



Mapping GeoJSON Data

Data Boot Camp
Lesson 13.2



The Big Picture



This Week: Leaflet.js

By the end of this week, you'll know how to:



Create and merge a new branch from the main branch on GitHub



Retrieve data from a GeoJSON file



Make API requests to a server to host geographical maps



Populate maps with GeoJSON data using JavaScript and the D3 library



Add multiple layers to maps using Leaflet control plugins to add user interface controls



Use JavaScript ES6 functions to add GeoJSON data, features, and interactivity to maps



Render maps on a local server



This Week's Challenge

Using the skills learned throughout the week, add tectonic plate and earthquake data to the map you've created, and create a new map of your choosing.

Module 13

Today's Agenda

Today's Agenda

By completing today's activities, you'll learn the following skills:

01

Use external GeoJSON data to populate a map

02

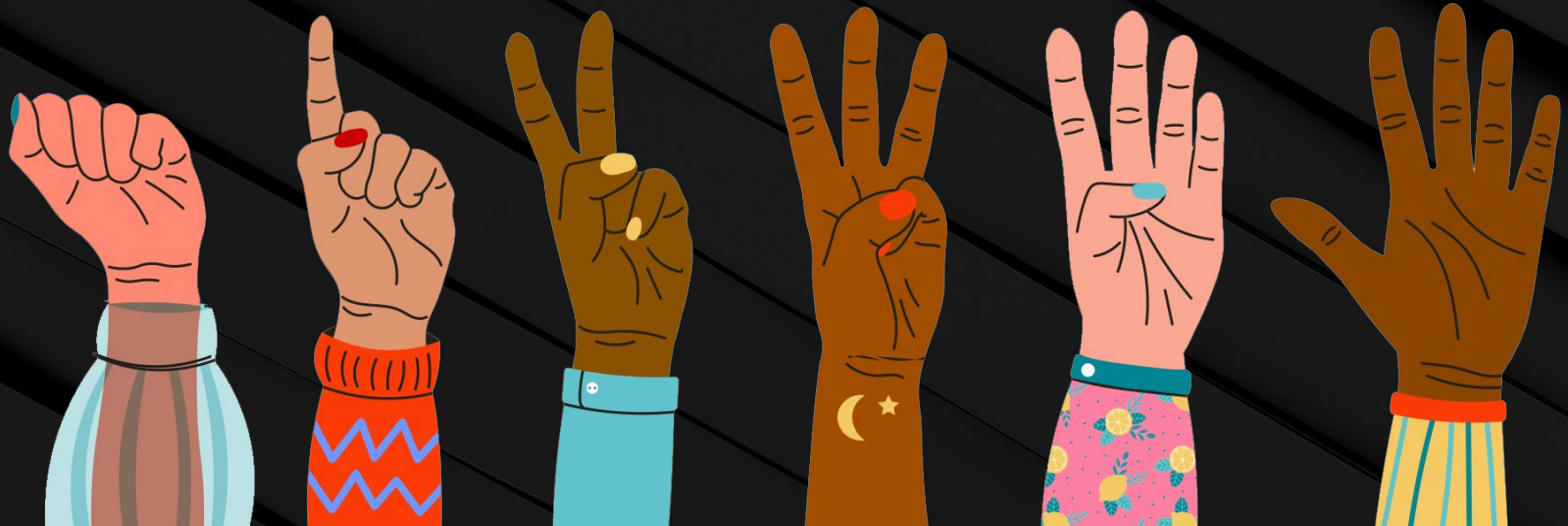
Modify the layer controls to add interactivity to maps



Make sure you've downloaded
any relevant class files!

FIST TO FIVE:

How comfortable do you feel with this topic?



GeoJSON



What is GeoJSON?



