Project 3: OpenStreetMap Data Wrangling with SQL

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Map Area: Freetown, Sierra Leone; I chose this because it is my hometown.

Location: Freetown, Sierra Leone

OpenStreetMap Url

MapZen URL

1. Data Audit

The XML file uses different types of tags so using ElementTree to parse the dataset and count number of the unique tags using mapparser.py .

```
{'bounds': 1,
 'member': 356,
 'nd': 1000732,
 'node': 820215,
 'osm': 1,
 'relation': 99,
 'tag': 199055,
 'way': 171156}
```

Patterns in the Tags

The "k" value of each tag contain different patterns. Using tags.py, I created 3 regular expressions to check for certain patterns in the tags. I have counted each of four tag categories.

```
{'lower': 195953, 'lower_colon': 754, 'other': 2346, 'problemchars': 2}
```

{'lower': 195953- for tags that contain only lowercase letters and are valid,

'lower_colon': 754- for otherwise valid tags with a colon in their names,

'other': 2346- for tags with problematic characters, and

'problemchars': 2 - for other tags that do not fall into the other three categories}

2. Problems Encountered in the Map

Street address inconsistencies

The main problem we encountered in the dataset is the street name inconsistencies. Below is the old name corrected with the better name. Using audit.py , we updated the names.

Abbreviations / Incomplete Street Name

```
runfile('C:/Udacity/audit1.py', wdir='C:/Udacity')

{'Circular': set(['Circular Road']),

'Cockle': set(['Cockle Bay Road']),

'College': set(['College Road']),

"Derick's": set(["Derick's Drive"]),

'Gordon': set(['Gordon Drive']),

'Lab': set(['Lab Lane']),

'Main': set(['Main Road Juba Hill']),

'Mamba': set(['Mamba Ridge']),

'New': set(['New Low Cost Housing']),

'Off': set(['Off Cape Road']),

'Pine': set(['Pine Street']),

'Priscilla': set(['Priscilla Street']),

'Regent': set(['Regent Road']),

'Sackville': set(['Sackville Lane']),

'Samercy': set(['Samercy Place']),

'Spur': set(['Spur Loop', 'Spur Road']),

'Wilberforce': set(['Wilberforce Street']),

'Wilkinson': set(['Wilkinson Road',

   'Wilkinson Road, Brinsley Johnson Drive']),

'Williams': set(['Williams Street'])}

Wilberforce Street => Wilberforce Street

Off Cape Road => Off Cape Road

Williams Street => Williams Street
```

College Road => College Road

Derick's Drive => Derick'S Drive

Regent Road => Regent Road

Main Road Juba Hill => Main Road Juba Hill

Lab Lane => Lab Lane

Cockle Bay Road => Cockle Bay Road

Sackville Lane => Sackville Lane

Gordon Drive => Gordon Drive

Samercy Place => Samercy Place

New Low Cost Housing => New Low Cost Housing

Mamba Ridge => Mamba Ridge

Pine Street => Pine Street

Wilkinson Road, Brinsley Johnson Drive => Wilkinson Road, Brinsley Johnson Drive

Wilkinson Road => Wilkinson Road

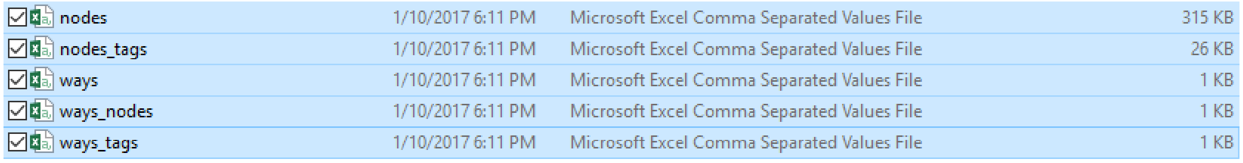
Spur Road => Spur Road

Spur Loop => Spur Loop

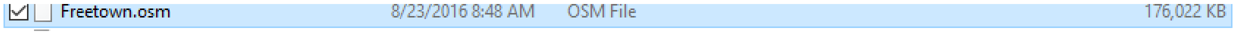
Priscilla Street => Priscilla Street

Circular Road => Circular Road

3. Data Overview



☑ nodes	1/10/2017 6:11 PM	Microsoft Excel Comma Separated Values File	315 KB
☑ nodes_tags	1/10/2017 6:11 PM	Microsoft Excel Comma Separated Values File	26 KB
☑ ways	1/10/2017 6:11 PM	Microsoft Excel Comma Separated Values File	1 KB
☑ ways_nodes	1/10/2017 6:11 PM	Microsoft Excel Comma Separated Values File	1 KB
☑ ways_tags	1/10/2017 6:11 PM	Microsoft Excel Comma Separated Values File	1 KB



