Air Quality

Team Members

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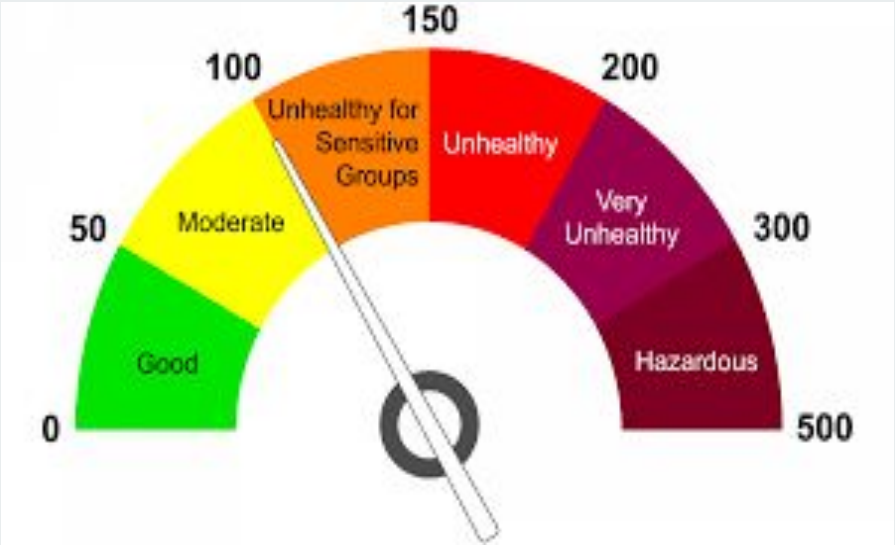


Introduction

Air quality is more important today than ever before.

- Referenced as an indicator of our environmental health
- Correlated to individual health outcomes in certain geographic regions

The focus of our project is identifying the places in the United States with the best air quality.

Project Focus

Where can we find the best air quality in the United States?

Are the outcomes surprising?

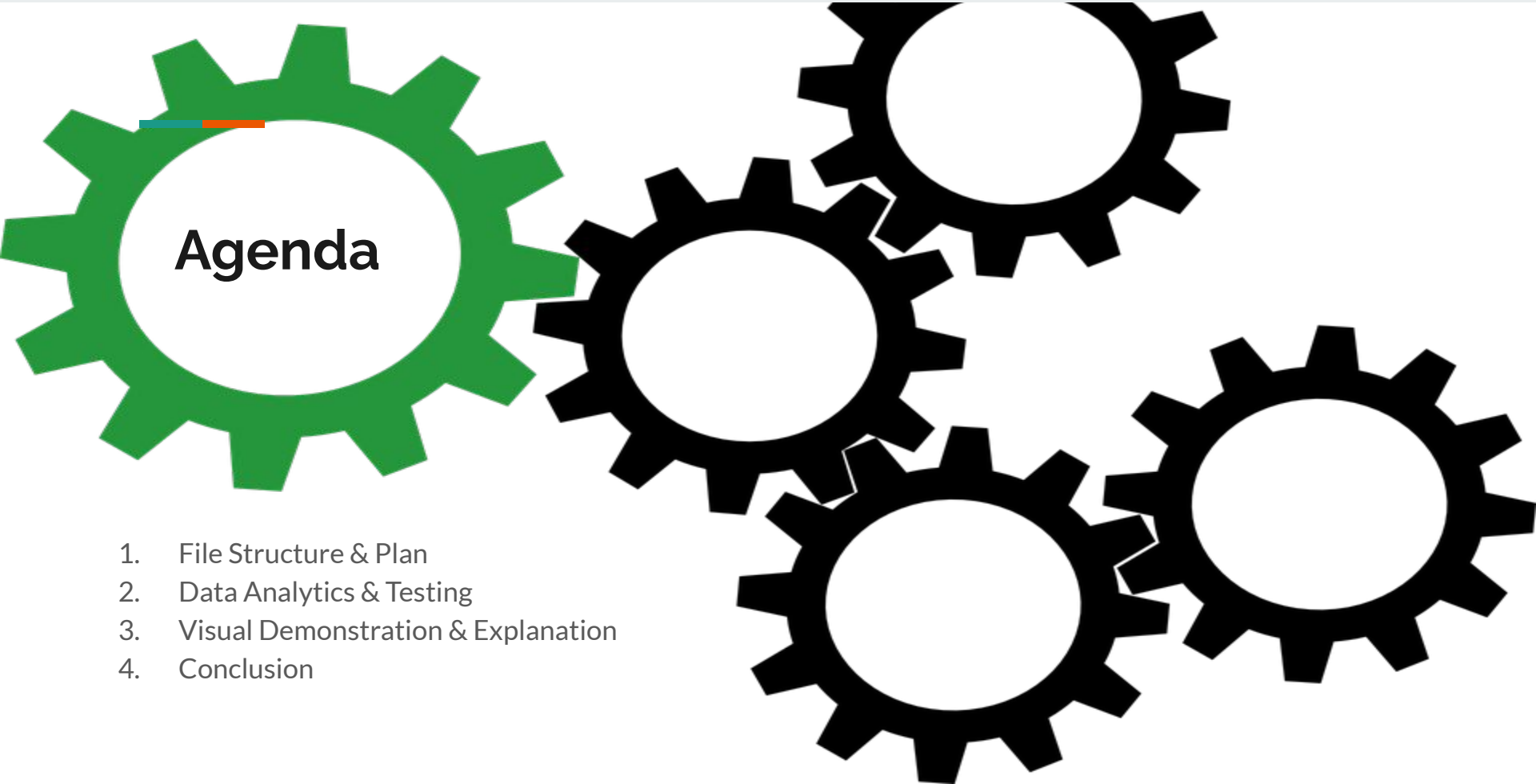
What additional insight can we gain from the data collected?

