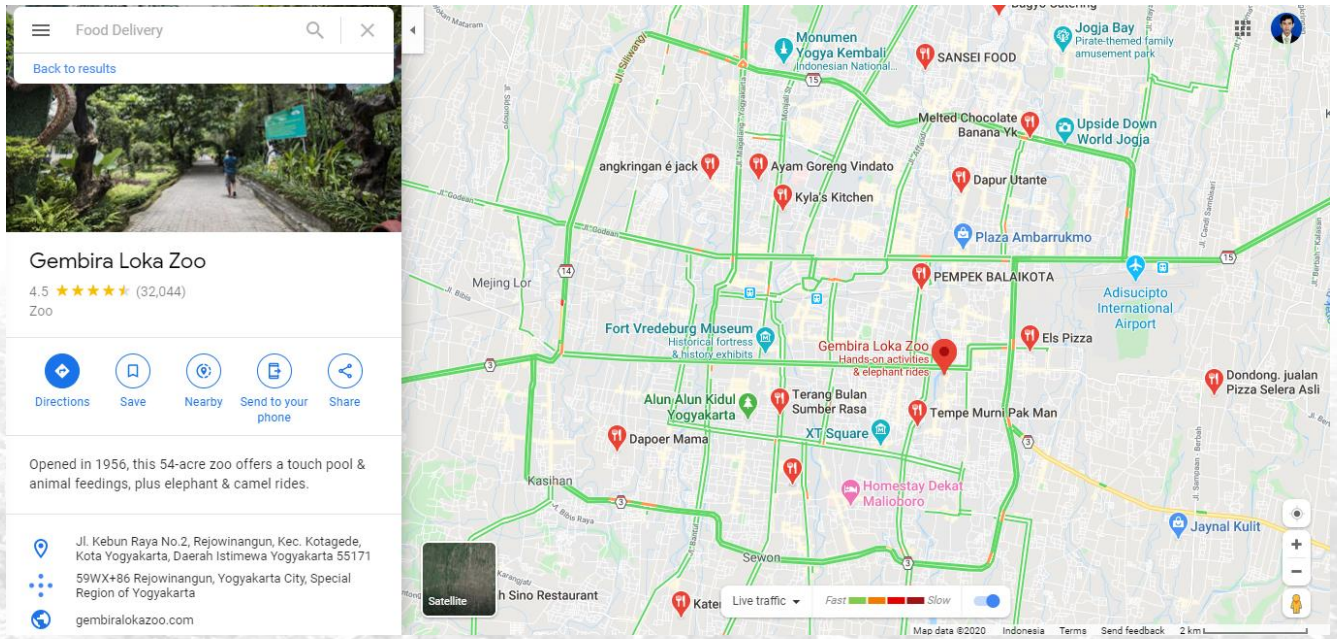
Dany Laksono

Dept. of Geodetic Engineering, UGM

Which one is a WebMap?