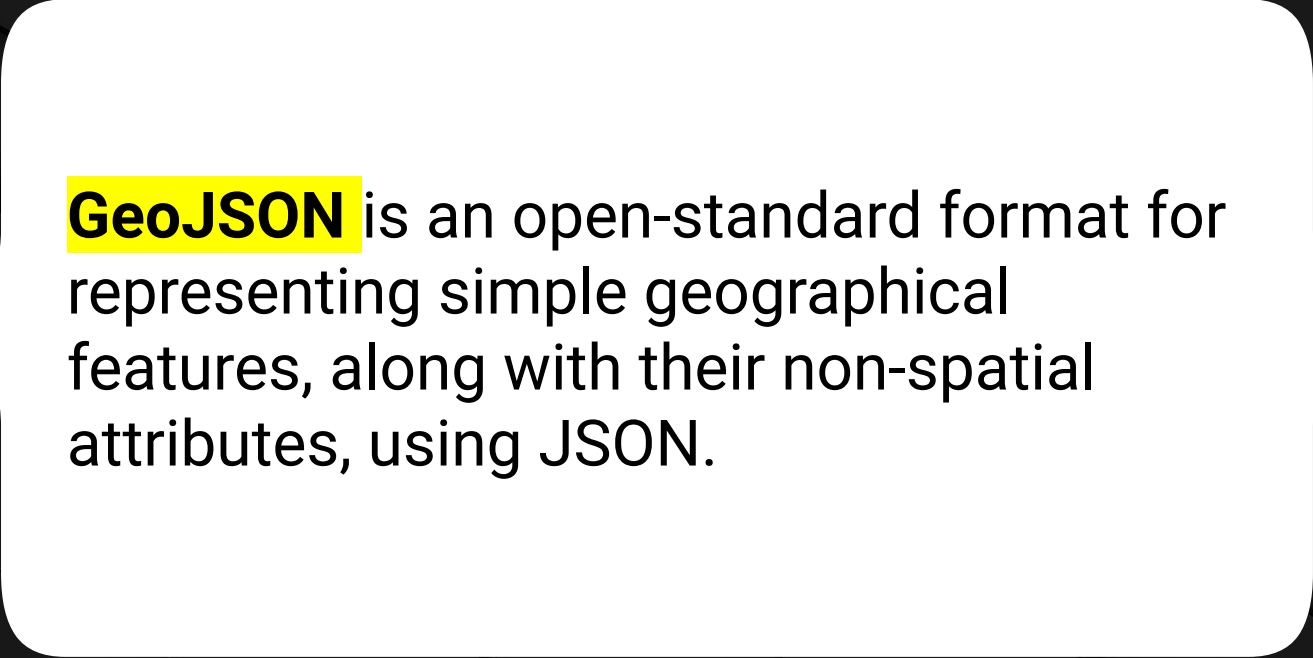
GeoJSON is the easiest way to
deliver geographical data.