Data Source:

EPA Outdoor Air Quality

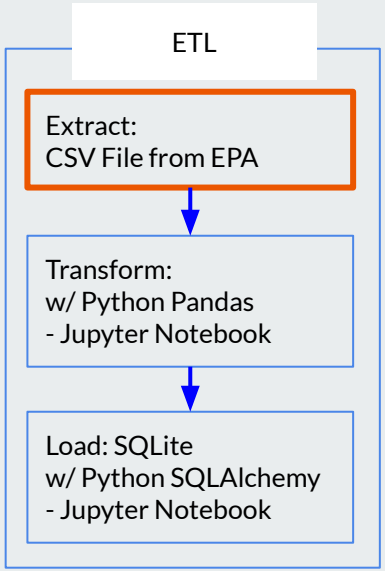
Date Range: Jan - Dec 2019

Agenda



1. File Structure & Plan
2. Data Analytics & Testing
3. Visual Demonstration & Explanation
4. Conclusion

File Structure & Plan

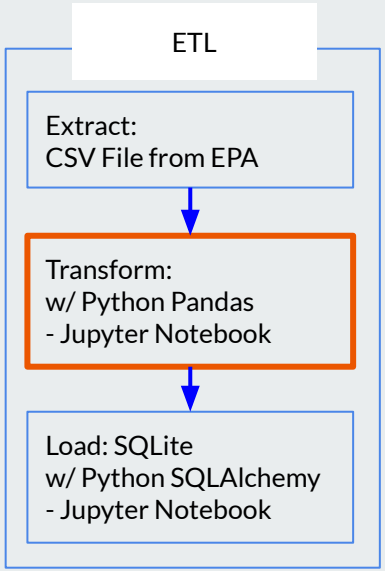


	State Code	County Code	Site Num	State Name	City Name	POC	Latitude	Longitude	Parameter Name	Arithmetic Mean
0	1	3	10	Alabama	Fairhope	1	30.497478	-87.880258	Ozone	0.044808
1	1	3	10	Alabama	Fairhope	1	30.497478	-87.880258	Ozone	0.040390
2	1	3	10	Alabama	Fairhope	1	30.497478	-87.880258	Ozone	0.040390
3	1	3	10	Alabama	Fairhope	1	30.497478	-87.880258	Ozone	0.040489
4	1	3	10	Alabama	Fairhope	1	30.497478	-87.880258	PM2.5 - Local Conditions	7.551402
...	...	...	...	...	...	...	...	...	...	...
62949	80	2	24	Country Of Mexico	Mexicali	1	32.654420	-115.407267	PM10 - LC	52.678571
62950	80	26	8012	Country Of Mexico	NaN	1	32.466389	-114.768611	Ozone	0.050774
62951	80	26	8012	Country Of Mexico	NaN	1	32.466389	-114.768611	Ozone	0.045271
62952	80	26	8012	Country Of Mexico	NaN	1	32.466389	-114.768611	Ozone	0.045271
62953	80	26	8012	Country Of Mexico	NaN	1	32.466389	-114.768611	Ozone	0.045291

62954 rows × 55 columns

Data Frame 1: Sample Locations Map
Data Frame 2: Graphs to show each state's mean of Ozone and PM2.5