JPG, uploaded to web



Google Maps

WebMap ≠ A map accessible online

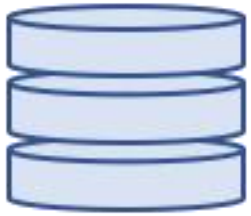
WebMap = A Web-Powered Map

Meaning: interactivity, multiple layers, dynamic data, multi-user, etc

Map Data

Tiles

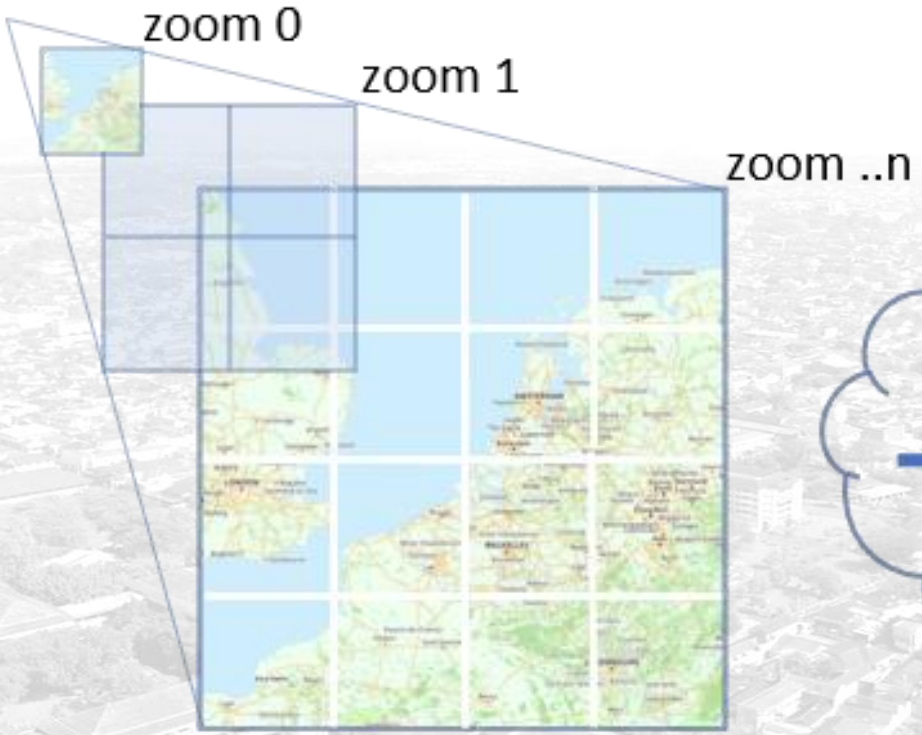
Viewing



Raster Data

Vector Data

Tiling Engine (server)



Javascript WebMap Libraries

(**LeafletJS**, OpenLayers, Mapbox, Google Maps, etc)

TABLE 6.1: Popular web-mapping libraries

Library	Released	Type	URL
Google Maps	2005	Commercial	https://developers.google.com/maps/
OpenLayers	2006	Open-source	https://openlayers.org/
ArcGIS API for JS	2008	Commercial	https://developers.arcgis.com/javascript/
Leaflet	2011	Open-source	https://leafletjs.com/
D3	2011	Open-source	https://d3js.org/
Mapbox GL JS	2015	Commercial	https://www.mapbox.com/mapbox-gl-js/api/

https://geobgu.xyz/web-mapping2/leaflet.html#introduction-5

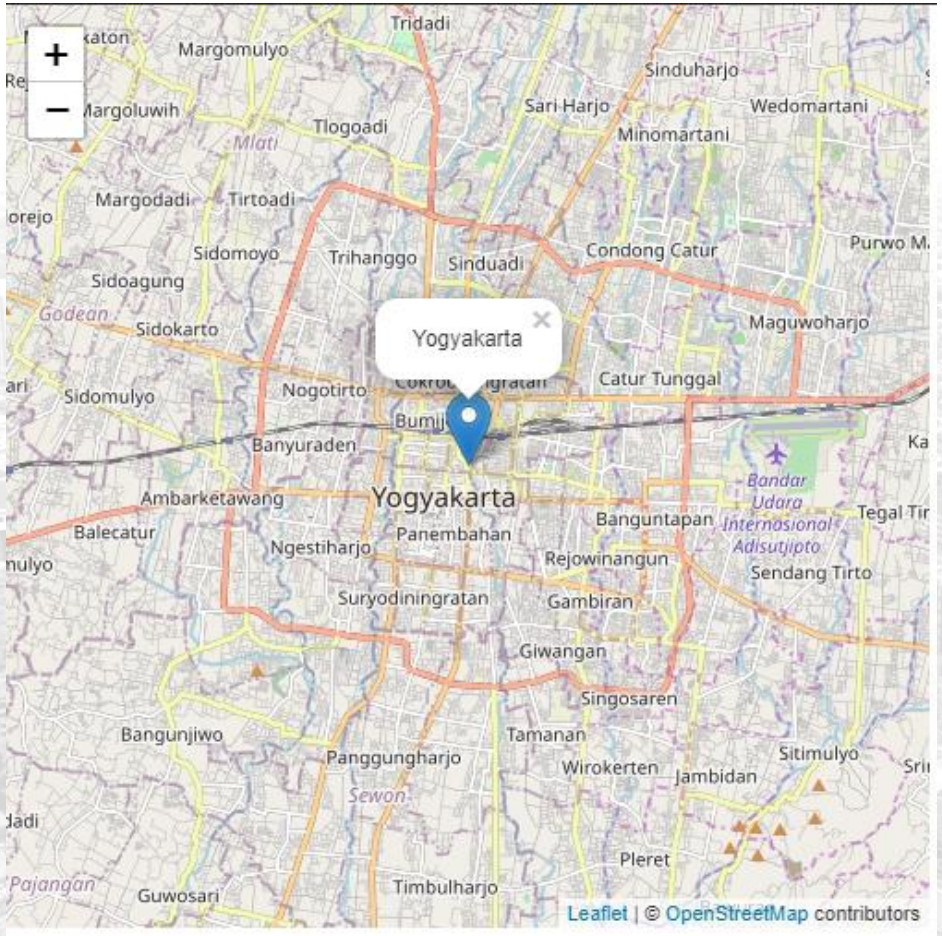
Layer:

