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D3.js: Introduction to Mapping

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D3 v3

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Welcome to the Essential ArcGIS Task Sheet Series. This series supplements the Iowa State University Geospatial Technology Training Program short course series. The task sheets are designed to provide quick, easy instructions for performing mapping tasks.

D3.js is a web-based data visualization library that utilizes JavaScript, HTML, SVG and CSS to create a variety of data visualizations. D3.js is a powerful library with many uses. This task sheet specifically focus on the map making ability of D3.js and demonstrates how to make a web map using GeoJSON formatted geographic data, as well as introduce you to the wide range of projections that can be used to display a map in D3.js.

1. Introduction

a. D3 has an internal feature that turns GeoJSON data into screen coordinates. This is similar to other libraries such as Leaflet.js, but D3 doesn't constrain the map to a Web Mercator projection. Leaflet and D3.js can be combined very successfully to display choropleth maps.

b. If you have a local web sever set up on your computer use that to complete this task sheet. If you don't, you can still complete this tutorial, but you must use **Mozilla Firefox** or **Safari** as your web browser to view the map.

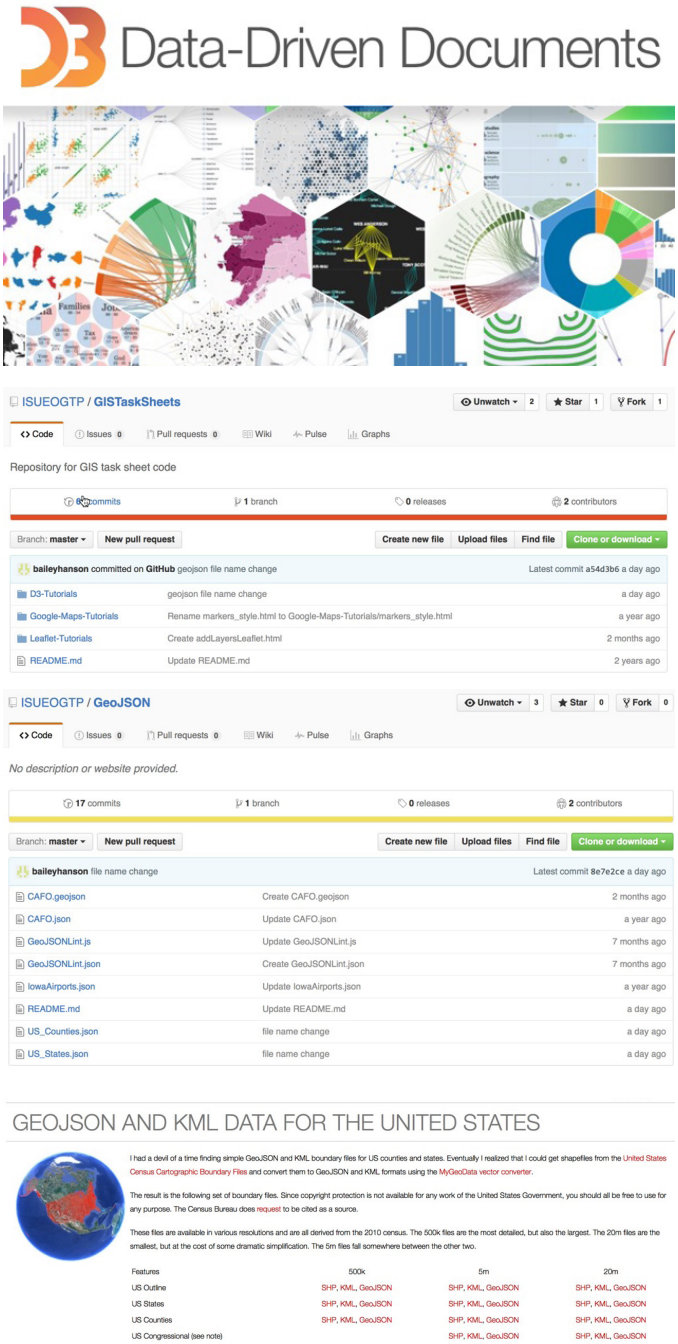
c. To open the HTML and GeoJSON files used in this task sheet you can use any of a variety of text editors such Notepad++ for Windows, or TextWrangler for Mac.