File Structure & Plan

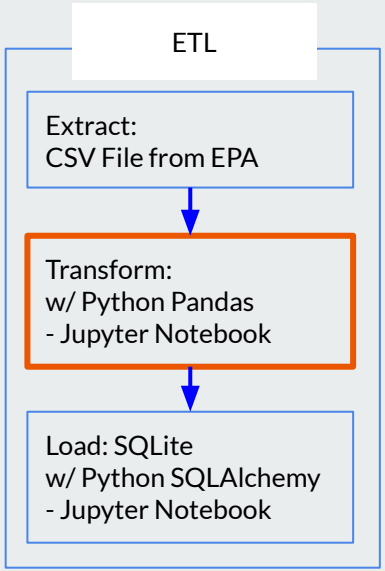


Data Frame 1: Sample Locations Map

	State Code	County Code	Site Num	state	city	latitude	longitude
3	1	3	10	Alabama	Fairhope	30.497478	-87.880258
15	1	33	1002	Alabama	Muscle Shoals	34.762619	-87.638097
27	1	49	9991	Alabama	Crossville	34.289001	-85.970065
31	1	51	4	Alabama	Wetumpka	32.535680	-86.255193
46	1	55	11	Alabama	Southside	33.904039	-86.053867
...	...	...	...	...	...	...	...
62653	56	45	3	Wyoming	NaN	43.873056	-104.191944
62702	72	21	10	Puerto Rico	Bayamon	18.420089	-66.150615
62816	72	33	8	Puerto Rico	Catano	18.440774	-66.126531
62858	72	97	7	Puerto Rico	Mayaguez	18.216038	-67.144107
62953	80	26	8012	Country Of Mexico	NaN	32.466389	-114.768611