Feature Layer (‘vector’ overlay)

Tilelayer (basemap)

Leaflet

"An open-source *JavaScript library* for building **interactive web maps**"




```
var map = L.map('map')
    .setView([-7.79558, 110.36949], 12);

L.tileLayer('https://{s}.tile.openstreetmap.org/{z}/{x}
/{y}.png',
{attribution: '&copy; <a
href="https://www.openstreetmap.org/copyright">OpenStreetMap</
a> contributors'})
    .addTo(map);

L.marker([-7.79558, 110.36949])
    .addTo(map)
    .bindPopup('Popup')
    .openPopup();
```

Bagaimana menggunakan LeafletJS?

Before writing any code for the map, you need to do the following preparation steps on your page:

- Include Leaflet CSS file in the head section of your document:

```
<link rel="stylesheet" href="http://cdn.leafletjs.com/leaflet-0.7.3/leaflet.css" />
```

- Include Leaflet JavaScript file:

```
<script src="http://cdn.leafletjs.com/leaflet-0.7.3/leaflet.js"></script>
```

- Put a `div` element with a certain `id` where you want your map to be:

```
<div id="map"></div>
```

- Make sure the map container has a defined height, for example by setting it in CSS:

```
#map { height: 180px; }
```

Now you're ready to initialize the map and do some stuff with it.

http://leafletjs.com/examples/quick-start.html

Basic LeafletJS Components

Setup map

```
var map = L.map('map').setView([51.505, -0.09], 13);
```

Tile Background

```
L.tileLayer('http://{s}.tiles.mapbox.com/v3/MapID/{z}/{x}/{y}.png',{ attribution: 'Map data &copy', maxZoom: 18 }).addTo(map);
```

Marker

```
var marker = L.marker([51.5, -0.09]).addTo(map);
```

Popup

```
marker.bindPopup("<b>Hello world!</b><br>I am a popup.").openPopup();
```

Control

```
var controlLayers = L.control.layers(maps).addTo(map);
```

Events

```
map.getCenter(); map.getBounds();
```

Fungsi Interaktif LeafletJS

Interaction Features

General

- Drag panning with inertia

On Desktop Browsers

- Scroll wheel zoom
- Double click zoom
- Zoom to area (shift-drag)
- Keyboard navigation (with arrows and +/- keys)

On Mobile Browsers

- Multi-touch zoom (iOS, Android 4+, Win8)
- Double tap zoom

For Layers

- Various events: click (tap), mouseover, contextmenu, etc.
- Marker dragging

Visual Features

- Zoom animation (for all layers, including tile layers, markers and vector layers)
- Panning animation
- Smooth continuous zoom on modern mobile devices
- Tile and popup fade animation
- Very nice default design for markers, popups and other map controls
- Retina resolution support for tile layers and markers

Available Map Layers

- Tile layers
- Markers
- Popups
- Vector layers: polylines, polygons, circles, rectangles, circle markers
- GeoJSON layers
- Image overlays
- WMS layers
- Layer groups

Map Controls

- Zoom buttons
- Attribution
- Layer switcher
- Scale

Customization Features

- Pure CSS3 popups and controls for easy restyling
- Image- and HTML-based markers
- A simple interface for implementing custom map layers
- The same for custom map controls
- Custom map projections (with `EPSG:4326`, `EPSG:3857` and `EPSG:3395` out of the box)
- Powerful OOP facilities for extending existing classes

