GIS Data Processing

11.S195: Computational Urban Science Workshop
Spring 2019, Nina Lutz

GIS Data

Geographic Information Systems

Basically anything that localizes data to a place on the Earth.

Population. Weather. Roads. Topology. Building footprints. Wind patterns. and so so much more

An Approach to Data

Data is fun! But…

Data itself doesn't matter.

Statistics, models, and research questions do. Stakeholders are people, not data.

Our goal is to teach you how to ask meaningful questions and make intelligent models before just diving into any data.

Sources & Tools

Google Earth

U.S. Department of Transportation

United States™ Census Bureau

OpenStreetMap
The Free Wiki World Map

NASA

QGIS® trademark

ArcGIS ESRI

SAGA
System for Automated Geoscientific Analyses

+ CODING :D

Data Formats

- A lot of big servers (Google Maps, OSM, etc) produce super messy XML or KML files that are not super human or code readable
- Fortunately, there are lots of free converters transform these into the two most commonly used formats: CSVs and JSONs/geoJSON

CSV

- Comma Separated Values. You can open these in Excel; they're just tables.

	A	B	C	D
1	shapeid	x	y	
2	0	-80.441822	27.86082	
3	0	-80.442029	27.861903	
4	0	-80.450323	27.875324	
5	0	-80.460144	27.89269	
6	0	-80.478132	27.923257	
7	0	-80.48996	27.943991	
8	0	-80.506672	27.97488	
9	0	-80.506749	27.975074	
10	0	-80.516403	27.994113	
11	0	-80.531596	28.02423	
12	0	-80.531711	28.024547	
13	0	-80.535394	28.032289	
14	0	-80.540226	28.04188	
15	0	-80.541629	28.04494	

	A	B	C	D	E	F	G	H	I
1	shapeid	GEOID10	NAMELSAD1	ALAND10	AWATER10	INTPTLAT10	INTPTLON10	DP0010001	DP0010002
2	0	1.201E+10	Census Tract	0	633328578	28.3327256	-80.545416	0	0
3	1	1.2009E+10	Census Tract	71273063	10847544	27.9648573	-80.581757	5492	253
4	2	1.2009E+10	Census Tract	70310565	5573522	27.848972	-80.552364	3646	57
5	3	1.2009E+10	Census Tract	14995558	113653	27.9839519	-80.645168	9330	669
6	4	1.2009E+10	Census Tract	47270318	0	27.9546545	-80.696293	12092	934
7	5	1.2009E+10	Census Tract	756444652	19364057	28.0356202	-80.813299	4294	154
8	6	1.2009E+10	Census Tract	15851843	43236128	27.9473366	-80.504706	4718	110
9	7	1.2009E+10	Census Tract	53601961	3717238	27.9098425	-80.56769	1513	29
10	8	1.2009E+10	Census Tract	20902507	33817	27.9395506	-80.652234	12266	805
11	9	1.2009E+10	Census Tract	5001502	2051830	27.8880104	-80.514685	5430	87
12	10	1.2009E+10	Census Tract	10939866	0	27.9376109	-80.634662	6760	402
13	11	1.2094E+10	Census Tract	10857502	327489	27.2637112	-80.815437	2095	139
14	12	1.2094E+10	Census Tract	0	256658077	27.0976791	-80.797641	0	0
15	13	1.2094E+10	Census Tract	83254484	26146434	27.1829011	-80.881432	1803	78
16	14	1.2094E+10	Census Tract	1057775291	15077398	27.5165836	-80.977437	2821	160
17	15	1.2094E+10	Census Tract	10834317	1799200	27.2159281	-80.775822	3423	198
18	16	1.2094E+10	Census Tract	12757734	1381269	27.22362	-80.815954	4221	240
19	17	1.2094E+10	Census Tract	16603104	329080	27.2236226	-80.848331	4801	261
20	18	1.2094E+10	Census Tract	22851190	162509	27.2637752	-80.887153	4568	429
21	19	1.2094E+10	Census Tract	88503568	5834634	27.2184018	-80.702809	3303	168
22	20	1.2094E+10	Census Tract	604803284	9972808	27.3731931	-80.810338	5770	259
23	21	1.2094E+10	Census Tract	58651576	421960	27.2975931	-80.868922	4598	471
24	22	1.2094E+10	Census Tract	24570586	454496	27.2301645	-80.75412	2593	256
25	23	1.2085E+10	Census Tract	6682432	21802833	27.2170851	-80.180876	2691	13
26	24	1.2085E+10	Census Tract	6730099	2198626	27.2325158	-80.27364	4848	192