USGS GeoJSON Data

http://earthquake.usgs.gov/earthquakes/feed/v1.0/summary/all_hour.geojson

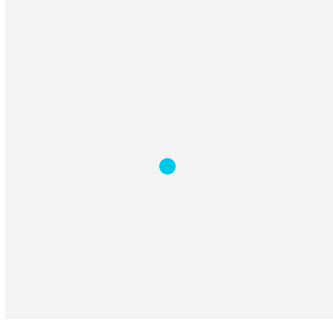
```
{
  "type": "FeatureCollection",
  "metadata": {
    "generated": 1603337170000,
    "url": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/summary/all_hour.geojson",
    "title": "USGS All Earthquakes, Past Hour",
    "status": 200,
    "api": "1.10.3",
    "count": 7,
    "features": [
      {
        "type": "Feature",
        "properties": {
          "mag": 1.29,
          "place": "13km SW of Searles Valley, CA",
          "time": 1603335918400,
          "updated": 1603336147381,
          "tz": null,
          "url": "https://earthquake.usgs.gov/earthquakes/eventpage/ci39440911",
          "detail": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/ci39440911.geojson",
          "felt": null,
          "cdi": null,
          "mmi": null,
          "alert": null,
          "status": "automatic",
          "tsunami": 0,
          "sig": 26,
          "net": "ci",
          "code": "39440911",
          "ids": "ci39440911",
          "sources": "ci",
          "types": "nearby-cities,origin,phase-data,scitech-link",
          "nst": 19,
          "dmin": 0.1353,
          "rms": 0.17,
          "gap": 140,
          "magType": "ml",
          "type": "earthquake",
          "title": "M 1.3 - 13km SW of Searles Valley, CA",
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            "type": "Point",
            "coordinates": [-117.5178333, 35.6966667, 6.65]
          },
          "id": "ci39440911"
        },
        "type": "Feature",
        "properties": {
          "mag": 5.1,
          "place": "50 km WNW of Jiangyou, China",
          "time": 1603335819083,
          "updated": 1603336468040,
          "tz": null,
          "url": "https://earthquake.usgs.gov/earthquakes/eventpage/us6000cb4i",
          "detail": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/us6000cb4i.geojson",
          "felt": null,
          "cdi": null,
          "mmi": null,
          "alert": null,
          "status": "reviewed",
          "tsunami": 0,
          "sig": 400,
          "net": "us",
          "code": "6000cb4i",
          "ids": "us6000cb4i",
          "sources": "us",
          "types": "origin,phase-data",
          "nst": null,
          "dmin": 11.379,
          "rms": 0.57,
          "gap": 141,
          "magType": "mb",
          "type": "earthquake",
          "title": "M 5.1 - 50 km WNW of Jiangyou, China",
          "geometry": {
            "type": "Point",
            "coordinates": [104.2181, 31.9295, 16.96]
          },
          "id": "us6000cb4i"
        },
        "type": "Feature",
        "properties": {
          "mag": 1.12,
          "place": "15km S of Trona, CA",
          "time": 1603334693410,
          "updated": 1603335588520,
          "tz": null,
          "url": "https://earthquake.usgs.gov/earthquakes/eventpage/ci39440895",
          "detail": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/ci39440895.geojson",
          "felt": null,
          "cdi": null,
          "mmi": null,
          "alert": null,
          "status": "reviewed",
          "tsunami": 0,
          "sig": 19,
          "net": "ci",
          "code": "39440895",
          "ids": "ci39440895",
          "sources": "ci",
          "types": "focal-mechanism,nearby-cities,origin,phase-data,scitech-link",
          "nst": 15,
          "dmin": 0.1147,
          "rms": 0.15,
          "gap": 131,
          "magType": "ml",
          "type": "earthquake",
          "title": "M 1.1 - 15km S of Trona, CA",
          "geometry": {
            "type": "Point",
            "coordinates": [-117.406, 35.6348333, 10.15]
          },
          "id": "ci39440895"
        },
        "type": "Feature",
        "properties": {
          "mag": 2,
          "place": "15km W of Ludlow, CA",
          "time": 1603334429420,
          "updated": 1603335569542,
          "tz": null,
          "url": "https://earthquake.usgs.gov/earthquakes/eventpage/ci39440887",
          "detail": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/ci39440887.geojson",
          "felt": null,
          "cdi": null,
          "mmi": null,
          "alert": null,
          "status": "reviewed",
          "tsunami": 0,
          "sig": 62,
          "net": "ci",
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          "ids": "ci39440887",
          "sources": "ci",
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          "dmin": 0.1323,
          "rms": 0.14,
          "gap": 148,
          "magType": "ml",
          "type": "earthquake",
          "title": "M 2.0 - 15km W of Ludlow, CA",
          "geometry": {
            "type": "Point",
            "coordinates": [-116.316667, 34.6976667, 3.3]
          },
          "id": "ci39440887"
        },
        "type": "Feature",
        "properties": {
          "mag": 0.3,
          "place": "30 km SSE of Mina, Nevada",
          "time": 1603333972210,
          "updated": 1603334302902,
          "tz": null,
          "url": "https://earthquake.usgs.gov/earthquakes/eventpage/nn00779882",
          "detail": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/nn00779882.geojson",
          "felt": null,
          "cdi": null,
          "mmi": null,
          "alert": null,
          "status": "automatic",
          "tsunami": 0,
          "sig": 340,
          "net": "nn",
          "code": "00779882",
          "ids": "nn00779882",
          "sources": "nn",
          "types": "origin,phase-data",
          "nst": 10,
          "dmin": 0.011,
          "rms": 0.03,
          "gap": 133.28,
          "magType": "ml",
          "type": "earthquake",
          "title": "M 0.3 - 30 km SSE of Mina, Nevada",
          "geometry": {
            "type": "Point",
            "coordinates": [-117.9923, 38.1273, 10.6]
          },
          "id": "nn00779882"
        },
        "type": "Feature",
        "properties": {
          "mag": 4.7,
          "place": "Reykjanes Ridge",
          "time": 1603333903888,
          "updated": 1603334600040,
          "tz": null,
          "url": "https://earthquake.usgs.gov/earthquakes/eventpage/us6000cb47",
          "detail": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/us6000cb47.geojson",
          "felt": null,
          "cdi": null,
          "mmi": null,
          "alert": null,
          "status": "reviewed",
          "tsunami": 0,
          "sig": 340,
          "net": "us",
          "code": "6000cb47",
          "ids": "us6000cb47",
          "sources": "us",
          "types": "origin,phase-data",
          "nst": null,
          "dmin": 9.792,
          "rms": 0.98,
          "gap": 119,
          "magType": "mb",
          "type": "earthquake",
          "title": "M 4.7 - Reykjanes Ridge",
          "geometry": {
            "type": "Point",
            "coordinates": [-35.4046, 53.0278, 10]
          },
          "id": "us6000cb47"
        },
        "type": "Feature",
        "properties": {
          "mag": 2,
          "place": "7 km NW of Fritz Creek, Alaska",
          "time": 1603333651473,
          "updated": 1603334659397,
          "tz": null,
          "url": "https://earthquake.usgs.gov/earthquakes/eventpage/ak020dlkfgbw",
          "detail": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/ak020dlkfgbw.geojson",
          "felt": null,
          "cdi": null,
          "mmi": null,
          "alert": null,
          "status": "automatic",
          "tsunami": 0,
          "sig": 62,
          "net": "ak",
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          "ids": "ak020dlkfgbw",
          "sources": "ak",
          "types": "origin",
          "nst": null,
          "dmin": null,
          "rms": 0.85,
          "gap": null,
          "magType": "ml",
          "type": "earthquake",
          "title": "M 2.0 - 7 km NW of Fritz Creek, Alaska",
          "geometry": {
            "type": "Point",
            "coordinates": [-151.3941, 59.784, 82.6]
          },
          "id": "ak020dlkfgbw"
        },
        "type": "Feature",
        "properties": {
          "mag": 2,
          "place": "7 km NW of Fritz Creek, Alaska",
          "time": 1603333651473,
          "updated": 1603334659397,
          "tz": null,
          "url": "https://earthquake.usgs.gov/earthquakes/eventpage/ak020dlkfgbw",
          "detail": "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/ak020dlkfgbw.geojson",
          "felt": null,
          "cdi": null,
          "mmi": null,
          "alert": null,
          "status": "automatic",
          "tsunami": 0,
          "sig": 62,
          "net": "ak",
          "code": "020dlkfgbw",
          "ids": "ak020dlkfgbw",
          "sources": "ak",
          "types": "origin",
          "nst": null,
          "dmin": null,
          "rms": 0.85,
          "gap": null,
          "magType": "ml",
          "type": "earthquake",
          "title": "M 2.0 - 7 km NW of Fritz Creek, Alaska",
          "geometry": {
            "type": "Point",
            "coordinates": [-151.3941, 59.784, 82.6]
          },
          "id": "ak020dlkfgbw"
        }
      ]
    }
  }
}
```