1287 rows

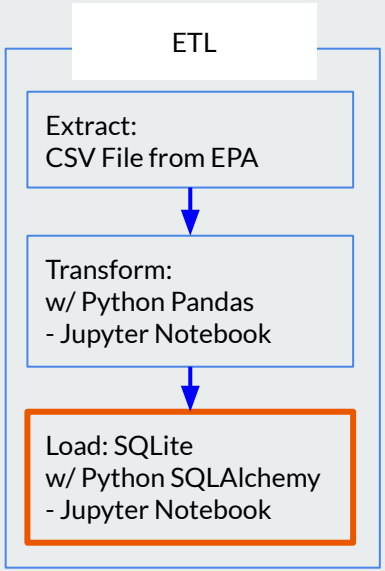
File Structure & Plan



Data frame 2: Graphs to show each state's mean of Ozone and PM2.5

	state	count_ozone	mean_ozone	min_ozone	max_ozone	count_pm	mean_pm	min_pm	max_pm
0	Alabama	22.0	0.041233	0.036283	0.045025	17.0	8.318954	7.213235	10.310833
1	Alaska	2.0	0.028851	0.023862	0.033841	9.0	9.072469	6.076667	15.206647
2	Arizona	54.0	0.047179	0.039959	0.052386	7.0	6.478174	1.881818	11.372951
3	Arkansas	8.0	0.039501	0.035541	0.042022	13.0	8.532442	7.524490	10.339831
4	California	175.0	0.043045	0.020109	0.060326	79.0	8.504724	3.141667	13.752975
5	Colorado	34.0	0.046275	0.038922	0.055680	13.0	5.856631	2.500000	9.488525
6	Connecticut	12.0	0.044233	0.038413	0.047632	8.0	5.605916	3.800833	6.378947
7	Country Of Mexico	1.0	0.045291	0.045291	0.045291	NaN	NaN	NaN	NaN
8	Delaware	7.0	0.043504	0.038480	0.045541	5.0	6.955217	6.246667	7.584589
9	District Of Columbia	3.0	0.042532	0.039082	0.046775	8.0	8.231982	7.868539	8.871350
10	Florida	58.0	0.036935	0.032443	0.040340	16.0	6.501624	5.304167	7.599167
11	Georgia	19.0	0.042615	0.038905	0.048131	19.0	8.239874	6.032143	9.516529
12	Hawaii	2.0	0.028131	0.027407	0.028854	14.0	2.257113	-1.006569	3.413313
13	Idaho	4.0	0.037204	0.027357	0.045691	9.0	7.711406	3.927479	10.070809
14	Illinois	37.0	0.042183	0.036436	0.046485	20.0	8.994997	7.542609	11.235714
15	Indiana	42.0	0.041999	0.036937	0.045314	29.0	8.878872	7.405556	11.947826
16	Iowa	24.0	0.039067	0.035571	0.041167	18.0	7.662622	6.426316	8.971667
17	Kansas	9.0	0.040748	0.036339	0.042950	3.0	6.769063	5.300612	7.613636
18	Kentucky	29.0	0.042798	0.039145	0.045559	16.0	7.412974	5.683471	9.365289
19	Louisiana	22.0	0.036913	0.031672	0.039979	14.0	8.034201	6.790435	10.695798
20	Maine	16.0	0.035985	0.030483	0.039669	10.0	4.950419	3.327928	6.581034
21	Maryland	20.0	0.045337	0.040863	0.050029	4.0	7.898773	6.769421	8.320000
22	Massachusetts	17.0	0.040428	0.033721	0.044742	11.0	5.133052	4.535714	5.702632
23	Michigan	29.0	0.039299	0.034050	0.042888	17.0	7.803161	4.981633	10.778095
24	Minnesota	17.0	0.036065	0.033032	0.039505	10.0	6.790725	4.100000	8.983333
25	Mississippi	10.0	0.039833	0.036517	0.042344	1.0	8.160870	8.160870	8.160870
26	Missouri	44.0	0.041933	0.037109	0.044909	1.0	9.118362	9.118362	9.118362
27	Montana	7.0	0.040850	0.037221	0.042931	3.0	2.386412	0.915000	3.288235
28	Nebraska	5.0	0.037457	0.034362	0.040873	6.0	6.092896	4.835398	6.885965
29	Nevada	23.0	0.045464	0.038997	0.052000	8.0	5.289804	3.841011	7.133913
30	New Hampshire	12.0	0.037441	0.033652	0.040808	5.0	4.287425	3.240000	6.191667
31	New Jersey	17.0	0.041729	0.035237	0.044742	17.0	7.287810	5.553097	9.057522
32	New Mexico	21.0	0.046998	0.043197	0.050331	9.0	5.870615	2.874294	7.733333
33	New York	31.0	0.039499	0.031692	0.044914	22.0	6.531111	2.846000	8.613223
34	North Carolina	38.0	0.044162	0.037142	0.047727	12.0	7.212124	5.717391	8.600000
35	North Dakota	10.0	0.039309	0.034669	0.041431	1.0	5.260331	5.260331	5.260331
36	Ohio	51.0	0.043377	0.036034	0.047448	43.0	8.276093	6.240984	11.730000
37	Oklahoma	21.0	0.041739	0.037958	0.045789	7.0	7.363568	6.781667	8.346371
38	Oregon	10.0	0.034797	0.028711	0.042454	13.0	8.070008	6.486777	10.442936
39	Pennsylvania	53.0	0.041789	0.036704	0.046571	22.0	8.715306	6.813793	12.162185
40	Puerto Rico	3.0	0.009614	0.005862	0.013117	7.0	6.505403	5.303571	7.487179
41	Rhode Island	3.0	0.043960	0.041977	0.045803	4.0	5.811671	3.922701	8.308523
42	South Carolina	18.0	0.044773	0.035090	0.048253	11.0	7.552915	6.936970	8.174336
43	South Dakota	6.0	0.042235	0.037986	0.047916	3.0	5.552579	4.996721	5.900000
44	Tennessee	23.0	0.043801	0.039979	0.047591	12.0	7.802612	7.343333	8.495628
45	Texas	74.0	0.039252	0.031203	0.047490	23.0	8.264313	5.642816	10.694986
46	Utah	31.0	0.043833	0.026033	0.050271	15.0	5.924586	0.603333	9.003562
47	Vermont	3.0	0.037228	0.036717	0.037517	2.0	4.727939	3.436522	6.019355
48	Virginia	23.0	0.042613	0.038927	0.045750	18.0	6.897253	6.252101	7.980342
49	Washington	13.0	0.034279	0.025693	0.043616	3.0	7.805554	5.937624	8.891150
50	West Virginia	11.0	0.041749	0.038018	0.044308	13.0	8.042143	6.986555	9.599145
51	Wisconsin	31.0	0.038586	0.034555	0.042722	2.0	7.361398	6.711321	8.011475
52	Wyoming	32.0	0.047063	0.040824	0.052138	14.0	3.833899	1.830063	7.655556
53	Virgin Islands	NaN	NaN	NaN	NaN	1.0	8.218284	8.218284	8.218284