Plugin LeafletJS

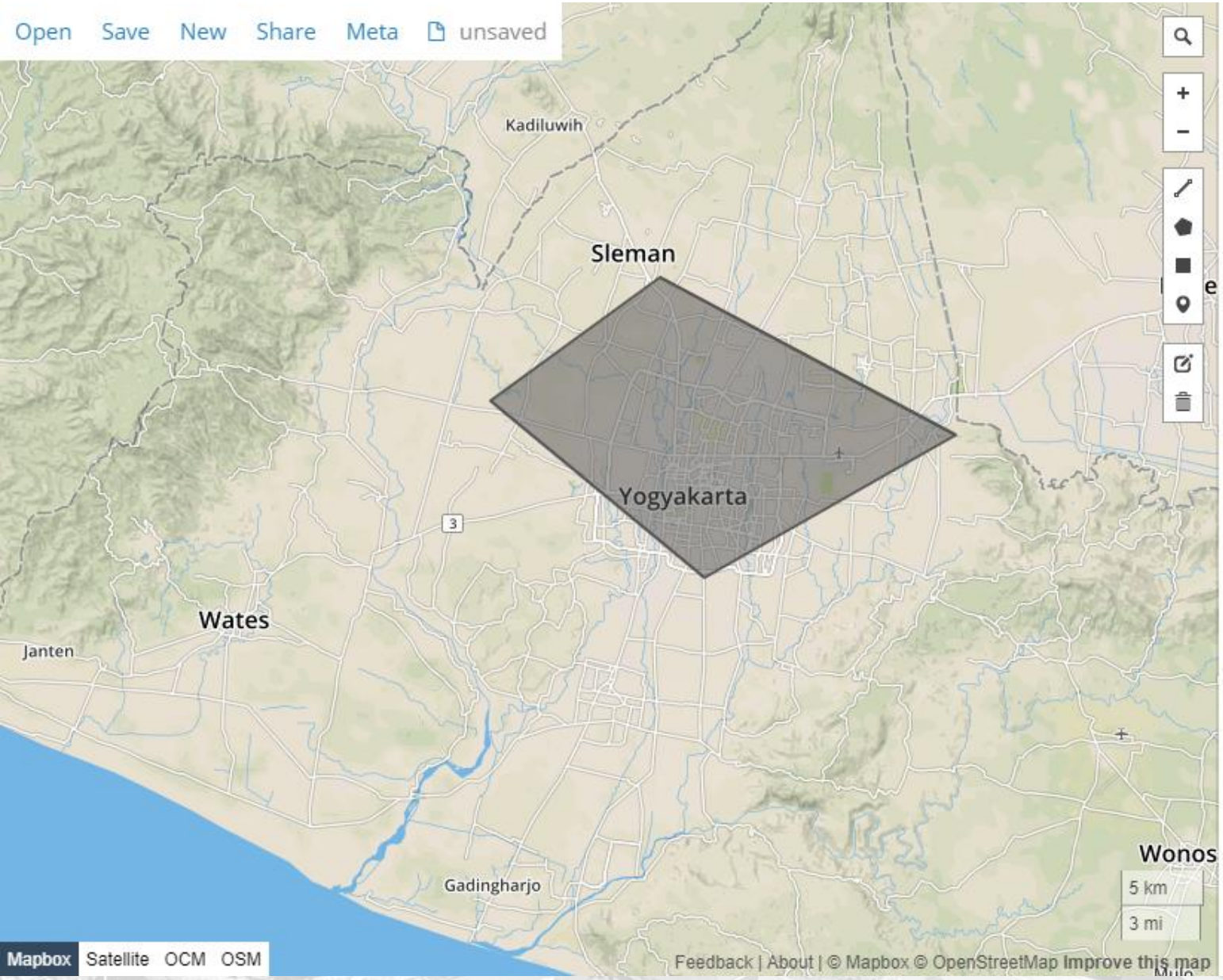
Notable Leaflet Plugins

While Leaflet is meant to be as lightweight as possible, and focuses on a core set of features, an easy way to extend its functionality is to use third-party plugins. Thanks to the awesome community behind Leaflet, there are lots of nice plugins to choose from.

Layers and Overlays

Plugin	Description	Maintainer
Leaflet.FreeDraw	Zoopla inspired freehand polygon creation using Leaflet.js and D3.	Wildhoney
Leaflet.ellipse	Leaflet.ellipse place ellipses on map by specifying center point, semi-major axis, semi-minor axis, and tilt degrees from west.	JD Fergason
Leaflet.plotter	leaflet-plotter allows you to create routes using a leaflet powered map. You can click on the mid-points to create a new, draggable point.	Nathan Mahdavi
Leaflet.markercluster	Beautiful, sophisticated, high performance marker clustering solution with smooth animations and lots of great features. *Recommended!*	Dave Leaver
Leaflet.label	Adds text labels to map markers and vector layers.	Jacob Toye
RaphaelLayer	Allows you to use Raphael as a layer on a Leaflet map for advanced animations and visualizations.	Dynamic Methods