The link will open a GeoJSON document depicting all of the earthquakes that have taken place in the last hour.



GeoJSON is an open-standard format for representing simple geographical features, along with their non-spatial attributes, using JSON.

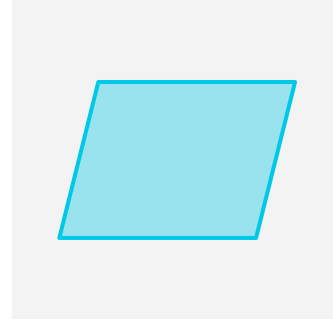
Different Types of Features



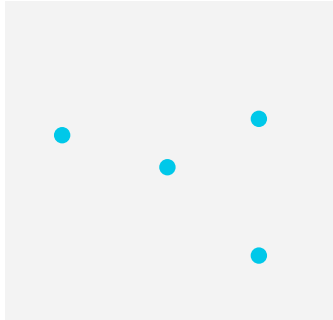
Point



LineString



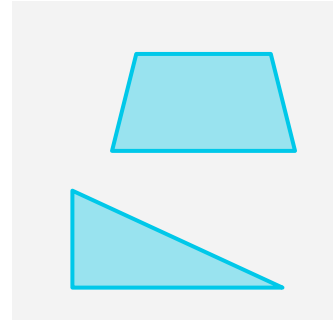
Polygon



MultiPoint



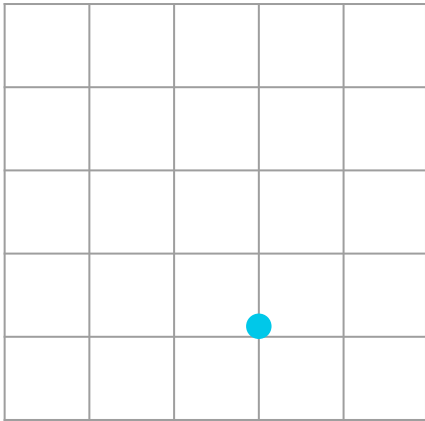
Multi LineString



Multi Polygon

GeoJSON

Geographical features are represented by coordinates and can have other properties attached to them.



```
{  
  "type": "Point",  
  "coordinates": [30, 10]  
}
```