File Structure & Plan



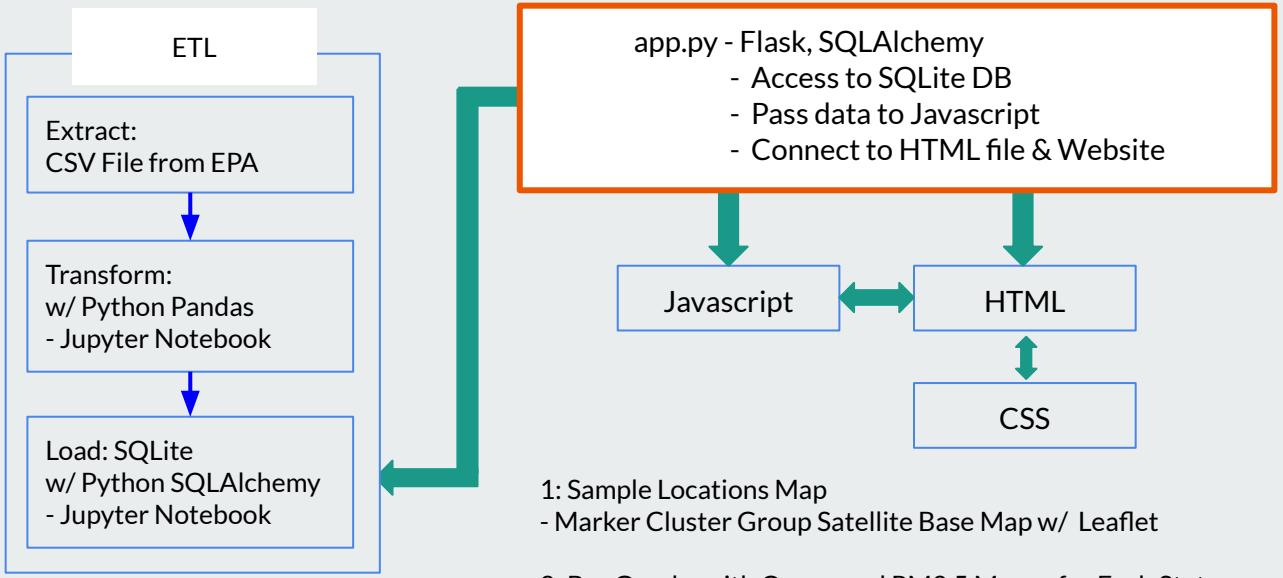
I. FILE

aqifinal.sqlite - 184.0KB

III. RESULT

name	sql
ozone	CREATE TABLE ozone ("index" BIGINT, state TEXT, city TEXT, latitude FLOAT, longitude FLOAT, pollutant TEXT, average FLOAT)
merged_state_mean	CREATE TABLE merged_state_mean ("index" BIGINT, state TEXT, count_ozone FLOAT, mean_ozone FLOAT, min_ozone FLOAT, max_ozone FLOAT, count_pm FLOAT, mean_pm FLOAT, min_pm FLOAT, max_pm FLOAT)

File Structure & Plan



1: Sample Locations Map
- Marker Cluster Group Satellite Base Map w/ Leaflet

2: Bar Graphs with Ozone and PM2.5 Means for Each State
- myChart.js w/ Dropdown Chart Updates Option

```python
from sqlalchemy import create_engine, func
import sqlite3
import os
import pandas as pd
from flask_sqlalchemy import SQLAlchemy

app = Flask(__name__, template_folder='templates')
app.config['SQLALCHEMY_DATABASE_URI'] = 'sqlite:///aqifinal.sqlite'
db = SQLAlchemy(app)
db.Model.metadata.reflect(db.engine)

################
# Flask Routes
##############
#create route for homepage that displays the heat map
@app.route("/")
def home():
    return render_template("index.html")

@app.route("/mean")
def mean():
    # Query Aqidata
    rows = Aqi.query.all()
    return jsonify([row.as_dict() for row in rows])

@app.route("/ozone")
def ozone():
    # Query ozone data
    rows = Ozone.query.all()
    points =[]
    for row in rows:
        points.append({
            "type":"Feature",
            "geometry": {
                "type": "Point",
                "coordinates": [row.Longitude, row.Latitude]},
            "properties": {
                "stateName":row.State,
                "cityName": row.City},
            })
    return jsonify(points)

# #create another route that will display the js graphs
@app.route("/graphs")
def graph():
    return render_template('indexStateMean2.html')

@app.route("/map")
def map():
    return render_template('indexSamples.html')

if __name__=="__main__":
    app.run(debug=True)
```