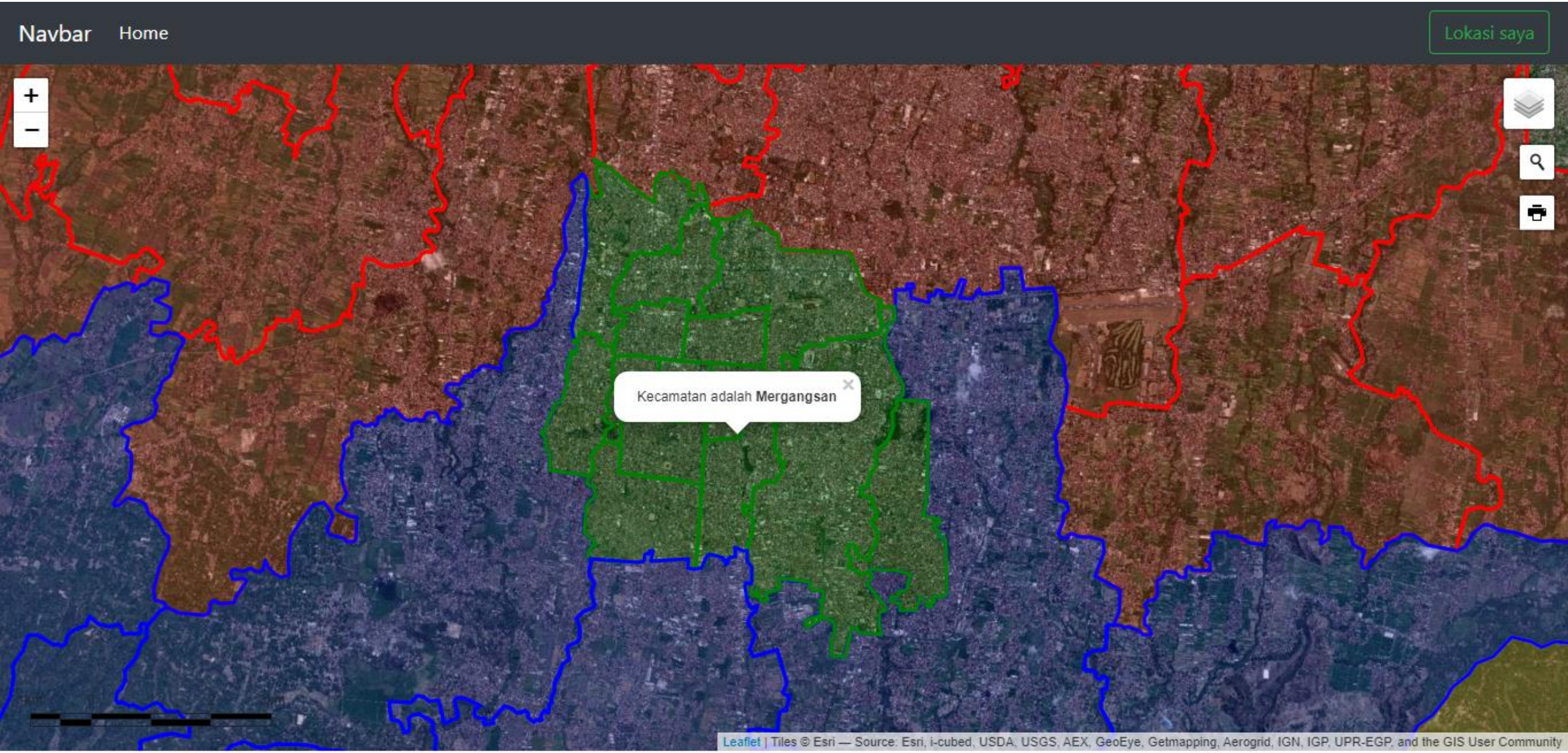
GeoJSON



JSON | Table | Help | anon | login

```
{
  "type": "FeatureCollection",
  "features": [
    {
      "type": "Feature",
      "properties": {},
      "geometry": {
        "type": "Polygon",
        "coordinates": [
          [
            [
              110.27595520019531,
              -7.757939164197402
            ],
            [
              110.37483215332031,
              -7.838894277548979
            ],
            [
              110.49087524414062,
              -7.773587170836483
            ],
            [
              110.35423278808594,
              -7.701465437245529
            ],
            [
              110.27595520019531,
```

LeafletJS + GeoJSON + Plugins, ++ Bootstrap



UNIVERSITAS
GADJAH MADA

TERIMA KASIH

LOCALLY ROOTED, GLOBALLY RESPECTED