Introduction to Leaflet

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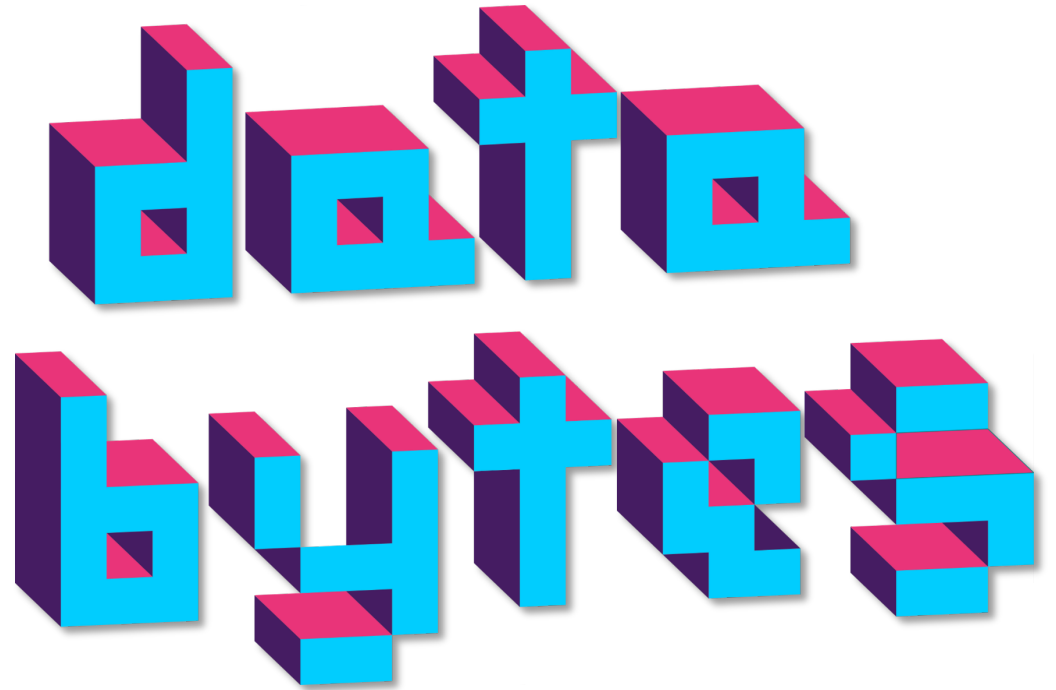
Leaflet

JHU Data Services
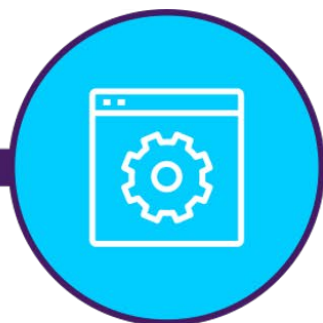
WE HELP FACULTY, RESEARCHERS AND STUDENTS:
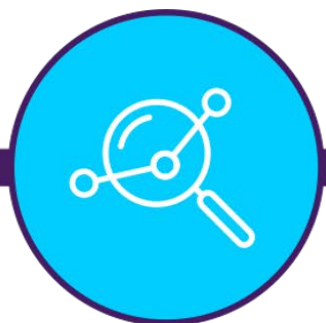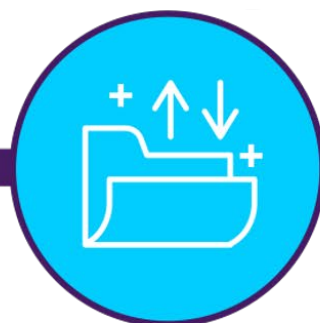

FIND   USE   VISUALIZE   MANAGE   SHARE   DATA
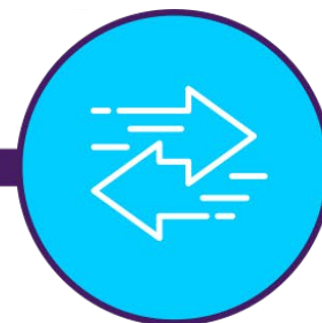
Agenda

1. An Overview of Leaflet

   - What is Leaflet?

   - What does it do? What does it **not** do?

   - Why use Leaflet over other mapping applications / packages?

   - What do you need to know to get started?

2. Demonstration

3. Questions

An Overview of Leaflet

What is Leaflet?

- The leading open-source JavaScript library for creating mobile-friendly, interactive maps

- Created 11 years ago by Volodymyr Agafonkin, a Ukrainian citizen and currently a developer at MapBox

- What is **JavaScript** (JS)?

  - One of the core programming language for web development

  - Can be used for both front-end (visual aspects of a website) and back-end development (website structure, system, data, etc)

Characteristics of Leaflet

- Lightweight, simple and flexible

- **Customizable** and **Extendible**

  base features can be extended via plugins
  (see list at https://leafletjs.com/plugins.html)

- Interoperable
  (mobile and desktop friendly)

Leaflet

What does Leaflet do?

Put simply,

Leaflet is a visualization framework

to create **web maps**

with **data** and with ways to **interact** with said data.

Leaflet

What does Leaflet do?

Features

Leaflet doesn't try to do everything for everyone. Instead it focuses on making *the basic things work perfectly*.