JSON

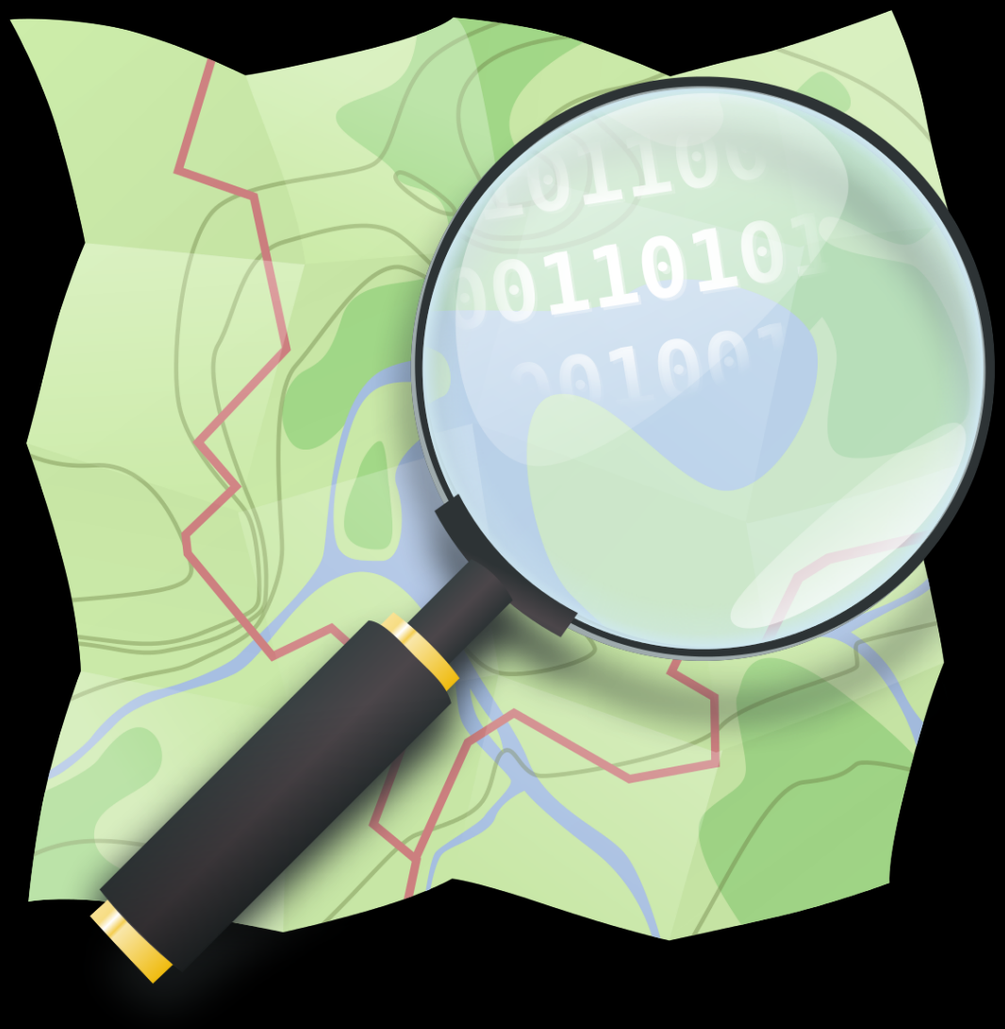
- This will be our main focus, at least for today as it has become more common and is a bit less intuitive.


```
{"type": "FeatureCollection",
    "features": [
     {
            "type": "Feature",
            "id": "node/365602150",
            "properties": {
                "type": "node",
                "id": "365602150",
                "tags": {
                    "amenity": "atm"
                },
                "relations": [],
                "meta": {
                    "timestamp": "2016-08-01T02:18:51Z",
                    "version": "2",
                    "changeset": "41158062",
                    "user": "Extant",
                    "uid": "1198553"
                }
            },
            "geometry": {
                "type": "Point",
                "coordinates": [
                    -71.0944639,
                    42.359031
                ]
            }
        },
```

Data Types

Point	Line	Polygon
POV	Way	Building, region, etc

Open Source — Open Street Map



“OpenStreetMap is a map of the world, created by people like you and free to use under an open license.”

Tutorial Time