2. File and Directory Setup

a. Download the HTML file and GeoJSON files used in this task sheet from the Geospatial Tech Program's GitHub page at https://github.com/ISUEOGTP. Select the **GISTaskSheets** repository and click **Clone or download** and choose **Download ZIP**. Go back one page and do the same for the **GeoJSON** repository.

b. Create a folder on your computer called **D3_tasksheet** and move the **D3_tasksheet.html** file from the **GISTaskSheets** repository into that new folder. You will also need to move the **US_States.json**, and **US_Counties.json** files from the **GeoJSON** repository to the new **D3_tasksheet** folder. *Note: these GeoJSON files come from Eric Celeste's website at http://eric.clst.org/Stuff/USGeoJSON.*

c. Open **D3_tasksheet.html** in your text editor and then open it in your web browser. It may take several seconds but a map showing U.S. States and Counties should appear. *Hint: to open the HTML file with a different program than the default right-click and select Open with.*



3. The D3.js Code

a. In the **D3_tasksheet.html** file you will see basic HTML tags that define how the browser formats and displays the content. *Note: more information on HTML can be found here - http://www.w3schools.com/tags/tag_html.asp.*

b. Within the **<head>** tag there is a **script** tag that sets the reference to d3.v3.min.js (the minified version of the D3 JavaScript library). This is required to make the map.

```
<script src="https://d3js.org/d3.v3.min.js" charset="utf-8"></script>
```

c. Within the **<body>** tag is the JavaScript code that builds the map. First, **width** and **height** variables are defined in pixel units. This essentially creates the frame that the map is drawn within the browser.

d. The **projection** function defines the map projection as **d3.geo.albersUsa()**, then **.translate** is used as a pixel offset to ensure that the center of the projection is in the center of the viewing frame, and **.scale** essentially manipulates the extent, or zoom level of the map. *Note: D3 includes several common projections by default (https://github.com/d3/d3/wiki/Geo-Projections), while many more projections are provided by this external plugin (https://github.com/d3/d3-geo-projection/).*

```
var projection = d3.geo.albersUsa()
     .translate([width / 2, height / 2])
     .scale(1000);
```

e. The **path** function is defined and takes the GeoJSON features and translates it into SVG path code that is used by D3 to draw the map based on projection defined in the previous step.

```
var path = d3.geo.path()
     .projection(projection);
```

f. The **svg** variable is defined and the **usCountiesJSON** and **usStatesJSON** variables are defined and appended to the svg.

```
var svg = d3.select("body")
     .append("svg")
     .attr("width", width)
     .attr("height", height)

//This order defines the draw order on the map
var usCountiesJSON = svg.append("g")
var usStatesJSON = svg.append("g")
```

g. Since the GeoJSON data is in a separate file **d3.json()** is used twice to load in the external data files, once for **US_Counties.json** and once for **US_States.json**. Then the GeoJSON features are bound to the new path elements, creating one new path for each feature, and applying some styling attributes to each feature.

```
d3.json("US_Counties.json", function(json) {
    usCountiesJSON.selectAll("path")
        .data(json.features)
        .enter()
        .append("path")
        .attr("d", path)
        .style("stroke", "black")
        .style("stroke-width", [.3])
        .style("fill", "white")
        .style("fill-opacity", 0.5);
```

h. To explore the other projections defined in the **D3_tasksheet.html** file, comment out the first projection by putting **/*** and ***/** around the whole **projection** function. Do the same for the other projection functions below. *Note: Make sure only one projection is active at a time.*

```
var projection = d3.geo.albers()
     .translate([width / 2, height / 2])
     .scale(1000);
```

i. By commenting and uncommenting the projection functions. You will see many of the default D3 projections at different scales. *Note: depending on the projection, you may need to use both rotate and center to center the projection on your area of interest.*

Contact:

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