Introduction to Leaflet

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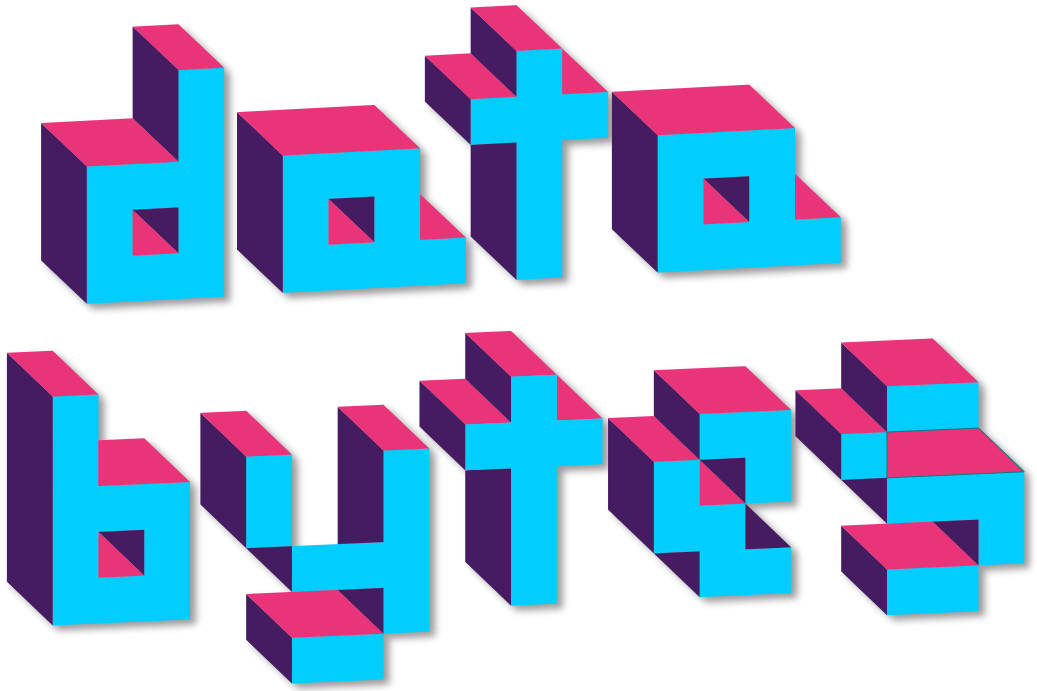
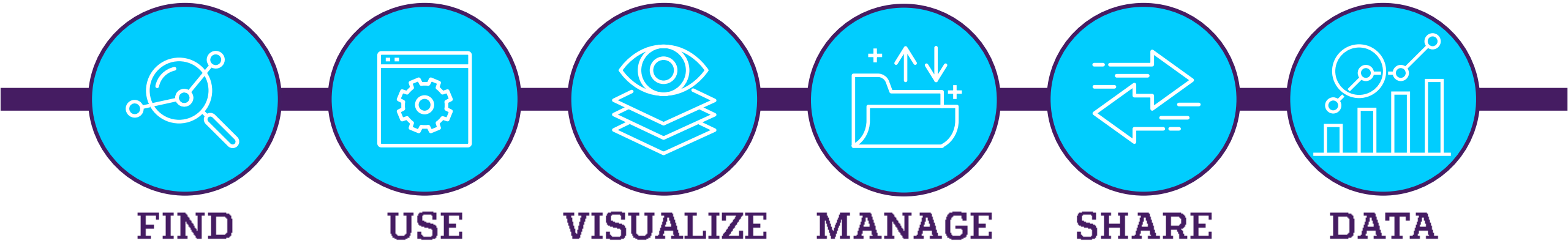


Leaflet

JHU Data Services

WE HELP FACULTY, RESEARCHERS AND STUDENTS:



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)

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.

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)

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

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

```
<!DOCTYPE html>

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

        <link>

        <script>
        </script>

        <style>
        </style>
    </head>

    <body>
        <div id = "map">
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    the newest version, pull from Leaflet's main site-->
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    height:500px;
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  <!--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', {
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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?