Layers Out of the Box

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

Interaction Features

- Drag panning with inertia
- Scroll wheel zoom
- Pinch-zoom on mobile
- Double click zoom
- Zoom to area (shift-drag)
- Keyboard navigation
- Events: click, mouseover, etc.
- Marker dragging

Visual Features

- Zoom and pan animation
- Tile and popup fade animation
- Very nice default design for markers, popups and map controls
- Retina resolution support

Customization Features

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

Performance Features

- Hardware acceleration on mobile makes it feel as smooth as native apps
- Utilizing CSS3 features to make panning and zooming really smooth
- Smart polyline/polygon rendering with dynamic clipping and simplification makes it very fast
- Modular build system for leaving out features you don't need
- Tap delay elimination on mobile

Map Controls

- Zoom buttons
- Attribution
- Layer switcher
- Scale

Browser Support

Desktop

- Chrome
- Firefox
- Safari 5+
- Opera 12+
- IE 9–11
- Edge

Mobile

- Safari for iOS 7+
- Chrome for mobile
- Firefox for mobile
- IE10+ for Win8 devices

Misc

- Extremely lightweight
- No external dependencies

If you find some feature really missing in Leaflet, first check if there's a plugin for it and if it's been discussed before already on GitHub issues. If not, please open a new GitHub issue.

Read over documentation at https://leafletjs.com/

Open-Source Contributions

Getting Involved

Let's create the best mapping library in the world! Leaflet was originally created by Volodymyr Agafonkin, but is now developed by a big community of contributors. Pull requests are always welcome. However, there are many more ways to get involved with the development of Leaflet.

You can help the project tremendously by discovering and reporting bugs, improving documentation, helping others on Stack Overflow, GIS Stack Exchange and GitHub issues, tweeting to @LeafletJS and spreading the word about Leaflet among your colleagues and friends.

Check out the contribution guide for more information on getting involved with Leaflet development.

Leaflet

What does Leaflet NOT do?

- Does **NOT** provide data – you provide the data!

- Is **NOT** a GIS replacement – not a system to manage, clean and analyze spatial data

  - Can be used together with GIS (ie: Mapbox, Carto, Esri)

Leaflet

Why Use Leaflet?

- Lightweight

- Flexible – extensive customization possible

- Open-source

- Integration with other platforms and tools (such as Leaflet for R)

- Can host across a variety of web platforms, such as Github pages

Leaflet

What do You Need to Know?

- Basic knowledge of HTML & CSS

- Basic knowledge of Javascript

- …or the willingness to learn and tinker around

Leaflet

How do I start?

Demo time!

What You'll Need

- Text Editor
  - Sublime Text, Atom, VS Code, Notepad, etc

Demonstration

What We'll Cover

- Creating a base HTML file

- Referencing Leaflet CSS and Leaflet JavaScript into HTML file

- Creating a Map div (division) element

- Initializing Map

- Begin Adding Layers and Data to Map

```html
<!DOCTYPE html>

<html>
    <head>
        <title>
        </title>

        <link>

        <script>
        </script>

        <style>
        </style>
    </head>

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

        <script>
        </script>
    </body>
</html>
```

```html
1    <!DOCTYPE html>
2
3    <html>
4        <head>
5            <title>
6            </title>
7
8            <link>
9
10           <script>
11           </script>
12
13           <style>
14           </style>
15       </head>
16
17       <body>
18           <div id = "map">
19           </div>
20
21           <script>
22           </script>
23       </body>
24   </html>
25
```

```html
<head>
  <!--It's good practice to give your webpage a title-->
  <title>01 - First Leaflet Map</title>

  <!--references the Leaflet CSS. Make sure you're using
    the newest version, pull from Leaflet's main site-->
  <link
  rel="stylesheet"
  href="https://unpkg.com/leaflet@1.9.2/dist/leaflet.css"
  integrity="sha256-sA+zWATbFveLLNqWO2gtiw3HL/lh1giY/Inf1BJ0z14="
  crossorigin=""
  />

  <!--references the Leaflet Javascript files. Make sure
    you're using the newest version, pull from Leaflet's main site-->
  <script
  src="https://unpkg.com/leaflet@1.9.2/dist/leaflet.js"
  integrity="sha256-o9N1jGDZrf5tS+Ft4gbIK7mYMipq9lqpVJ91xHSyKhg="
  crossorigin=""
  >
  </script>

  <!--Position the map and title with Cascading Style Sheet (CSS) -->
  <style>
  #map {
    width: 960px;
    height:500px;
    }
  </style>
</head>
```

Left panel:

```
1    <!DOCTYPE html>
2
3    <html>
4        <head>
5            <title>
6            </title>
7
8            <link>
9
10           <script>
11           </script>
12
13           <style>
14           </style>
15       </head>
16
17       <body>
18           <div id = "map">
19           </div>
20
21           <script>
22           </script>
23       </body>
24   </html>
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1

Right panel:

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```html
<body>
  <!--Leaflet requires a <div> element. Give it an id like "map"-->
  <div id="map">
  </div>

  <!--Where the magic happens. Create a variable called "map",
    provide coordinates to center on, a zoom level and add layers here-->
  <script>
    var map = L.map('map',{
      center: [39.32907, -76.61814], zoom: 15
      });

    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);
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2

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Fall 2022 Data Bytes Schedule

All sessions are on Mondays from 12 to 1 pm.

Finding Maps and Map Data
Sept 12th

Choosing a Python IDE
Sept 19th

Creating Infographics in
Business Analyst
Sept 26th

Debugging your Python Code
Oct 3rd

Speeding up your Python Code
Oct 10th

Introduction to Leaflet
Oct 17th

Advanced StoryMaps
Tips and Tricks

Oct 24th

Introduction to APIs in R
Oct 31st 🎃

GIS and Maps
Programming

More info at:
bit.ly/data_-bytes

Thank you
for attending!

Please complete
our survey at:
bit.ly/data_-bytes-
survey

Questions?