**What type of geographical feature
is the GeoJSON earthquake data?**

It is "Point" Type

```
features: [
  - {
    type: "Feature",
    - properties: {
      mag: 0.77,
      place: "7km WNW of Cobb, CA",
      time: 1612474627850,
      updated: 1612474721741,
      tz: null,
      url: "https://earthquake.usgs.gov/earthquakes/eventpage/nc73518476",
      detail: "https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/nc73518476.geojson",
      felt: null,
      cdi: null,
      mmi: null,
      alert: null,
      status: "automatic",
      tsunami: 0,
      sig: 9,
      net: "nc",
      code: "73518476",
      ids: ",nc73518476,",
      sources: ",nc,",
      types: ",nearby-cities,origin,phase-data,",
      nst: 13,
      dmin: 0.008209,
      rms: 0.01,
      gap: 77,
      magType: "md",
      type: "earthquake",
      title: "M 0.8 - 7km WNW of Cobb, CA"
    },
    - geometry: {
      type: "Point",
      - coordinates: [
        -122.8000031,
        38.8351669,
        1.8
      ]
    }
  }
]
```

```
},
- geometry: {
  type: "Point",
  - coordinates: [
```




Where have we used this before?



**How does this activity equip us
for the Challenge?**



**What can we do if we don't
completely understand this?**



Everyone Do: GeoJSON activity

In this activity, we will be working with GeoJSON data to plot occurrences of earthquakes.

Suggested Time:
20 Minutes



Questions?



NYC Neighborhoods

20 minutes



Everyone Do: NYC Neighborhoods

In this activity, we will dive into some advanced Leaflet/GeoJSON functionality by building a map of New York City broken down by boroughs and neighborhoods.

Suggested Time:
25 Minutes



Questions?



Make Your Own Map

Time to Code

In **groups of 4-6**, we will be creating a **data visualization story** by plotting one or more of the provided **Boston GeoJSON datasets**.

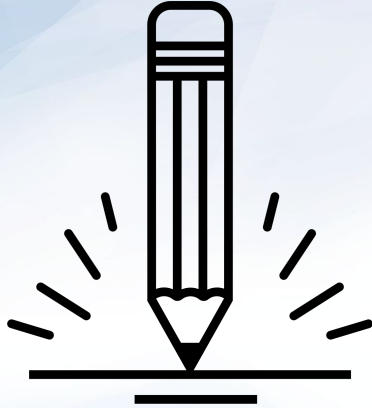
We will **present the visualizations** in the next activity.

Suggested Time:

30 Minutes

Present Your Map

Everyone Do: Map Presentations



In this activity, groups will present their data visualization story. Be sure to answer these questions in your presentation.

- Why did you choose the datasets you did for your story?
- How did you map the data?
- What does the mapped data show the viewer?

Suggested Time:
5 Minutes / Group



Questions?





Let's Review

Review the Skills We Covered Today

These are the lessons where these skills are used.



Lessons 13.5.1 - 13.5.6 *Mapping GeoJSON data*



Lesson 13.6.1 *Mapping earthquake data*



Lesson 13.6.2 *Adding a style to the map*



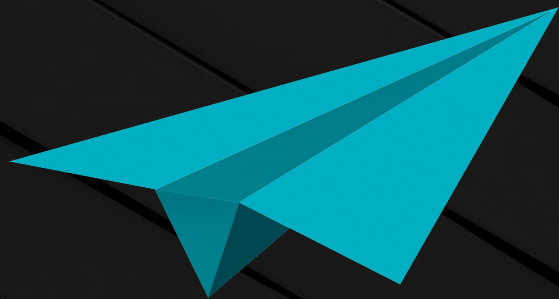
Lesson 13.6.3 *Adding a color to the map*



Lesson 13.6.4 *Adding an additional overlay*

Questions?





Office Hours

30 Minutes