☑ Freetown.osm	8/23/2016 8:48 AM	OSM File	176,022 KB

Number of Nodes

sqlite> SELECT COUNT(*) FROM nodes;

Number of nodes: 3891

Number of ways

```
sqlite> SELECT COUNT(*) FROM ways;
```

Number of ways: 171156

Number of Unique users:

```
sqlite> SELECT COUNT(DISTINCT(a.uid)) FROM (SELECT uid FROM nodes UNION ALL SELECT
uid FROM ways) a;
```

Number of unique users: 124

Top contributing Users

```
sqlite> SELECT a.user, COUNT(*) as num FROM (SELECT user FROM nodes UNION ALL SELECT
user FROM ways) a GROUP BY a.user ORDER BY num DESC LIMIT 10;
```

```
Dave Stanley|871

Waldrenner|399

vichada|325

bdiscoe|166

vaust|164

omegahacker|160

Russ|118

West Lake|118

LauraWright|110

Coastlines-RJB|100
```

Numbers of users contributing only once

```
sqlite> SELECT COUNT(*) FROM    (SELECT a.user, COUNT(*) as num     FROM (SELECT user
FROM nodes UNION ALL SELECT user FROM ways) a     GROUP BY a.user     HAVING num=1) b;
```

Number of users contributing once: 26

4. Additional Data Exploration

Common amenities

```
sqlite> SELECT value, COUNT(*) as num FROM nodes_tags WHERE key='amenity' GROUP BY value ORDER BY num DESC LIMIT 10;
```

Output:

```
fuel|3
restaurant|1
```

Biggest Religion

```
sqlite> SELECT nodes_tags.value, COUNT(*) as num FROM nodes_tags JOIN (SELECT DISTINCT(id) FROM nodes_tags WHERE value='place_of_worship') i    ON nodes_tags.id=i.id WHERE nodes_tags.key='religion' GROUP BY nodes_tags.value ORDER BY num DESC LIMIT 1;
```

Output:

Popular Cuisine

```
sqlite> SELECT nodes_tags.value, COUNT(*) as num FROM nodes_tags JOIN (SELECT DISTINCT(id) FROM nodes_tags WHERE value='restaurant') a   ON nodes_tags.id=a.id WHERE nodes_tags.key='cuisine' GROUP BY nodes_tags.value ORDER BY num DESC;
```

Output:

5. Conclusion

The database was created with a clean data by updating the street names, curbing abbreviations, extra spaces etc. I noticed that the contributing users are so many so my thought to be able to get clean data is :- there has to be a standard for inputting data, throw in some exception handlers that will send out error if a certain filed/ values does not meet data type specifications. This I think will curb abbreviations, extra space, typos and some character types also maybe a monitor system to check everybody's contribution regularly be put in place. Openstreet Map should set a regular updating system to get current information of cities.

Benefits:

- By ensuring a clean data is available for any analysis, it will give users the courage to want to find out about my hometown Freetown, without the hassle of having to clean the data ie for those who know how to and for those who might forget about cleaning data before analyzing it they can avoid errors in their reports

- A current and up to date data will put Freetown in a better view in the world, the world will see the progress it is making however small

Anticipated Problems:

- It might be a little difficult for the custodians of openstreet map to set exception handlers as that will be a complete overhauling of their system, this will incur cost which I believe a free site would not want to shoulder, so users use the information at their own risk

- Getting current and up to date data is somehow farfetched as the country under observation too I believe do not have a good culture of recording data. Most of their data are difficult to get in soft copy.

Files:
Quiz/ : scripts completed in lesson Case Study OpenStreetMap
README.md : this file freetown.osm :
sample data of the OSM file
sample.py : extract sample data from the OSM file
tags.py : count multiple patterns in the tags
mapparser.py : find unique tags in the data
audit1.py : audit street, city and update their names
data_process.py : build CSV files from OSM and also parse, clean and shape data
schema.py: to enable import schema
database.py : create database of the CSV files
query.py : different queries about the database using SQL